Project Manual

FULLER MIDDLE SCHOOL

31 Flagg Drive
Framingham, Massachusetts

prepared by:

Jonathan Levi Architects, LLP
266 Beacon Street
Boston, Massachusetts 02116

Date of Issue:
November 22, 2019

Volume 1 of 3 Divisions 00 to 05

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PROJECT DIRECTORY

OWNER

City of Framingham
c/o City of Framingham School Building Committee (SBC)
73 Mt. Wayte Avenue
Framingham, Massachusetts 01702

OWNER'S PROJECT MANAGER

SMMA / Symmes Maini & McKee Associates
1000 Massachusetts Avenue
Cambridge, Massachusetts 02138

CONSTRUCTION MANAGER

Consigli Construction Company
72 Sumner Street
Milford, Massachusetts 01757

ARCHITECT

Jonathan Levi Architects
266 Beacon Street
Boston, Massachusetts 02116

CONSULTANTS

LANDSCAPE ARCHITECTS

CBA Landscape Architects, LLC
24 Thorndike Street, 4th Floor
Cambridge, Massachusetts 02141

GEOENVIRONMENTAL ENGINEER

McPhail Associates, LLC
2269 Massachusetts Avenue
Cambridge, Massachusetts 02140

GEOTECHNICAL ENGINEER

RSE Associates, Inc.
63 Pleasant Street
Watertown, Massachusetts 02472

HAZARDOUS MATERIALS ENGINEER

CDW Consultants, Inc.
6 Huron Drive
Natick, Massachusetts 01760

SUSTAINABLE DESIGN CONSULTANTS

The Green Engineer
23 Bradford Street, 1st Floor
Concord, Massachusetts 01742

STRUCTURAL ENGINEERING

RSE Associates, Inc.
63 Pleasant Street
Watertown, Massachusetts 02472

DOOR HARDWARE CONSULTANT

Allegion, PLC
77 Wexford Street
Needham, Massachusetts 02494

THEATER CONSULTANT

Theatre Projects Consultants
47 Water Street
Norwalk, Connecticut 06854

FOOD SERVICE CONSULTANT

Crabtree McGrath Associates, Inc.
161 West Main Street
Georgetown, Massachusetts 01833

ELEVATOR CONSULTANT

Van Deusen & Associates
101 Summer Street, 4th Floor
Boston, Massachusetts 02210

PLUMBING & FIRE PROTECTION ENGINEER

AKAL Engineering, Inc.
44 Central Street, Unit 4
Berlin, Massachusetts 01503

MECHANICAL AND ELECTRICAL, ENGINEERING

Garcia, Galuska & DeSousa, Inc.
370 Faunce Corner Road, Suite D
Dartmouth, Massachusetts 02747

AUDIO/VISUAL CONSULTANT

Acentech
33 Moulton Street
Cambridge, Massachusetts 02747

ACOUSTICAL CONSULTANT

Acentech Inc.
33 Moulton Street
Cambridge, Massachusetts 02138

COST ESTIMATING CONSULTANT

Miyakoda Consulting, Inc.
P.O. Box 47
Raynham, Massachusetts 02767

TRAFFIC CONSULTANT

Pare Corporation.
10 Lincoln Road, Suite 103
Foxboro, Massachusetts 02035

SPECIFICATIONS CONSULTANT

Wil-Spec LLC
345 Main Street
Boxford, Massachusetts 01921

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ECSP = Early Concrete and Steel Package, issued August 9, 2019 (Bid Package 2)
CD = Construction Document Submission, issued November 22, 2019

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VOLUME 3 *(DIVISIONS 26 THROUGH 33 + APPENDICES)*

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05/10/19	ESP	Section 33 10 00	Water Utilities
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Document 00 11 16

INVITATION TO BID

The City of Framingham, acting through the City of Framingham School Building Committee (SBC), invites sealed bids for the Fuller Middle School at 31 Flagg Drive, Framingham, Massachusetts in accordance with Contract Documents prepared by Jonathan Levi Architects, LLP., Boston, Massachusetts, dated November 22, 2019.

General Project Description: The Project consists of a new Middle School having a multi-story common atrium area in its center, with classrooms abutting along the edges, with study pods located throughout.. Demolition of the existing school and final development of the site will occur after the new Fuller Middle School (Phase 2) is occupied.

The Project Team includes:

Architect: Jonathan Levi Architects, LLP., Boston, Massachusetts

Owner's Project Manager (OPM): SMMA / Symmes Maini & McKee Associates

Construction Management Team: Consigli Construction Company

ONLY PRE-QUALIFIED TRADE CONTRACTORS CAN BID ON THIS PROJECT: Each Trade Contractor must submit with its bid a copy of the Certificate of Eligibility from the Division of Capital Asset Management and Maintenance (DCAMM) and a completed "*Update Statement"*, with its bid. Trade Contractors failing to submit with their Bids, both the *Certificate of Eligibility* and *Update Statement*, will be rejected for failure to comply with statutory bidding requirements.

Trade Contractors will be required for the Work of the following Classes of Work (trades):

MASONRY as specified under Section 04 00 01 – MASONRY TRADE CONTRACT REQUIREMENTS, and the associated sections listed in Section 04 00 01.

MISCELANEOUS METALS AND ORNAMENTAL IRON as specified under Section 05 00 01 – MISCELANEOUS METALS AND ORNAMENTAL IRON TRADE CONTRACT REQUIREMENTS, and the associated sections listed in Section 05 00 01.

WATERPROOFING, DAMPPROOFING AND CAULKING as specified under Section 07 00 01 – WATERPROOFING, DAMPPROOFING AND CAULKING TRADE CONTRACT REQUIREMENTS, and the associated sections listed in Section 07 00 01.

ROOFING AND FLASHING as specified under Section 07 00 02 – ROOFING AND FLASHING TRADE CONTRACT REQUIREMENTS, and the associated sections listed in Section 07 00 02.

METAL WINDOWS as specified under Section 07 00 02 – METAL WINDOWS TRADE CONTRACT REQUIREMENTS, and the associated sections listed in Section 07 00 02.

GLAZING as specified under Section 08 80 00 – GLAZING.

TILE as specified under Section 09 00 03 – METAL WINDOWS TRADE CONTRACT REQUIREMENTS, and the associated sections listed in Section 07 00 02.

RESILIENT FLOORING as specified under Section 09 00 06 – RESILIENT FLOORING TRADE CONTRACT REQUIREMENTS, and the associated sections listed in Section 07 00 02.

ACOUSTICAL TILE as specified under Section 09 51 00 – ACOUSTICAL CEILINGS.

PAINTING as specified under Section 09 00 09 – PAINTING TRADE CONTRACT REQUIREMENTS, and the associated sections listed in Section 07 00 02.

ELEVATORS as specified under Section 14 21 00 – ELEVATORS.

FIRE PROTECTION as specified under Section 21 00 01 – FIRE PROTECTION TRADE CONTRACT REQUIREMENTS, and the associated sections listed in Section 21 00 01.

PLUMBING as specified under Section 22 00 01 - PLUMBING TRADE CONTRACT REQUIREMENTS, and the associated sections listed in Section 22 00 01.

HEATING, VENTILATING AND AIR CONDITIONING as specified under Section 23 00 01 – HEATING, VENTILATING AND AIR CONDITIONING TRADE CONTRACT REQUIREMENTS, and the associated sections listed in Section 23 00 01.

ELECTRICAL as specified under Section 26 00 01 - ELECTRICAL TRADE CONTRACT REQUIREMENTS, and the associated sections listed in Section 26 00 01.

TRADE CONTRACT BIDS will be received until 11:00 AM (local time), FRIDAY, DECEMBER 20, 2019

⊕Official time is that of Awarding Authority at location of bid receipt; no late bids will be accepted.

Bidding procedures and award of Trade Contracts are subject to the provisions of the General Laws of the Commonwealth of Massachusetts (MGL) including but not limited to c.149, §44A to §44J inclusive; applicable sections of MGL c.30.

A. PRE-BID CONFERENCE:

A pre-bid conference will be held on Tuesday. December 3, 2019 at 9:30AM. local time at the job-site location, 31 Flagg Drive, Framingham, Massachusetts. All bidders are strongly encouraged to attend.

B. AVAILABILITY OF DOCUMENTS:

Bidding Documents will be available after 2:00 PM on November 22, 2019. Bidding Documents and issued Addenda may be obtained from BFS Business Printing located at 76 South Street, Boston MA., 02111 and may be seen online, and

electronically downloaded free by registering at www.bfsplanroom.com. Click on project name, then bidders will be required to register themselves by creating a user login with password in order to download the Bid Documents.

Bidders requiring hardcopy (paper copy) of Bidding Documents and Agenda can obtain documents upon deposit of cash, check or money order payable to the "*City of Framingham*" in the amount of Two-Hundred Dollars ($200.00) per set. The deposits will be refunded upon return of the documents in good condition within thirty (30) calendar days after opening of Trade Contract Bids, otherwise the deposit shall be the property of the Awarding Authority.

Additional sets may be purchased from the Awarding Authority upon payment of Two-Hundred Dollars ($200.00) per set, non-refundable.

C. REQUESTS FOR INFORMATION AND INTERPRETATION:

For Trade Contractors, all inquiries should be submitted in writing by e-mail at ebugbee@leviarc.com by 5:00 PM on December 6, 2019. All requests for information/interpretation (RFI) are required to be accompanied with Document 00 63 13 – REQUEST FOR INTERPRETATION FORM (RFI) FORM.

D. RECEIPT OF BIDS:

SEALED BIDS FOR **TRADE CONTRACTS** listed above will be received by the Awarding Authority until date and time stipulated herein above.

ADDRESS FOR RECEIPT OF BIDS:

City of Framingham
c/o location/attention of Finance Division
150 Concord Street, Room 123
Framingham, MA. 01702

E. BID SECURITY:

Bid Security: All Trade Contractor Bid proposals shall be accompanied by a bid deposit in an amount not less than five percent (5%) of the value of the bid. Bid deposits, payable to the "*City of Framingham*" shall be in the form of either a BID BOND, or a CERTIFIED or TREASURER'S CHECK issued by a responsible bank or trust company. Cash and company checks are not acceptable.

F. SALES TAX:

Sales Tax: Materials, equipment and supplies to be used on this project are exempt from sales tax to the extent provided by MGL c.64(H), §6(f). Bidders should not include taxes in figuring or in references to any bid.

G. WAGES:

Wages: The minimum wages to be paid mechanics, apprentices, teamsters, chauffeurs, and laborers on the Project shall be established by the Minimum Wage Schedule, as determined by the Commissioner of Labor and Industries, pursuant to the provisions of MGL c.149, §25 to §27D, inclusive, as amended, which schedule is included in the Bidding Documents.

H. PERFORMANCE, LABOR AND MATERIALS BONDS:

A one hundred percent (100%) Performance Bond and a one hundred percent (100%) Labor and Materials Payment Bond will be required from the successful Trade Contractor, as required under MGL c.149 §44 F(2)D.

I. CONTRACT AWARD:

Upon receipt of bids, the Owner and Project Team must determine, from information submitted on the Update Statement, whether the apparent low bidder is responsible and can be awarded the Contract.

The Awarding Authority will reject Trade Contract Bids when required to do so by the above-referenced General Laws. The City of Framingham reserves the right to reject any Trade Contract bid if it determines that such bid does not represent the bid of a person or firm competent to perform work as specified or that less than three such Trade Contract Bids were received and that the prices are not reasonable for acceptance without further competition.

All bids shall remain in effect for 30 days (Saturdays, Sundays, and legal holidays excluded) after opening of Bids for Fuller Middle School. Successful bidders shall agree to commence work and complete the Work in accordance with the dates set forth in the Bidding Documents.

End of Document

Document 00 21 13

INSTRUCTIONS TO BIDDERS

ARTICLE 1 – STATUTE REFERENCES

A. Wherever in the Contract Documents reference is made to General Laws of Massachusetts, (MGL), it shall be construed to include all amendments thereto effective as of the date of issue of INVITATION TO BID on the proposed work.

B. Trade Contractor Bids are subject to the provisions of Massachusetts General Laws, including but not limited to Chapter 149 and Chapter 30, and all other applicable provisions of MGL.

1. This “Instructions to Bidders” contains important information about bidding procedures and is intended to provide guidance and assistance to bidders. This “Instructions to Bidders” does not change or supersede the provisions of the above referenced Massachusetts General Laws, or other provisions of Statute Law.

2. In the event of any conflict or inconsistency between the provisions of the Bid and Contract Documents and the provisions of applicable law, the provisions of law shall govern. In such event, the application of all remaining provisions of the Bid and Contract Documents not in conflict and not inconsistent with applicable law shall not be affected thereby.

C. The attention of bidders is called to MGL Chapter 149, Section 179A, which requires persons contracting to do public work to give preference in awarding contracts to persons who are citizens of the United States and to partnerships all of whose members are such citizens.

1. Foreign Corporations: Attention of all Bidders is directed to provisions of MGL Chapter 30, Section 39L, as amended, which provides that the Awarding Authority may not enter into a contract for construction work, and may not approve as a subcontractor furnishing labor and materials for a part of any such work, a foreign corporation that has not complied with certain requirements of Chapter 156D of the Massachusetts General Laws. The term "foreign corporation" means a corporation not incorporated under the laws of the Commonwealth of Massachusetts. Bidders are responsible to know and comply with the requirements of Section 39L of Chapter 30.

ARTICLE 2 – DEFINITIONS

A. Awarding Authority:

City of Framingham
c/o City of Framingham School Building Committee (SBC)
73 Mt. Wayte Avenue
Framingham, Massachusetts 01702

B. Owner’s Project Manager (OPM)

SMMA / Symmes Maini & McKee Associates
1000 Massachusetts Avenue
Cambridge, Massachusetts 02138

C. Construction Manager (CM)

Consigli Construction Company
72 Sumner Street
Milford, Massachusetts 01757

D. Architect/Designer (A/E):

Jonathan Levi Architects, LLP
266 Beacon Street
Boston Massachusetts 02116

E. Bidding Documents: As referenced herein refers to Document 00 11 13 - INVITATION TO BID, Document 00 21 13 - INSTRUCTIONS TO BIDDERS, Document 00 22 00 – SUPPLEMENTARY INSTRUCTIONS TO BIDDERS, Document 00 41 13 - FORM FOR TRADE CONTRACT BID, all other bid requirements, and the "Contract Documents" (see Form of Agreement for definition of "Contract Documents"), including all Addenda.

1. Document 00 11 13 – INVITATION TO BID, this Document 00 21 13 – INSTRUCTIONS TO BIDDERS and Document 00 22 00 – SUPPLEMENTARY INSTRUCTIONS TO BIDDERS contain important information about bidding procedures and are intended to provide guidance and assistance to bidders. Both documents are complementary and should be carefully reviewed by Bidders for specific instructions. Information contained in Document 00 11 13 is not repeated herein this Document 00 21 13.
    a. Bidding Documents contained herewith do not change or supersede the provisions of Massachusetts General Laws, including the provisions of Chapter 149 and Chapter 30, and all other applicable provisions of law, as amended.

ARTICLE 3 - BIDDER QUALIFICATIONS

A. The Awarding Authority has followed the procedures for the Pre-Qualification of Trade Contractors for this Project, in accordance with the provisions of M.G.L. c.149, §§ 44D½ and 44D¾. A list of the trades for which sub-bidders have been prequalified is included in Document 00 11 13 - INVITATION TO BID.

1. Trade Contractors: Under the process as set forth in MGL chapter 149 § 44D ¾, the Awarding Authority has ALREADY prequalified Traded Contractors interested in this Project and ONLY those firms who have ALREADY been prequalified are eligible to participate in the bidding for trades identified as Prequalified.

B. Each Trade Contractor Bidder shall be certified by the Massachusetts Division of Capital Asset Management and Maintenance (DCAMM) for the category of work and the dollar amount of this project in accordance with the provisions of Massachusetts General Laws Chapter 149 before consideration for such bid will be given.

C. In compliance with MGL Chapter 149, Section 44D, as amended, Trade Contract Bids shall be accompanied by a copy of a DCAMM Certificate of Eligibility and Contractor's Update Statement.

1. Public Records: Contractor's Update Statement is not a public record as defined in MGL Chapter 4, Section 7, and will not be open to public inspection.

ARTICLE 4 - EXAMINATION OF DOCUMENTS AND SITE CONDITIONS

A. Site Visit: Each bidder is strongly encouraged to visit the site of proposed work and become fully and completely aware of all existing conditions and the character of the operations to be carried on under the proposed Contract. Each bidder shall become fully familiar with the facilities, physical conditions, and restrictions attending the work under the Contract. Failure to make such examinations will not relieve the bidders from any obligation under Trade Contractor Bid, as submitted, and bidders agree, by virtue of submitting a bid, that they will make no claim on account of their failure to discover that which may have been discovered upon such examinations and visit.

B. Document Examination: Each Bidder shall thoroughly examine and become familiar with the Contract Documents and the Bidding Requirements. Failure of any General Bidder or Filed Sub-bidder to thoroughly examine the Bidding Requirements and Contract Documents, shall in no way relieve him of any obligation with respect to his bid or of any responsibility assigned him under the Contract, and bidders agree, by virtue of submitting a bid, that they will make no claim on account of their failure to discover that which may have been discovered upon such an examinations.

C. Pre-Bid Conference: An open, public pre-bid conference will be convened at the job site to permit bidders to examine the site, examine existing conditions, and ask questions. Time and place of the Pre-Bid Conference is indicated in Document 00 11 13 – INVITATION TO BID. All bidders are strongly encouraged to attend.

ARTICLE 5 - ADDENDA AND INTERPRETATION

A. Bidders shall promptly notify the Architect of questions, ambiguities, and inconsistencies which they may discover upon examination of the Contact Documents, the site, and local conditions. All questions by prospective bidders as to the interpretation of the Contract Documents shall be submitted in writing to the Architect's office.

1. Written requests: Submit written requests for clarification and interpretation to the Architect only by mail or fax.
    a. Telephone calls pointing out errors or discrepancies in the documents will be received by the Architect, but only for receipt of information and potential processing, but not for interpretation or clarification.
    b. Oral or telephone interpretations will not be made.
2. Timing of requests: Requests for clarification and interpretations must be received by the Architect at least 5 working days (Saturdays, Sundays, Federal and Massachusetts State Holidays excluded) prior to the date bids are due.

B. Architect's Response: If the Architect considers such request for clarification or interpretation to be of sufficient importance, the Architect will issue a response in the form of a written Addenda which will become part of the Contract Documents. Clarifications and interpretations offered by the Authority, the Architect, or any of the Architect's consultant's in any form other than a formal written Addenda shall be invalid.

C. Issuance of Addenda: It is intended, but not guaranteed that an Addenda will be issued to every bidder on record as having obtained bid documents. Copies of Addenda will be available at locations where Contract Documents are filed for public inspection as listed in the Invitation and these Instructions to Bidders. Failure to receive such Addenda shall in no way relieve any Bidder from the execution of its provisions. All Bidders shall verify the number of Addenda which have been issued and secure any needed copies from the Architect before submitting a bid.

D. Acknowledgement of Addenda on Bid Form: Bidders shall acknowledge Addenda in the spaces provided on bid forms. Failure of a bidder to acknowledge Addenda in the spaces provided on bid form will cause rejection of the bid. Failure of the bidder to receive any addenda shall not relieve it from any obligation under its bid as submitted.

ARTICLE 6 - PREPARATION AND SUBMISSION OF BIDS

A. Bid for trades shall be submitted upon the FORM FOR TRADE CONTRACT BID provided by the Awarding Authority. All blank spaces shall be filled in, in ink or typewritten, in words or figures. Use figures alone only where no space is provided for words. The sub-bid shall be signed by the sub-bidder. The FORM FOR TRADE CONTRACT BID, including the required bid deposit, shall be enclosed in a sealed envelope with the following plainly marked on the outside:

TRADE BID FOR ....
{Title of Trade Contract and Specification Section Number}

PROJECT: FULLER MIDDLE SCHOOL

B. If the bid is mailed, the Trade Contract Bidder shall enclose its sealed bid in an outer envelope, addressed as follows:

FROM ....
(Bidder's Name and Business Address)

PROJECT: FULLER MIDDLE SCHOOL

TRADE: ....
(Trade for which bid is submitted)

TO: City of Framingham
c/o location/attention of Finance Division
150 Concord Street, Room 123
Framingham, MA. 01702

C. Bidders are cautioned to allow ample time for transmittal of bids. Bids received after the specified time will not be accepted or recognized. The time of receipt by Awarding Authority will determine the acceptability of all bids, regardless of postmark.

D. No oral, written or telegraphic amendments to the bid will be received or be recognized. A bidder wishing to amend a bid after transmittal to the Awarding Authority may do so only by amending the bid document itself prior to the time for opening bids.

E. Bid Withdrawal: Any bid may be withdrawn by written request mailed, faxed or hand-delivered to the Architect prior to date and time of receipt of bids. Withdrawn bids may be resubmitted until date and time of receipt of bids.

1. Mailed Written Request: Bid withdrawal by mail shall be in writing and shall be sent by certified or registered mail, and shall be received by the Architect on or before the date and time scheduled for the opening of such bids or authorized postponement thereof.
2. Faxed Written Request: Bid withdrawal by fax shall be in writing and shall be received by the Architect on or before the date and time of receipt of bids.
3. Modifications: No written, oral, telephone, or telegraphic modifications to bids will be considered after the bid is received.
4. Bid Deposits of Withdrawn Bids: The bid deposit will be returned if bids are withdrawn, in accordance with the above, before date and time of receipt of bids.
5. No bid may be withdrawn for thirty (30) days, Saturdays, Sundays and legal holidays excluded, after opening of bids.

F. Bids will be opened and read publicly at the time and place scheduled for the opening of such bids or the authorized postponement thereof. Bidders or their authorized representatives are invited to be present. Bidding results will not be given out over the telephone; results will be made available by written request to the Awarding Authority.

ARTICLE 7 - BID DEPOSIT REQUIREMENTS AND PROCEDURES

A. The following matters respecting bid deposits are governed by MGL Section 44B of Chapter 149. Every Trade Contract Bid bid not accompanied by the prescribed bid deposit will be rejected.

B. Each Trade Contract Bid bid for designated trades must be accompanied by a deposit in the form of a bid bond, or cash or a certified check on, or a treasurer's or cashier's check issue by, a responsible bank or trust company, payable to the City of Framingham. A bid bond shall be (a) with a surety company qualified to do business in the Commonwealth of Massachusetts and satisfactory to the Awarding Authority, and (b) conditioned upon the faithful performance by the principal of the agreements contained in the bid. The amount of such bid deposit shall be five percent (5%) of the amount of the bid.

1. Trade Contracts are required for trades listed in Document 00 11 13 - INVITATION TO BID.

C. All bid deposits of Trade Contractors, except those of the three (3) lowest responsible and eligible sub-bidders, shall be returned within ten (10) days, Saturdays, Sundays and legal holidays excluded after the opening of the general bids. The bid deposits of the three (3) lowest responsible and eligible Trade Contractors shall be returned upon the execution of the Contracts, except that, if a selected Trade Contract bidder fails to perform its agreement to execute a subcontract with the Construction Manager, contingent upon the execution of the general contract, and, if requested to do so in the bid by Construction Manager, such bidder, to furnish a performance and payment bond as stated in his sub-bid in accordance with MGL Section 44F(2) of Chapter 149, the bid deposit of such Trade Contract Bidder shall become and be the property of the Awarding Authority as

liquidated damages, provided that the amount of the bid deposit which becomes the property of the Awarding Authority shall not, in any event, exceed the difference between its sub-bid price and the sub-bid price of the next lowest responsible and eligible sub-bidder; and provided further that, in case of death, disability, bona fide clerical or mechanical error of a substantial nature, or other similar unforeseen circumstances affecting the general bidder, its bid deposit shall be returned to him/her named in the general bids.

D. In addition to the provisions for the return of bid deposits in the foregoing Paragraphs 9.3 and 9.4 upon receipt of a bid bond in an amount not less than the amount of the required bid deposit, the Awarding Authority shall return any bid deposit of a bidder forthwith after public opening of bids. The bid bond shall be in an amount and in the form provided in Paragraph 9.2.

ARTICLE 8 – BID SUBMISSION CHECKLIST

A. Trade Contract Bids: On or before the date and time of receipt of Trade Contract Bids, Trade Bidders must submit the following:

1. Document 00 41 14 - Form for Trade Contractor Bid.
2. Document 00 43 13 - Bid Security Form (AIA Form A310 -Bid Bond). or another acceptable form of Bid Security
3. DCAMM Certificate of Eligibility *(not bound herewith).*
4. DCAMM form – Contractor's Update Statement *(not bound herewith).*

ARTICLE 9 – FORM OF CONTRACT

A. Form of Agreement between Construction Manager and Trade Contractor: An example Form of Contract for Construction Services is included in the Bidding Documents.

ARTICLE 10 - ALTERNATES

A. Bid on all alternates listed in the Contract Documents. In the event an alternate does not involve a change in the amount of the base bid, indicate this by writing "No Change" in the space provided for the price of that alternate.

B. Trade Contractors shall enter on the Form for Trade Contract Bid the dollar amount of addition or subtraction, or the indication of "No Change" which pertains to the Work of the particular trade as defined in the Specifications.

ARTICLE 11 - SALES TAX EXEMPTION

A. The City of Framingham is exempt from certain taxes as provided by MGL Chapter 64H, Section 6(f). It is therefore required that the Construction Manager, and all Trade Contractors, and subcontractors purchasing taxable goods or services make known to suppliers the tax-exempt status of the Owner, in order that such taxes will not be applied to the goods under Contract. The City of Framingham will provide the necessary evidence and certificates of its tax-exempt status to the Construction Manager and Trade Contractors at the Pre-construction Conference.

B. Copies and Receipts Required: In compliance with Department of Revenue regulations, the Contractor shall provide the Awarding Authority with copies of all

receipts for materials and products used for this Contract purchased using the Awarding Authority's Tax Exemption Number.

ARTICLE 12 – LOCAL FEES

A. Trade Contractors are responsible for all permits, fees, inspections, and licenses, as may be required by State and local authorities.

B. Fees: All trade contract permits are required and all fees associated with these permits shall be paid in full. All other permits required by Town, State Agencies or other public agencies will require payment of fees. Each Bidder shall take this into account in calculating his or her bid for work.

ARTICLE 13 – EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS

A. MBE and WBE: bidders are advised that minority and women business enterprise goals for this project are defined in the Construction Manager – Owner Agreement.

ARTICLE 15 - METHOD OF AWARD

A. Bid Opening: Bids will be opened in public at the time and date specified in Document 00 11 13, and bidders may be present at the bid opening. Bid amounts will be read aloud, recorded, and referred to the Awarding authority for consideration.

B. Contract Award: Subject to Chapters 149 and 149A of the General Laws, the Contract will be awarded within 30 days after receipt of general bids (Saturdays, Sundays, and Legal Holidays excluded) to the lowest responsible and eligible bidder, on the basis of the proposed base contract price and accepted alternates. No bid shall be considered accepted until the Awarding Authority has issued a written Notice of Award sent by mail or delivered to the address given by the successful bidder on its bid form.

1. Definition of "Lowest Responsible and Eligible Bidder" : The "lowest responsible and eligible bidder" means the Trade Contract Bidder whose bid is the lowest of bidders Trade Contract who have been prequalified by the Owner. Refer to the provisions of MGL Chapter 149 Section 44A; defining the terms "responsible" and "eligible".

ARTICLE 16 - EXECUTION OF CONTRACTS

A. All bidders' attention is called to the agreements and certifications made by general bidders and sub-bidders in the required FORM FOR TRADE CONTRACT BID, respectively.

B. The contract between the General Contractor and each Subcontractor shall be in the form contained in the Contract Documents following these Instructions, as required by MGL Chapter 149, Section 44F.

ARTICLE 17 – PERFORMANCE AND PAYMENT BONDS

A. Performance and Payment Bonds: Each successful Trade Contractor will be required to provide a payment and a performance bond to the Construction

Manager, and the Trade Contractor shall include the cost for the premium for those bonds in its Trade Bid price. (Reference MGL Chapter 149 Sect. 44 F(2)D.)

1. An attorney-in-fact who executes the required bond on behalf of the surety must affix thereto a certified and current copy of his Power of Attorney.

ARTICLE 18 - COMMENCEMENT OF WORK AND TIME OF COMPLETION

A. It is agreed that time is of the essence of this Contract. The successful bidder, upon execution of the Contract Agreement, shall commence the work of the Contract within seven (7) calendar days from receipt of written Notice to Proceed issued by the Awarding Authority. The selected Trade Contract Bidders shall agree to commence and prosecute the Work under this Contract in conformance with the conditions of the Contract Documents and shall thereafter diligently and continuously carry on the work without interruption in such manner as to substantially complete the work of each phase in accordance with the Contract Documents.

1. The Contract Time may be extended due to suspensions, delays, interruptions or failures caused by the Owner as provided for by MGL Chapter 30, Sections 39O and 39P, and for changes in the scope of the Contract due to differing subsurface or latent physical conditions as provided for by MGL Chapter 30, Section 39N.

End of Document

November 22, 2019

FULLER MIDDLE SCHOOL
Framingham, MA

BID PACKAGE #3: CONSTRUCTION DOCUMENTS PACKAGE
CM'S SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

CONTENTS

SECTION A.1: GENERAL INSTRUCTIONS

These supplementary conditions are intended to assist all bidders (trade contractors and non-trade contractors alike) in establishing items within the scope of their work. They are neither definitive nor all-inclusive and do not relieve bidders of the responsibility to quote complete work packages. Without limiting the scope of work, this section contains additional instructions that complement the Contract Documents. The items listed herein are not intended to be a complete list of work items to be performed under the Subcontractor's scope of work. Furthermore, details referenced are included for convenience but are not intended to identify all applicable details. If any conflicts are found or any clarifications are needed, please forward an RFI to Consigli Construction Co., Inc. immediately, or as otherwise instructed. In the event of conflicts, the more stringent specification/application applies.

ALL BIDDERS MUST PROVIDE FOR THE FOLLOWING:

GENERAL ITEMS:

1. All components of these Supplemental Instructions shall apply to all subcontractors.
2. Prevailing wages.
3. All subcontractors shall be required to submit records of employment, and payroll records according to the requirements of MGL 149 §27B.
4. Compliance with Division 00 & 01 specifications.
5. All subcontractors are responsible to meet their interim deadlines established in the Project Milestone Schedule Section H, located at the end of the Supplemental Instructions
6. Subcontractors are responsible for all efforts, methods, procedures and costs required to meet or better the schedule dates. If at any time it is determined by Consigli or the Owner that a subcontractor is not on schedule, the subcontractor shall increase its manpower, work overtime, or both to bring their work back on schedule. Such efforts shall be performed at no additional cost to Consigli or the Owner
7. There is no guarantee of workflow from area to area. Subcontractor shall work in all areas as they become available and as directed by Consigli. Changes will not be considered for out-of-sequence work. Some work may be suspended during the winter months and/or due to noise restrictions.
8. All employees on the project, including third-party workers, must pass a CORI check prior to being allowed on site. CORI forms must be submitted 2 weeks prior to site mobilization. It is the subcontractor's responsibility to verify with Consigli that CORI documentation has been approved prior to arrival on site.

SAFETY RELATED ITEMS:

9. Compliance with OSHA & Consigli Safety requirements outlined in Section E, Project Safety Requirements, of this specification section.
10. Per MGL 30 §39S, all employees on the worksite must have completed OSHA 10 training and provide their card to Consigli prior to being allowed to work onsite.
11. All project foremen are required to have OSHA 30 Hour training.
12. All new workers must report to Consigli's field office for orientation prior to commencing work on their first day. OSHA certifications will be checked as part of the orientation. A valid Photo ID is required for orientation. Any worker's without this documentation will be turned away.
13. Consigli will be holding Safety Pre-operation meetings for every subcontractor on the project. Every subcontractor shall attend and be responsible for the Safety terms as outlined in Exhibit E of these Supplemental Instructions. Failure to attend meeting will result in a $500 fine.
14. Subcontractors shall be responsible for their own fall protection systems as required to complete their work in accordance with OSHA and Consigli standards. Subcontractors are to submit a fall protection plan to Consigli for approval.
15. All subcontractors & trade contractors must adhere to OSHA Crystalline Silica Standard and all associated work plans. This includes but is not limited to dustless drilling, dustless saw-cutting, dustless coring, dustless grinding etc.

16. Hot Work permits are required for all hot work activities. Fire Details are required whenever Hot Work is being performed and shall be the responsibility of the contractor completing the work as required by the authority having jurisdictions.

17. All Contractor's shall be responsible for all requirements of the NFPA-241 Impairment Plan as applicable to their work.

DOCUMENTATION/MATERIAL RELATED ITEMS:

18. All correspondence, submissions, shall be routed through the Consigli office. There shall be no deviation unless approved by Consigli. Direct contact with the design team or owner is strictly prohibited. Unauthorized contact will result in fines of $500 per occurrence.

19. All submittals shall be submitted electronically through Consigli's project management software (Procore). Upon award, Consigli will issue companies a username and password to access. The only submittals that should still be forwarded through the mail are physical samples and color selection charts. If submittals and RFIs are received in any form other than Procore (including email), they will not be processed, and the subcontractor will be responsible for resulting delays and associated costs.

20. Submittals shall be due no later than 10 days from the date of the subcontract execution. All RFIs that impact submittals shall be due no later than 5 days from the date of the subcontract execution.

21. When a submittal is marked Revise & Resubmit, Return as Corrected, Revise for Record or any such status requiring a resubmittal, that resubmittal will be due no later than one week after the original submittal is returned to the subcontractor.

22. Trade and non-trade contractors shall be responsible for providing lead times on all materials no later than 14 days after contract issuance. These lead times shall represent the time frame for materials to arrive onsite after architect approvals. This does not alleviate the subcontractor from meeting contractual schedule dates and milestones outlined in the "Request for Proposal" package.

23. If a conflict exists between the drawings and specifications or within either document itself, the better quality or greater quantity of work shall be included in the base bid. An RFI should be submitted immediately upon discovery of such conflicts. If an RFI is not submitted and work is commenced, this is done at the subcontractor's risk.

24. Whenever the Contract Documents require a Professional Engineer's stamp, review or report, it shall be understood to mean a Professional Engineer licensed and registered in the Commonwealth of Massachusetts.

25. All contractual warranties will commence on the substantial completion form AIA G704 document issued by the Architect. The subcontractor shall provide all necessary extended warranties to account for the time period from the completion/installation/startup of their work through this date, including manufacturer's warranties.

26. Subcontractors required to provide as-builts at the end of the project will be responsible for marking up one field set of drawings on a weekly basis that will be maintained in the construction field office. If these updates are not made as required, progress payments will be held until they are complete.

27. All MEP subcontractors will be responsible for filling out and submitting all rebate forms as requested by the owner.

28. Subcontractor has performed a complete and comprehensive review of all contract drawings and specifications. Price is assumed to include labor, materials, equipment, and fees required to complete the scope of work as well as any labor/material cost increases throughout the duration of the job. Systems shall be complete and in proper working order in accordance with the contract documents.

SCHEDULE RELATED ITEMS:

29. The following are established as the substantial completion dates for the project. Subcontractors shall provide the appropriate manpower to maintain and adhere to the below dates:

Phase 1: Enabling

- Start: June 21, 2019
- Completion: August 20, 2019

Phase 2: New Construction
- Start: August 21, 2019
- Completion: June 15, 2021

Phase 3: Demolition & Site Finishes
- Start: September 28. 2021
- Completion: December 20, 2021

30. In addition to the above-mentioned substantial completion dates, all subcontractors are responsible to meet their interim deadlines established in the Project Milestone Schedule, located at the end of the Supplemental Instructions Section H.

31. No work is to be done on the following Holidays: New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving, and Christmas Day.

32. Subcontractors are responsible for all efforts, methods, procedures and costs required to meet or better the schedule dates. If at any time it is determined by Consigli or the Owner that a subcontractor is not on schedule, the subcontractor shall increase its manpower, work overtime, or both to bring their work back on schedule. Such efforts shall be performed at no additional cost to Consigli or the Owner.

33. Consigli will issue an updated milestone schedule once a month and a 6-week look-ahead once a week. Each subcontractor is required to provide detailed comments if they disagree with anything represented within the schedule within 3 days of its issuance. If no comments are received, that schedule becomes the new contract schedule. If at any time there is an instance that the subcontractor feels their schedule is affected (i.e. - delivery dates, previous trades), that subcontractor is required to notify Consigli in writing within 24 hours at which point the delay can be evaluated. If this notification is not provided within the required time frame, the latest contract schedule prevails and must be adhered to.

34. In conjunction with our Lean Building Program, sometime after the trade bid date when all major trade and non-trade subcontracts have been awarded, Consigli will hold a schedule kick-off meeting and monthly schedule update meetings. At this summit we will further develop the detailed schedule logic as a team that will provide the map to achieving the end date milestone schedule. Attendance by subcontractor's Project Manager and foreman is required. Failure to attend meeting will result in a $500 fine.

MATERIAL DELIVERY & LOGISTIC RELATED ITEMS:

35. Work hours are 7:00am – 3:30pm. While school is in session, no deliveries will be allowed between the blackout hour of 7:45am – 8:45am, and 2:00pm – 3:00pm.

36. Subcontractors must adhere to Truck Route Plan; see Section J.

37. Material deliveries must be logged on the delivery board located in the Consigli Field office at least 48 hours in advance.

38. Subcontractors are responsible for unloading, hoisting and rigging required to complete their work. This includes the use of any lifts, lulls and operators as required to access the work.

39. Unless noted otherwise, any access requirements on the interior and exterior of the building regardless of height, will be the responsibility of the subcontractor. The following staging will be provided by Consigli:
   A. "Dance Floor" platform staging will be provided at the Auditorium between column lines M and AC.

40. Subcontractors are required to provide their own connections to yard hydrants (provided by others) as required to operate equipment and perform their work.

41. Onsite parking is available, and at the discretion of the Consigli superintendent.

42. Consigli conducts stand up meetings daily to discuss project safety, review project, outline, discuss, and coordinate upcoming scheduled work activities, and address quality and other matters affecting the project. Subcontractor representation by a person familiar with and responsible for project activities and authorized to speak for and make binding commitments on the behalf of their firm is mandatory at these meetings. All subcontractors currently onsite or on the 6 Week Look Ahead Schedule are required to attend these meetings. Failure to attend will result in a $500 fine on each occurrence.

43. Subcontractors shall provide offsite storage of all materials until installation, unless previously authorized by Consigli. Consigli shall coordinate and dictate all on-site storage and office space.

44. Theft or vandalism of tools, equipment, materials, is not the responsibility of Consigli or the Owner.

45. Precautionary measures necessary to prevent damage to Owner's property, buildings, finished work, and stocked materials are the responsibility of the subcontractor that installed the work. Repairs of damage and replacement of materials will be paid for by the party that inflicted the damage.

46. Consigli will be holding Quality Pre-operation meetings for every subcontractor on the project as detailed in Exhibit B of these Supplemental Instructions. The intent of these meetings is to discuss items such as material delivery dates, scheduling, manpower, installation procedures, expectations, coordination with other trades, and comments on returned submittals. Attendance by subcontractor's Project Manager and Superintendent is required at these meetings. Failure to attend meeting will result in a $500 fine.

EXECUTION OF THE WORK-RELATED ITEMS:

47. Review job conditions prior to commencing work. Advise Consigli of any unacceptable conditions; otherwise the subcontractor accepts the job conditions.

48. Subcontractors shall be responsible for all permits to complete their work (except the General Building Permit) and shall be responsible for coordinating, scheduling, and completing the associated inspections. This includes all inspectional fees and permits for the individual mechanical, electrical, plumbing, and fire protection trade contracts.

49. Subcontractors shall be responsible for any power requirements, other than 110v, to run their equipment.

50. All installing subcontractor are responsible for the protection of their installed materials from the time of installation to substantial completion. If installed material are not protected the installing contractor will be responsible for fixing, replacing and/or touching-up their damaged material.

51. Unless otherwise noted, clean up and removal of trash to bins provided on each floor daily. Bins will be removed from the building and brought to dumpsters by Consigli. If clean-up is not completed, the offending Subcontractor will not be permitted to continue work until they have complied with this requirement and have cleaned the site of their trash and debris and all resulting delays will be the responsibility of that subcontractor. Consigli recycles excess materials, and the Subcontractor is therefore responsible for separating waste. Some bidders will be specified to have their own dumpsters; for instance, abatement/demolition.

52. All trades are responsible for furnishing approved access doors if required for their work. Access doors shall be of sufficient size to allow regular access by maintenance employees and shall meet the same fire rating as the partition in which they are installed. Installation shall be by Drywall Contractor. Access doors must be accompanied by a transmittal letter, and signed off as received by the drywall contractor.

53. All subcontractors shall coordinate and provide all permits, flagging, signal beacons, etc. necessary to meet FAA requirements for all cranes on site for the work of their respective trades, due to the close proximity of the Massachusetts State Police barracks and helicopter pad to the North of the site.

54. All subcontractors will be required to adhere to the Waste Management Plan in accordance with Specification Section 01 74 19.

55. Subcontractors shall provide their own task lighting required to complete their scope of work. Temporary construction lighting/power including maintenance complying with OSHA standards shall be provided by the Electrical trade contractor.

56. All trades are responsible for verifying field dimensions / on site conditions prior to fabrication of materials.

57. All subcontractors are responsible for providing their own layout for penetrations required through existing walls, roofs, etc.

58. All trades are responsible for their own layout; assume use of Trimble or similar. Control points will be provided by Consigli.

59. Subcontractor's with project deficiencies will be listed on Consigli's Observation's Log on Procore that is issued weekly. All items listed on this log are required to be corrected within 5 working days unless otherwise approved in writing by Consigli. Failure to do so will result in fines of $500/day until the deficiency is rectified.

60. The punch list will be generated by the Consigli, Architect/Engineer and/or Owner. If subcontractors are listed on the punch list, they have 5 working days to correct these items unless otherwise approved in writing by Consigli. Failure to do so will result in fines of $500/day until the deficiency is rectified.

61. Subcontractors will be responsible for investigating all issues that arise within the building/project during the specified warranty period. As a result, extra compensation for these investigations in the event the issue ends up not being related to the subcontractor's work will not be entertained.

62. Subcontractors need to be present for any 3rd party testing, inspections, commissioning or training of their systems as required.

CHANGES/BILLING RELATED ITEMS:

63. This is a tax-exempt project. The Certificate of Exemption Number is 046-001-151. ST-2 and ST-5c forms can be located on Consigli's Procore site under the Project Documents section.

64. Certified payrolls are to be uploaded weekly to Procore, to each subcontractor's individual sub folder.

65. All change order pricing shall be due to Consigli no later than 7 calendar days after the issuing document or field condition is discovered. If pricing is not received within this time frame, it will be deemed that the subcontractor accepts the scope of work into their contract at no additional cost or time. In the event that the issuing document and/or field condition do not affect the subcontractor's cost or time, a response stating such is still required within the 7-day time frame.

66. Change Order pricing shall include all vendor/supplier backup pricing as well as a break-down of labor including rates and number of hours, material including quantities, equipment, as well as showing the breakout for items such as OH&P and bond. Change orders shall also include narratives as to how work is altered resulting in the change in cost or time. Change orders without the required breakout or acceptable descriptions of the changed work will be rejected and time lost on change orders as a result of waiting on resubmissions will be the responsibility of that subcontractor. Change Order resubmissions are required within 48 hours of the notice provided by Consigli. All Change in the Work and Changes in Contract Price or Contract Time shall be in accordance with Article VII of the General Conditions of the Contract.

67. Additional charges within change orders for items such as PM time, foreman time (shop or field), supervision, as-builts/CAD time, cleanup, small tools, remobilizations, travel, warranty, and/or safety will not be entertained as those are already owned and required as part of the project.

68. In accordance with Article VII of the General Conditions of the Contract the maximum amount allowable for overhead and profit on change orders by subcontractors is 10%.

69. Subcontractors may be required to proceed with potential change orders prior to formal approval in order to maintain the project schedule. It is mutually agreed and understood that negotiations may be required on this pricing and that the team will work to approve and/or provide comments as soon as possible.

70. Consigli's goal on the project is to avoid back charges. In the event that back charges are required to be issued, Consigli will mark them up by 15% for administration and fee for others to perform the work.

71. Consigli has attached a change order coversheet that all subcontractors must use when submitting change orders. This change order form will be made available in editable format. See Section M.

72. Subcontractors shall be responsible for providing a Schedule of Values no later than 14 days after contract issuance for approval. No payments will be processed until the Schedule of Values is approved by Consigli and/or the Owner/Architect. Schedule of Values must be separated in to labor and materials for all portions of the subcontractor's scope by phase and no line item shall exceed $50,000 without prior approval by Consigli and/or the Owner/Architect.

73. Subcontractors shall be responsible for providing Labor Rates no later than 14 days after contract issuance for approval. No payments will be processed until the Labor Rates are approved by Consigli and the Owner/Architect. Labor Rates must be based on prevailing wage issued for the project and be in compliance with the allowable labor rate items as laid out in the General Conditions of the Contract.

74. If incorporating a line on the schedule of values for mobilization subcontractors must also include a line for demobilization with an equivalent dollar value. All subcontractors must include a line for closeout equal to 2.5% of their total contract value.

75. Valid insurance certificates will be required for payments to be processed each month, even if the subcontractor is not currently onsite or complete with their work. Valid insurance certificates will also be required from all subcontractors prior to working onsite. If insurance certificates expire while a subcontractor is working onsite and the renewal has not been forwarded to Consigli, subcontractors will not be allowed onsite until the renewal is received. Any delays associated with expired insurance certificates shall be the responsibility of the subcontractor.

76. When billing for any FSC wood on the project, invoices which include the chain of custody for this material must be submitted with the requisition. If this documentation is not provided, that portion of the requisition will not be approved.

77. In the event time and material work is needed, subcontractors are required to fill out T&M sheets on a daily basis. All T&M work must be approved in writing prior to commencement. All T&M sheets must be accompanied with a Consigli T&M coversheet which is attained from the Consigli Field Office, and the Consigli T&M Coversheet will be signed by the OPM. All slip pricing is due no later than (5) days after the signed slip is received from the Owner's Project Manager. Any T&M pricing submitted later than (5) days, missing the OPM signature, or without the accompanying Consigli coversheet will not be accepted.

78. Requisitions will be through Textura, Subcontractors are to pay any licensing/usage fees. Fees to Subcontractors are calculated as 0.22% (22 basis points) of contract value, with a minimum fee of $50 and a maximum fee of $3,750. Fees to Subcontractors' subcontractors and suppliers are a fixed fee of $100 per subcontract or supplier contract.

79. Liquidated damages shall be incurred if the project is not completed by the Substantial Completion date. Therefore, liquidated damages incurred by delays caused in whole by the Subcontractor, shall be paid by the Subcontractor in the following amounts.

- Phase 1: $2,000 per day
- Phase 2: $3,000 per day
- Phase 3 & 4: $1,500 per day
- If the delay is caused in part by the Subcontractor, the Contractor shall assess the percentage of delay caused (1% - 99%), by the Subcontractor and said Subcontractor shall pay required percentage.

SECTION A.2: TRADE SPECIFIC

Where "include" is used below it means to furnish and install.
Items and details referenced below are typical. Not all pertinent details and/or items are listed. Subcontractors are to own their specifications complete.

SITEWORK

80. For all trench excavations, sitework subcontractor is responsible for their own dewatering as it pertains to means and methods to complete such work.
81. Site subcontractor shall be responsible for all excavation and backfill of site utilities.
82. Site contractor shall review all drawings provided for reference only. Site contractor shall be responsible for coordination, excavation and backfill associated with all under slab utilities.
83. Site contractor shall include assisting in the development of the SWPPP, and implementation and maintenance of the SWPPP during all phases of the project.
84. Include snow removal and sanding of roads and parking (including temporary roads and parking) through 3 winters. This is regardless of whether on site or not.
85. Site subcontractor shall be responsible for all concrete footers associated with granite curbing.
86. Electrical light pole bases and conduit to be installed in parking lots before binder course. No trenching of new binder will be allowed.
87. Include access ramps into the excavations every 25'.
88. Include a wheel wash station; coordinate location with Consigli's superintendent and site logistics plan.
89. Include street sweeping as needed, full time during excavation, soil imports/exports.
90. Include a wash-out area for all concrete operations. Subcontractor shall be responsible for the removal of concrete spoils as a result of the wash-out.
91. Include (2) yard hydrants; locations to be determined by Consigli's superintendent. This includes temporary water meters and associated usage fees.
92. Include (4) crane pads: 20' x 20' gravel bed at 2' deep.
93. Provide suitable substrate for a distance of 20' around entire perimeter of new building to allow access for machinery and equipment required by trades.

CONCRETE

94. Include layout; Consigli to provide control.
95. Include clean-up to dumpsters provided by this Subcontractor. Subcontractor responsible to account for site all concrete washout areas.
96. Furnish, distribution, and place rebar and mesh. Material to be unloaded and hoisted by Structural Steel subcontractor, deliveries to be coordinated with Structural Steel and Consigli to not delay steel erection.
97. Weldable lenton couplers shall be installed by the Structural Steel Subcontractor. This Concrete Subcontractor shall be responsible for furnish and installation of the appropriate reinforcing bar to match lentons.
98. Concrete subcontractor shall review all for reference MEP/FP drawings provided in this bid package. Concrete subcontractor is to coordinate, provide and install all steel sleeves for foundation penetrations. Include all penetrations in rebar elevation drawings.
99. Concrete infills as needed at all structural steel locations following erection.
100. Concrete subcontractor shall be responsible for installation of all leveling plates (plates provided by Structural Steel Subcontractor), including grouting of each.
101. Include mechanical/housekeeping pads as shown on Civil, Landscaping or MEP/FP drawings.
102. Assume all site foundations and bases, sidewalks, site stairs, and site walls are by concrete subcontractor.
103. The schedule of concrete foundation and slab work is through the winter. Contractor shall include admixtures for concrete, supplemental heat, as required, and covering with blankets.
104. Blow-off decks prior to installation of concrete slabs-on-deck.

105. Install foam fillers around all temporary structural steel safety posts prior to slab on deck placement. Removal of foam filler shall be performed by others.
106. Provide boxouts in slabs as necessary to create pockets for all curtainwall anchorage points. Infill pockets with concrete after installation of curtainwall anchors.
107. All work is to be done in accordance with notes on Structural drawings, (including S000)

STRUCTURAL STEEL

108. Provide all engineering and layout required for the work Structural Steel erection, including as-built survey of leveling plates and anchor bolts installed by the Concrete Subcontractor.
109. Furnish all anchor bolts and leveling plates and deliver to the site for installation by the Concrete Subcontractor.
110. Steel subcontractor shall include provisions to shore/brace structural steel as required until masonry bearing walls can be tied in following steel erection.
111. Include unloading and hoisting of rebar and mesh to each deck level.
112. Intumescent paint on all exposed steel in learning commons.
113. Subcontractor to provide as-builts of structural steel frame to confirm that the structural steel frame is plumb and level.
114. Subcontractor to provide as-builts of slab edge prior to slab placements.
115. Subcontractor shall plug any holes in exterior galvanized steel prior to installation.
116. Provide a 3-line safety cable rail at the perimeter of each floor level, and a 2-line safety cable rail at each roof level, at all floor openings and Stair 4 & 5. Maintenance and removal by Consigli after floor has been turned over
117. Steel subcontractor shall include two crews and two cranes erecting simultaneously. Coordinate with Consigli.
118. Steel subcontractor shall coordinate and provide all permits, flagging, signal beacons, etc. necessary to meet FAA requirements for all cranes on site due to the close proximity of the Massachusetts State Police barracks and helicopter pad to the North of the site.
119. Steel Subcontractor shall furnish and install all weldable lenton couplers at all edge of slab locations shown on the drawings. All welding shall be performed in the shop prior to delivery of steel to the site.
120. Steel Subcontractor to set masonry relieving angles as shown on the drawings. Coordinate locations, elevations, depths, etc. with Architectural Plans as necessary.

042000 – MASONRY

121. Include all staging, hoisting, rigging and equipment needed for work of this trade contractor. Include engineered shop drawings and leg loads for scaffolding systems bearing on building components, including roofs. Shop drawings must be stamped by a structural engineer, licensed in the Commonwealth of Massachusetts.
122. This trade contractor will be provided temperature-controlled field office space within the existing Fuller Middle School, adjacent to Consigli field office. Assume room for (2) desks and file cabinet.
123. Include clean-up to dumpster provided by Consigli.
124. All stored brick, mortar, sand and other masonry materials will need to be put on pallets and remain covered. Include provisions for all protection of masonry materials stored onsite.
125. Include protection of all top of wall cavities until final flashing is installed.
126. Masonry trade contractor will be responsible for protecting all adjacent surfaces and/or finishes during the installation and wash-down of new masonry work. This includes protecting roofs for masonry work installed on low roofs.
127. CMU bearing walls to be installed during the Winter of 2020. Masonry façade work to start Spring 2020; assume multiple mobilizations as required to achieve schedule.
128. Include the following winter conditions (Heating equipment and fuel provided by Consigli):
   A. Hot water and mortar/grout additives
   B. Blankets to cover work and labor for moving blankets

C. Snow removals required for installation of masonry including but not limited to digging out for materials, staging and laydown areas
D. Tenting for exterior masonry

129. Include installation of all structural steel embedded plates and top of wall bearing plates, furnished by others. See 3,4,5,6/S503.
130. Install all embedded inserts, lintels, sleeves, rails, anchors, etc. as required that are provided by others. Unload, distribute and install the loose steel lintels, misc. metal and iron sleeves anchors, inserts and plates, furnished by others, to be built into masonry.
131. The masonry trade contractor will be responsible for installing compatible sealant where their masonry ties or clips penetrate the air/vapor barrier. Furnished by others.
132. Furnish and install all reinforcing and clips, including all welding and anchors to structural steel components.
133. Any reinforcing integral to the masonry walls will be provided and installed by the masonry trade contractor.
134. Exclude firestopping at floor and wall penetrations associated with this trade.
135. Provide all field welding of steel masonry reinforcing indicated on the structural drawings.
136. Install all through-wall stainless steel flashing at masonry-type walls, furnished by roofing sub (See Details 1-5,7,9/A520 and 1,3,4,6/A521). At all locations where mason installs through-wall flashing, install self-adhering flashing strip, furnished by AVB sub. Exclude vertical leg of two-piece counter-flashing, as shown on 4/A520 and 2,3/A521, to be furnished and installed by roofer. Exclude flashing at window heads with non-masonry cladding above, to be by others.
137. Masonry trade contractor shall assume all load bearing walls need to be complete prior to steel erection. See Section H, Project Schedule.
138. Include provisions to complete CMU bearing wall between column lines GD between X3/X4 after steel erection. Assume full height opening, approximately 14' wide.
139. Include provisions to re-mobilize after installation of roof trusses in Gymnasium/Auditorium building to complete infill of CMU pockets as identified and detailed on S303.
140. Include all bracing of CMU bearing walls during installation as required to comply with OSHA standards for free standing, unsupported masonry walls.
141. Include provisions for blocking out for access panels in masonry walls. Coordinate with full drawing set for sizes of ductwork, electrical conduits, fire protection, structural steel and other materials requiring block-outs in masonry walls. Install access panels in masonry, furnished by others.
142. Include provisions for blocking out openings for MEP penetrations greater than 12" round. Coordinate with full drawing set for approx. sizes and locations.
143. Detail 1A/S400: CMU curb detail applies under west entrance storefront 10A, adjacent to doors 1045A & 1045B.
144. Include all shoring as required for installation of CMU bond beams. Refer to detail 4/S303 for typical reinforcing.
145. Include furnish, install and maintenance of hydrant meter.
146. Include setting and installation of mechanical sleeves, furnished by others. Assume 15 within CMU bearing walls.

055000 – MISCELLANEOUS & ORNAMENTAL IRON

147. Misc. Metals trade contractor shall provide documentation to Drywall Subcontractor, prior to installation of light-gage framing, identifying location of all in-wall blocking required for installation of misc. metals. If the in-wall blocking is not properly identified this subcontractor is responsible for all cost incurred to provide proper blocking after the walls are sheathed.
148. Misc. Metals trade contractor shall include provisions to fabricate and install Stairs #1 and #2 from structural steel shop drawings, assume starting Spring 2020 and finishing prior to last slab-on-deck in that area.

070001 – WATERPROOFING, DAMPROOFING & CAULKING

149. Waterproofing trade contractor shall be responsible for all sealants and backer rods, interior and exterior, as shown throughout the project, unless noted otherwise. The waterproofing trade contractor to own caulking all dissimilar materials, including but not limited to drywall to CMU, casework to drywall, and dissimilar façade materials.

150. Include all above-grade waterproofing. All below grade water proofing has been performed by others; include lap as needed and specified.

151. Coordinate termination of air/vapor barrier at roof line with roofer. Include an additional 24" wide by linear footage of roof edge of peel and stick type membrane beyond the roofline to provide proper overlap with roofing vapor barrier.

070002 – ROOFING

152. Include labor and equipment necessary to remove roofing waste and excess material from the roof and into dumpsters furnished by roofing subcontractor.

153. Furnish and install all expansions joints at roof.

154. Roofing contractor to verify heights of all new roofing systems and depth of blocking required. Blocking to be installed by others. Shop drawings shall clearly indicate correct depth of wood blocking at all locations where required.

155. All roof penetrations for MEP systems will be done after the roof is installed. Assume patching of (30) penetrations.

156. Install roof flagging and fall protection for all roof perimeters until roof is complete and inspected, in accordance with OSHA and Consigli Safety Requirements.

157. Roofing material to be stored in a manner that will prevent material from being damaged causing damage or restricting access or egress.

158. Furnish and install acoustic insulation above acoustical roof deck at locations shown on structural drawings.

159. It is understood that roof membrane and roof edge metal may be installed during separate mobilizations. Costs shall be included for temporarily securing and maintaining the edge of the membrane until the metal is installed.

160. Include a contingency of 120 man-hours of labor and $5,000 in material for roof repairs. This contingency to be used at Consigli's discretion and will be tracked accordingly.

084313 – METAL WINDOWS

161. Include provisions to re-mobilize and complete work required at loading bay locations, assume 2 locations.

162. Metal window trade contractor is responsible for all applicable testing listed as specified in section 014529. All trade testing to be completed prior to third party testing. Metal window trade contractor shall provide lift for third party testing agent.

090003 – TILE

163. Furnish and install all reducer strips, transition strips and related accessories between tile and dissimilar materials. Include at all drywall controls joints.

164. Level, patch, clean, detail or otherwise prepare substrate as necessary to ensure proper adhesion or finish prior to finalizing installation.

165. Protect tile floors with ram board or similar. Removal by others.

090006 – RESILIENT FLOORING

166. Include transition strips at all resilient flooring locations regardless of adjacent material.

167. The resilient flooring trade contractor is responsible for all floor preparation required form the tolerances of the concrete slab placement. This subcontractor is responsible for reviewing the condition of the floors and ability to commence their work within two weeks of slab placement.

168. Floor protection removal by others.

169. The resilient flooring trade contractor will not be responsible for the final cleaning or waxing of resilient floors.

090009 – PAINTING

170. Include protection of adjacent materials for over-spray, including unfinished surfaces and materials.
171. Painter should include re-prime (per misc. metals spec) of all stairs prior to finish paint.
172. Fire rating labels shall not be painted or covered.
173. Include a contingency of 120 man-hours of labor and $5,000 in material for touch-up painting (damage of finish paint due to no fault of painter). This contingency to be used at Consigli's discretion and will be tracked accordingly.

095100 – ACOUSTICAL CEILINGS

174. Include provisions to furnish and install additional ceiling tiles in the quantities listed below due to damage caused by other trades. These quantities are in addition to quantities required in the Specifications. Turn over unused tiles to owner for attic stock:
   A. ACT-01 – 1,500 sf
   B. ACT-02 – 1,200 sf
   C. ACT-03 – 150 sf
   D. ACT-04 – 150 sf

175. Furnish and install grid system in its entirety prior to install of any tile. Installation of tile will be done on a return operation and will not be part of the initial sequence of work. Installation of tile will be scheduled by Consigli. Installation of cuts in tile for devices (supplied and installed by others) may be required in a separate mobilization.
176. Provide cutouts in the ceiling, coordinated with other trades, for penetrations and lay-in items, including but not limited to, diffusers, grilles, plates, recessed lights, sprinkler heads and strobes.
177. Subcontractor is responsible for a complete ceiling layout and coordination of issues or conflicts, prior to the installation of grid, including, but not limited to, Mechanical, Electrical, Plumbing, and Fire Protection routing and ceiling heights.
178. Where exposed to view, provide touch-up paint at cut ceiling tile edges.
179. Remove fingerprints and dirt marks upon completion of work.
180. All ACT ceilings to be supported from building structure. Provide uni-strut or similar where necessary to span shown MEP services and equipment.

142100 – ELEVATORS

181. Assume off-site storage will be required.
182. Include 100 hours of elevator operator time for temporary use by others to be used at Consigli's discretion. Include additional protection and maintenance during temporary use.

210000 – FIRE PROTECTION

183. Refer to Section C: 3D Coordination Plan for coordination and modeling requirements.
184. This trade contractor will be provided temperature-controlled field office space within the existing Fuller Middle School, adjacent to Consigli field office. Assume room for (2) desks and file cabinet.
185. Include provisions for all testing as required by local, state and federal codes and regulations.
186. Include provisions to flush and test the new underground service per NFPA 24 back to street main. This may include flushing/testing sections of piping that were installed by another subcontractor.
187. Include provisions to pre-test all flow/tamper devices with fire alarm contractor prior to fire department inspection. Include provisions to test all devices with fire department, make any changes as required, and re-test system as needed to achieve a 100% working system.

188. Include provisions to pressure test all piping to be witnessed by Consigli and Owner's representative. Failure to provide documentation of testing will require re-test at no additional cost.

189. Trade contractor shall be responsible for furnishing all access panels as required to access components of their work. Installation in walls/ceilings by others.

190. All Access doors shall be keyed alike per Owner's standard. Provide access panels with replaceable cores. Final cores by others.

191. Furnish and install drip pans in locations where water piping is run through electrical rooms or technology rooms. Provide drip pan drain piping to nearest floor drain.

192. Do NOT include firestopping at floor and wall penetrations associated with this trade.

193. Include provisions to furnish and install (2) temporary standpipes including signage, hoses, maintenance, etc. for the NFPA-241 Plan.

194. Maintain redline drawings as work progresses, updated weekly at minimum. Redline drawings to be submitted to Consigli monthly with pay requisitions.

195. Record as-built documents shall be in .DWG and .PDF format. It's the subcontractor's responsibility to include in the project record documents modifications shown on all construction documents issued, and any changes made in the field that are not reflected in formally issued construction document.

196. Include all coring and sleeves required for this trade. All slab on deck openings shall be sleeved, and sleeves shall extend minimum of 2" above finished floor. This includes both round and square openings of all sizes.

197. Include provisions to cut away metal deck from sleeved opening locations once slab is placed. Include provisions to protect all openings per OSHA standards immediately after cutting away decking.

198. Comply with all start-up and commissioning procedures as outlined in specification 019113. Consigli shall require all paperwork / checklists to be signed and turned in by Sub Contractors prior to scheduling startup / commissioning of all Mechanical, Electrical, Plumbing, and Fire Protection Systems.

220000 – PLUMBING

199. Refer to Section C: 3D Coordination Plan for coordination and modeling requirements.

200. This trade contractor will be provided temperature-controlled field office space within the existing Fuller Middle School, adjacent to Consigli field office. Assume room for (2) desks and file cabinet.

201. Include drafting manpower as required to submit the following coordination drawing CAD plumbing layers within 6 weeks of award of contract: underground coordination and storm water system including roof drain locations, overhead piping and risers and all floors.

202. Include provisions for all testing as required by local, state and federal codes and regulations.

203. Include provisions to pressure test all piping to be witnessed by Consigli and Owner's representative. Failure to provide documentation of testing will require re-test at no additional cost.

204. Plumbing trade contractor shall be responsible for furnishing all access panels as required to access components of their work. Installation in walls/ceilings by others.

205. All Access doors shall be keyed alike per Owner's standard. Provide access panels with replaceable cores. Final cores by others.

206. Furnish and install drip pans in locations where water piping is run through electrical rooms or technology rooms. Provide drip pan drain piping to nearest floor drain.

207. Do NOT include firestopping at floor and wall penetrations associated with this trade.

208. Plumbing trade contractor to provide templates for sinks located in countertops by others within (1) week of product approval.

209. Examine drawings to ensure compliance with ADA clearances. Any discrepancies must be submitted as an RFI prior to installation of plumbing.

210. Provide (2) temporary 1" cold water risers in Stairs #1 and #2 for use by other trades during construction. Include standard hose valve at each floor including roof level and ½" drain valve at base of riser and at water source. Risers installation planned for September 2020.

211. Install roof drain bodies prior to roof installation. Include provisions to install permanent rain leaders for all roof drains down to the first floor level (through 2nd floor SOD) prior to placement of roof slabs. Install and

maintain temporary rain leader piping overhead on the 1st floor from each vertical riser to the nearest exterior opening.

212. Maintain redline drawings as work progresses, updated weekly at minimum. Redline drawings to be submitted to Consigli monthly with pay requisitions.

213. Record as-built documents shall be in .DWG and .PDF format. It's the subcontractor's responsibility to include in the project record documents modifications shown on all construction documents issued, and any changes made in the field that are not reflected in formally issued construction document.

214. Include all coring and sleeves required for this trade. All slab on deck openings shall be sleeved, and sleeves shall extend minimum of 2" above finished floor. This includes both round and square openings of all sizes.

215. Include provisions to cut away metal deck from sleeved opening locations once slab is placed. Include provisions to protect all openings per OSHA standards immediately after cutting away decking.

216. Comply with all start-up and commissioning procedures as outlined in specification 019113. Consigli shall require all paperwork / checklists to be signed and turned in by Sub Contractors prior to scheduling startup / commissioning of all Mechanical, Electrical, Plumbing, and Fire Protection Systems.

230000 – HVAC

217. Refer to Section C: 3D Coordination Plan for coordination and modeling requirements.

218. This trade contractor will be provided temperature-controlled field office space within the existing Fuller Middle School, adjacent to Consigli field office. Assume room for (2) desks and file cabinet.

219. HVAC contractor to manage coordination drawing signoff process including collecting and over-laying CAD signoff layers from other trades and distributing drawings for signoff. Refer to attached 3D Coordination Supplemental Instructions for details.

220. Include provisions for all testing as required by local, state and federal codes and regulations.

221. Include provisions to pressure test all piping to be witnessed by Consigli and Owner's representative. Failure to provide documentation of testing will require re-test at no additional cost.

222. Furnish and install drip pans in locations where water piping is run through electrical rooms or technology rooms. Provide drip pan drain piping to nearest floor drain.

223. Do NOT include firestopping at floor and wall penetrations associated with this trade.

224. Maintain redline drawings as work progresses, updated weekly at minimum. Redline drawings to be submitted to Consigli monthly with pay requisitions.

225. Record as-built documents shall be in .DWG and .PDF format. It's the subcontractor's responsibility to include in the project record documents modifications shown on all construction documents issued, and any changes made in the field that are not reflected in formally issued construction document. Refer to 01 78 39 for additional requirement

226. Include all coring and sleeves required for this trade. All slab on deck openings shall be sleeved, and sleeves shall extend minimum of 2" above finished floor. This includes both round and square openings of all sizes.

227. Include provisions to cut away metal deck from sleeved opening locations once slab is placed. Include provisions to protect all openings per OSHA standards immediately after cutting away decking.

228. HVAC trade contractor shall be responsible for furnishing all access panels as required to access components of their work. Installation in walls/ceilings by others.

229. All Access doors shall be keyed alike per Owner's standard. Provide access panels with replaceable cores. Final cores by others.

230. Comply with all start-up and commissioning procedures as outlined in specification 019113. Consigli shall require all paperwork / checklists to be signed and turned in by Sub Contractors prior to scheduling startup / commissioning of all Mechanical, Electrical, Plumbing, and Fire Protection Systems.

231. Include provisions to provide temporary construction filter media over all return grilles prior to balancing, removal of construction filters on a system by system basis as balancing occurs, re-installation of construction filters once balancing of each system is complete, and removal of all construction filters prior to occupancy. Inspect filters weekly and replace as needed.

232. In addition to factory-furnished filters, include provisions for air filter changes for all equipment following completion of TAB, and a separate filter change prior to final occupancy.

233. Protect ends of all ductwork and equipment prior to delivery to the site. Inspect all ductwork stored on site daily and repair any end protection that's been damaged. Protect all open ends of installed ductwork at the end of each shift.

260010 – ELECTRICAL

234. Refer to Section C: 3D Coordination Plan for coordination and modeling requirements.

235. This trade contractor will be provided temperature-controlled field office space within the existing Fuller Middle School, adjacent to Consigli field office. Assume room for (2) desks and file cabinet.

236. Include provisions for all testing as required by local, state and federal codes and regulations.

237. Trade contractor shall be responsible for furnishing all access panels as required to access components of their work. Installation in walls/ceilings by others.

238. All Access doors shall be keyed alike per Owner's standard. Provide access panels with replaceable cores. Final cores by others.

239. Provide temporary power in the new building per specification 015000 paragraph 2.3.D. Include temporary power to (4) subcontractor trailers.

240. Establish and maintain temporary LED lighting and stringers for new building per specification 015000 paragraph 1.8 and OSHA standard 1915.82(a)(2) at all times during construction until permanent lighting is installed. Furnish and install one switch to control temporary lighting for the entire building. Provide a temporary lighting plan to Consigli for approval prior to installation of temporary lighting. Include provisions to remove all temporary lighting prior to final inspections.

241. Do NOT include firestopping at floor and wall penetrations associated with this trade.

242. Include with the fire alarm submittal a floor plan drawing with a tag at each FA device indicating how the device will be named in the fire alarm control panel. Include provisions to meet with the fire department to discuss naming convention and to update the floor plan drawing following review by the fire department.

243. Include provisions to re-program, upload and re-test the fire alarm device naming one-time following fire department testing

244. Electrical trade contractor shall pretest Fire Alarm system prior to inspection by Framingham FD. Pre-Test shall be witnessed by Consigli.

245. This trade shall own all power and control wiring and final connections to electrified door hardware, whether supplied by this trade or others. Refer to the door hardware schedule for electrified hardware scope

246. Include installation and wiring of starters and drives furnished by other trades.

247. Maintain redline drawings as work progresses, updated weekly at minimum. Redline drawings to be submitted to Consigli monthly with pay requisitions.

248. Record as-built documents shall be in .DWG and .PDF format. It's the subcontractor's responsibility to include in the project record documents modifications shown on all construction documents issued, and any changes made in the field that are not reflected in formally issued construction document.

249. Include all coring and sleeves required for this trade. All slab on deck openings shall be sleeved, and sleeves shall extend minimum of 2" above finished floor. This includes both round and square openings of all sizes.

250. Include provisions to cut away metal deck from sleeved opening locations once slab is placed. Include provisions to protect all openings per OSHA standards immediately after cutting away decking.

251. Comply with all start-up and commissioning procedures as outlined in specification 019113. Consigli shall require all paperwork / checklists to be signed and turned in by Sub Contractors prior to scheduling startup / commissioning of all Mechanical, Electrical, Plumbing, and Fire Protection Systems.

252. Include provisions to provide temporary 3-phase power to elevator.

SECTION B: QUALITY PLAN

Quality is based on the customer's perception of a finished product's construction and how well the construction matches the original specifications, the ability of the product to service and satisfy stated or implied needs and is achieved by conforming to established requirements.

Improving quality will increase owner satisfaction; and decrease project costs and schedule duration by reducing or eliminating re-work, which shortens the length and limits the severity of the punch list at the project's end.

Goals:

- Provide an excellent construction product
- Reduce re-work
- Improve close out performance

Quality is measured by:

- Close out performance
- Owner satisfaction

A **pre-operation meeting** will be held prior to starting any major operation.

- Operations that require meetings will be specified at the kick off meeting prior to the start of the project.
- This meeting details how major operations will be completed and establishes what results are expected. Expected results will be based on a review of the specification and an analysis of the effect this operation has on the finished product.
- It establishes installation durations of each part of the subcontractor's scope.
- It establishes manpower requirements to meet the project schedule.
- It confirms delivery dates of all materials to the project site.
- It establishes the maximum time to repair deficient work.
- It establishes the maximum time to complete end of job punch list.
- This meeting will be scheduled by the Project Engineer.
- Attendance at the meeting will include project superintendent, project engineer, craft foreman, subcontractor supervisor (as required), owner's representative/inspector, and architect.
- Any **mockups** or **product samples** will be a major focus of this meeting. The form of, and the time frame to create, the mockup and a date to jointly review it will be discussed. Product samples will be reviewed at the pre-operation meeting.
- A checklist to be used during periodic inspections will be formulated. Consigli will formalize the checklist and distribute it to the subs or foremen.
- For coordination purposes, subcontractors may be required to attend pre-operation meetings for other trades.
- Consigli's Project Engineer ensures that notes are recorded and distributed

Consigli and subcontractors will **inspect the quality of our work weekly**.

- The inspection checklist formulated at the kickoff meeting will be used to carry out the inspection.
- Inspection will be performed by the supervisor in charge of that portion of the work. A separate inspection will be performed by a Consigli representative in addition to the subcontractor's inspection.
- Consigli inspections of the work will be the responsibility of the project team and all are expected to participate – superintendent, manager, and engineer.
- All issues will be noted on the deficiency log or corrected immediately

A **deficiency log** will be distributed weekly and will include all noted deficiencies.

- The log will identify outstanding deficiencies, date noted, date a solution was proposed, date for proposed solution completion, date deficiency actually corrected.
- The responsible party has one week to correct noted deficiencies. The solution will be submitted to the owner by the CM if required.
- Time frame for the proposed solution will be noted on the returned report.
- Time to repair items will be tracked and compared with time established at the kickoff meeting.
- Maximum time to complete end of job punch list will be tracked and compared with the time established at the kickoff meeting.
- The deficiency log is a listing of issues associated with work in place that is incorrect and needs to be fixed. The short-term schedule should list work that is not complete. If work noted on the short-term schedule is not completed properly then those items can be added to the deficiency log.
- The general superintendent will rate the timeliness of the log, the accuracy of the log, and the efficiency of the log.
- Items not fixed, repaired, or replaced within three weeks of being notified of the deficiency, will be completed by the CM and associated monies will be withheld from the responsible subcontractor.

The deficiency log will be discussed at the **weekly subcontractor meeting**.

- The Subcontractor's on-site personnel will be required to attend weekly project mandatory meetings with the CM's on-site personnel, and other appropriate parties when directed by the Contractor's Project Manager. Absence from required meetings will result in a fine of $500.00 per incident.
- If a subcontractor is performing work onsite, has work on the four-week schedule, has work on the four-week schedule that affects his work, or has an open item on the deficiency log, then they are required to attend the meeting.

Performance on the quality plan will be evaluated monthly and a report with an overall score will be issued.

SECTION C: 3D COORDINATION PLAN

PART 1 – GENERAL

1.1 Summary

1. Models will be prepared by each individual trade for the Coordination process. All relevant models will be incorporated into one review file (by CCC) for use during coordination meetings, and similarly the 2D coordination drawings will be compiled into one review drawing (by the mechanical subcontractor).
2. The coordination team will utilize NavisWorks Manage 2018 to expedite the drawing review process, identify clashes and reach consensus on solutions. A free NavisWorks viewer is available and should be used by subcontractors to view the coordination model.
3. It is understood that drawings, models and specifications are scope documents which indicate the work and intent of the project and, as such, the drawings and specifications do not necessarily indicate or describe all work required for the full performance and completion of the work. This Subcontract is awarded on the basis of such scope documents with the understanding that the Subcontractor is to furnish and install all items required for the proper completion of his work without adjustment to the Subcontractor price.
4. If the subcontractor does not have the in-house capability/capacity to produce the required model(s), they may utilize the services of a 3rd party modelling service subject to Consigli and Owner's approval.

PART 2 – PRODUCTS

2.1 Software

1. Subcontractor shall provide the team with 2D and 3D .dwg files (Revit Suite 2018) for their scope of work.
2. The coordination modeling software will be NavisWorks 2018.

2.2 Drawings and Models

1. Base Drawings
   a) 2D CAD base drawings (architecture and structure) will be provided from the Design Documents.
   b) Any additional preparation required to make the drawings sufficient for coordination purposes (steel elevations, etc.) shall be performed by the mechanical subcontractor prior to the start of coordination. These base drawings shall be used by all subcontractors for the coordination effort.
2. Coordination/Shop Drawings
   a) 2D coordination drawings shall be produced by each trade and will be compiled and printed by the mechanical subcontractor for the coordination meetings and final sign-off.
   b) 3D coordination models will also be produced by each trade, to be combined into one coordination model by Consigli for the coordination meetings.
3. Record/As-Built Drawings
   a) Subcontractors shall maintain their model(s) during construction to match the 'as-built' condition of their installed work.
   b) Subcontractors shall provide as-built updates to Consigli on a monthly basis as part of the requisition process.
   c) Subcontractors shall provide as-built updates via 3D model and PDF (no hard copies).

PART 3 – EXECUTION

3.1 Coordination Process

1. Kickoff Meeting

a) Consigli will schedule, prior to the start of coordination, a kickoff meeting to discuss coordination specifics.
b) Each subcontractor shall attend with their Project Manager, Foreman and modeler.

2. Coordination Meetings
   a) Each trade contractor is required to take part in regular coordination review meetings. The time and place for these meetings will established by Consigli.
   b) The purpose of the coordination meeting is to resolve interferences between building systems that could not be resolved by the ongoing coordination efforts between subcontractors. The coordination meeting is NOT the primary venue for resolving conflicts; subcontractors must work collaboratively to coordinate their work outside of this meeting.
   c) Subcontractors' foreman, modeler/draftsperson and/or person authorized to act and make decisions on behalf of their organization shall attend each coordination meeting. Virtual attendance via telephone and the web may be acceptable if approved by Consigli in advance.
   d) If conflicts are identified and a resolution is agreed upon it is the subcontractor's responsibility to make the necessary changes in their model and republish said model to the project file sharing site at least 24 hours prior to the next meeting unless another timeframe is agreed upon.
3. Order of Modeling
   a) Unless otherwise noted in the bid packages and subcontract agreement, the sheet metal contractor shall model first and shall publish their model with major trunk lines and risers shown which will serve as the basis for the other trades to begin their individual models.
   b) The order of subcontractors modeling efforts shall be sheet metal, mechanical piping, plumbing, fire protection and electrical. Modeling/drawing shall be in sequence by trade once sheet metal has posted their initial files unless agreed upon by all parties. Any subcontractor who draws out of sequence will re-coordinate their scope at their own cost should there be conflicts.
4. Clash Identification and Resolution
   a. Each trade is responsible for coordinating their systems to avoid systems that were drawn prior.
   b. Each trade is to perform Clash Detection prior to posting new drawings to confirm that added and updated systems fit properly in the space and do not create any new clashes with other trades. Clash detection can be performed using Navisworks Manage 2018 or similar 3D modeling software. Consigli may request clash report results from individual trades, and clash report files should be saved and maintained throughout the coordination process
   c. When a clash is identified, drafters shall notify the other trade involved and work collaboratively to determine a resolution. Notify Consigli only if the two trades are not able to achieve resolution by relocating their systems, or when design or architectural modifications are required.
   d. Each trade is responsible for submitting RFIs for record in cases where conflict resolution requires design changes or incurs additional cost.
5. Sign-off drawings
   a) Upon completion of coordination activities for a floor or area as deemed appropriate by Consigli, a 2D drawing or series of drawings (extracted from the models) representing the floor or area will be compiled and plotted by the assigned subcontractor and signed by all members participating in the coordination. This will become the record coordination document.
   b) Digital or model signoffs may be implemented if agreed upon by the project team.
   c) Refer to attached drawings showing breakdown of coordination areas. Trades to provide signoff drawings for each of the areas shown
   d) All trades to provide hard color copy of their trade specific drawings to the scale determined by the VDC Manager.
6. Information Sharing
   a) Coordination files will be saved to the project file sharing site for access by all trades, Consigli and the owner's representative. It will be the subcontractor's responsibility to maintain the appropriate models in the correct file at all times.

b) Model updates will be posted weekly. The subcontractor shall issue a notification via email to each of the other coordination team members notifying them that new information is available for upload unless the file share site provides notifications automatically. Email shall not be the primary method of delivering model files or drawing updates.

7. Change Conditions
   a) In the event the design changes are issued by approved bulletin, CCD or other method which will result in changes in the model/models, it is the responsibility of the subcontractor to make any and all changes required for coordination and compliance with the design in conjunction with the design team.
   b) The trade contractor may include the cost of modeling and coordination if warranted into their request for change authorization. Change Conditions
   8. Responsibility
      a. All trades must model specifically to equipment to be used in the field in order ensure the accuracy of the model which will subsequently be built in the field.
      b. All trades are responsible for field verification of conditions as they develop during construction that may impact the coordination process. This will include, but no the limited to RFI's, bulletins, etc.
      c. All trades are responsible for any clashes in the model that are carried into the field during the fabrication and installation process at no added cost to both the GC and The Owner.

3.2 <u>3D Modeling</u>

1. Overall content and conventions:
   a) Each trade contractor will be responsible for producing the 2D drawings and 3D models necessary to represent their complete scope of work.
   b) All elements must be drawn to scale and shall be a true representation of what is to be installed in the field in all three dimensions.
   c) One common file origin or project insertion point (x,y,z) shall be agreed upon by the project team. Any conflicts that arise due to non-adherence with the insertion point shall be the responsibility of the non-compliant trade contractor. Any files that are submitted without a graphic insertion point or with an incorrectly placed insertion point will be rejected.
   d) Posted trade coordination drawings/models should contain only the scope for that trade plus the agreed upon insertion point.
   e) File naming convention: file names shall be descriptive to include author, date and floor level.
   f) Working units, unless otherwise specified, shall be in inches.
   g) All trades must use a separate color as follows or as agreed upon for each trade:
      a. Ductwork – Blue
      b. Fire Protection – Red
      c. Plumbing – Green
      d. Process piping – Cyan
      e. Mechanical Piping – Magenta
      f. Electric/Data – Orange
      g. Architectural Backgrounds – Grey

2. Stratification
   a) Each trade will be assigned specific work zone elevations (top and bottom) to run racks and mains. The assigned trades will take precedence in these areas, when traveling outside of these areas the following rules apply. (Additional rules may be instituted at the first coordination meeting).
      a. Immovable objects (equipment pads, hoods, shafts)
      b. Graded piping routed throughout floors (waste, storm drainage, high purity)
      c. Item coordinated with structure (duct penetrations shown on structural)
      d. Items located in their designated area (piping zone, pipe rack, cable tray)

e. Items that require access (VAV's, shut off valves, fire/smoke dampers, etc.)

3. System Models and Level of Detail (LOD)
   a) The level of detail defined in each section below (Modeling Standards) is the minimum level of detail required in the model. Greater detail than the minimum should be incorporated in the model whenever inclusion of such detail will improve spatial or sequencing coordination of the work.
   b) Pre-purchased equipment shall be the responsibility of the contractor assigned to receive, install and coordinate the equipment. This subcontractor shall be fully responsible for layout, 3D drawings and coordination of the pre-purchased equipment.
   c) Each trade contractor is responsible for modeling protected access zones. Access zones should be drawn at less than 100% shading or transparency as not to obscure the main fixture or element being protected or shall have another similar identifying characteristic.
   d) Individual model elements (such as VAV boxes, pumps etc.) described in further detail below shall each contain the specific and individual name/information assigned to it as per the design documents, following the approved naming conventions established by the Owner.

4. Modeling Standards
   a) HVAC Sheet metal Standards
      a. All ducts, related accessories (including but not limited to standard dampers, fire dampers, VAV boxes, diffusers, turning vanes, etc.) and HVAC equipment will be modeled.
      b. Ducts will be modeled to the outside face dimension of duct or duct insulation.
      c. Hangers and inserts/embeds must be modeled where necessary to coordinate with the work of other trades.
      d. Access zones shall be modeled for all elements requiring access including but not limited to equipment, fixtures, standard dampers, fire dampers, VAV boxes, diffusers, turning vanes, etc.
      e. All equipment shall be modeled to its overall height, width and depth.
      f. All access panels shall be modeled, including access zones above and below.
      g. In the event that seismic bracing for suspended elements is required by code, such bracing shall be included in the model.

5. HVAC Piping Standards
      a. All piping, related accessories (valves, air vents, drain valves, flow meters, etc.) and HVAC equipment will be modeled.
      b. Pipes will be modeled to the outside diameter of the pipe; pipe insulation shall be modeled if present.
      c. Hangers and inserts/embeds must be modeled where necessary to coordinate with the work of other trades.
      d. Equipment will be modeled to its overall height, width and depth.
      e. Access zones shall be modeled for all elements requiring access including but not limited to equipment, fixtures and valves.
      f. All access panels shall be modeled, including access zones above and below.
      g. In the event that seismic bracing for suspended elements is required by code, such bracing shall be included in the model.

6. Plumbing and Specialty Piping Standards
      a. All plumbing, specialty piping, related accessories (valves, air vents, drain valves, flow meters etc.) and equipment will be modeled (piping 1 1/2" diameter or larger). Process piping 2" diameter or larger shall be modeled. Under slab piping shall be modeled.
      b. Pipes will be modeled to the outside diameter of the pipe; pipe insulation shall be modeled if present. Pipe slope will be incorporated in the model.

c. Hangers and inserts/embeds must be modeled where necessary to coordinate with the work of other trades.
d. Equipment will be modeled to its overall height, width and depth.
e. Access zones shall be modeled for all elements requiring access including but not limited to equipment, fixtures, valves and cleanouts.
f. All access panels shall be modeled, including access zones above and below.
g. In the event that seismic bracing for suspended elements is required by code, such bracing shall be included in the model.

7. Electrical Standards
   a. All conduit/MC cabling (1 1/2" dia. and larger), power feeds to equipment, switch gear, panels, junction box, floor box and pull station locations will be modeled. Where groups of smaller conduits are run together, a graphic representation of the overall dimension of the grouped conduit must be substituted.
   b. Light fixtures with above-ceiling space requirements are to be included in the model and coordinated with reflected ceiling plan. All access zones or clearances to maintain light fixtures will also be modeled.
   c. Equipment and cable tray with access zones to be included in the model. Equipment will be modeled to its overall height, width and depth.
   d. Equipment and junction box access zones per specification and code (whichever is greater) shall be modeled.
   e. All access panels shall be modeled, including access zones above and below.
   f. In the event that seismic bracing for suspended elements is required by code, such bracing shall be included in the model.

8. Fire Protection (Sprinkler, Fire Alarm)
   a. All components of the fire protection system will be modeled. Access zones shall be modeled for all elements requiring access including but not limited to equipment, fixtures, valves and controllers.
   b. Locate all piping, valves, fire pump, and sprinkler heads.
   c. Hangers and inserts/embeds must be modeled where necessary to coordinate with the work of other trades.
   d. All access panels shall be modeled, including access zones above and below.
   e. In the event that seismic bracing for suspended elements is required by code, such bracing shall be included in the model.

9. Structure
   a. All structural steel shall be modeled, including but not limited to columns, beams, braces, gusset plates, connections, reinforcing plates and angles, pour stops, metal grating, seismic or secondary supports and beam penetrations.
   b. All concrete structural elements shall be modeled, including but not limited to footings, foundations, slabs, walls, columns and beams.
   c. The model elements shall contain non-graphic information that associates each element with its erection sequence as appropriate and identifies the size of the structural element.

SECTION D: NOISE CONTROL PLAN

1. **INTRODUCTION**
   This Noise Control Plan is intended to identify, record, and mitigate potential noise impacts from work areas throughout construction activity. Consigli Construction Co. Inc. will monitor and control work area noise to meet local ordinance requirements during each phase of construction.

2. **CONTROL MEASURES**
   Consigli Construction Co., Inc. will check all equipment prior to its arrival on site to determine it has been properly maintained and is running at suitable noise levels and within industry standards. In the case the equipment is not operating properly, maintenance will be performed prior to arrival at the jobsite. Daily inspections will occur to assure equipment continues to operate properly. Work is scheduled for day shift only and is not intended to be operated during the night.

3. **REPORTING**
   Should a noise violation occur, Consigli Construction Co., Inc. should be notified immediately in order to make the proper adjustments.

4. **MONITORING**
   Work areas will be monitored to verify noise has not exceeded desired levels. This monitoring will occur at the beginning of the construction, when new construction activities occur, when construction activities begin at a new location, when equipment modifications occur, and throughout construction activities.

5. **MITIGATION**
   In the instance that a noise exceedance is reported, engineering controls are to be implemented to control the issue. Controls may include shrouds, barriers, or changing of equipment when practical. Corrective measures will be performed as quickly as possible. Should these corrective measures fail to mitigate the problem, the situation will be further analyzed.

6. **EQUIPMENT**
   An equipment list will be presented prior to the start of construction to identify potential noise issues and outline what type of noise can be expected. All pieces of equipment listed may not be used all at one time, but may be used in some combination thereof. These pieces of equipment will be monitored and checked for compliance.

7. **SCHEDULING**
   See section A.1 for work hours, and vehicle and delivery restrictions.

SECTION E: PROJECT SAFETY REQUIREMENTS

1. HEALTH AND SAFETY HAZARD AWARENESS

Subcontractor recognizes that it and its Subcontractors, suppliers and employees have the obligation to comply with all federal and/or state safety and health laws and regulations. Subcontractor specifically acknowledges that it has the primary responsibility to prevent and/or correct all health and safety hazards within the operations for which it and its employees or its Subcontractors and their employees are responsible. Subcontractor further acknowledges that it and its Subcontractors, suppliers and employees have special expertise in recognition and prevention of such hazards in the operations for which they are responsible, and that Contractor does not have such expertise and is relying upon such expertise by Subcontractor and its Subcontractors, suppliers and employees. Contractor retains the right to direct Subcontractor to eliminate all hazards of which Contractor has actual knowledge, but the recognition and abatement of such hazards are the responsibility of Subcontractor and its Subcontractors, suppliers and employees. Subcontractor agrees to indemnify Contractor and all other Subcontractors for all costs and penalties incurred, including attorney fees, as a result of hazards created by Subcontractor, its Subcontractors, suppliers and employees. Subcontractor hereby certifies that it will not allow on the project site any Subcontractor, supplier and/or employee of any of them who is not fully trained in all safety aspects of the Subcontract Work and who is not expert in the operations comprising the Subcontract Work.

2. OSHA REQUIREMENTS

The Subcontractor hereby acknowledges that it is familiar with the Federal Regulation 29CFR Part 1926 - Safety and Health Regulations for Construction. In compliance with that regulation, the Contractor has developed a written Hazard Communication Program identifying the requirements for hazardous material identification. The Subcontractor hereby agrees to conform with the requirements of the OSHA regulations and to follow the procedures set forth in the Contractor's Communication Standard identified herein and in accordance with those regulations and that standard shall forward to the Contractor's office to the attention of the Safety Coordinator copies of all "Material Safety Data Sheets" for materials being brought onto the jobsite. The "Materials Safety Data Sheets" shall be accompanied by a letter of transmittal stating the name of the Subcontractor, the name and location of the jobsite, description of what "Material Safety Data Sheets" are being sent and any special precautionary measures that should be taken when using these materials.

3. BASIC SAFETY RULES AND REGULATIONS

The Subcontractor hereby agrees to comply completely during the performance of the Subcontract Work with all of the Contractor’s designated safety programs for the project.

4. ACCIDENT REPORTING

The Subcontractor hereby acknowledges and agrees to orally notify the Contractor's Project Superintendent immediately after any of the Subcontractor's employees and/or equipment and/or motor vehicles or any of its lower tier subcontractor's and/or supplier's employees and/or equipment and/or motor vehicles are involved in a jobsite accident or injury. Further, the Subcontractor also hereby acknowledges and agrees to provide the Contractor with a completed first report of injury within five (5) days after any of the Subcontractor's or any of its lower tier subcontractor's or supplier's employees are injured in a jobsite accident.

5. OSHA 10 HOUR TRAINING

All Subcontractors’ personnel shall have OSHA 10 hour construction training and certification prior to working on any Consigli Construction Co. Project site. Personnel that are not trained will be asked to leave the respective project site until certification is obtained.

6. CRANE SAFETY POLICY

When mobilizing cranes on site for completion of their respective work, all Subcontractors shall comply with the Contractor’s Crane Safety Policy, including but not limited to, third party independent inspection of all Lattice Boom and Tower Cranes during set up and prior to operation.

7. OSHA REQUIREMENTS FOR EXCAVATION

The Subcontractor hereby acknowledges and certifies that it is familiar with Federal Regulation 29 CFR, Part 1926, Subpart P - Excavations, as revised and as printed in the Federal Register on Tuesday, October 31, 1989, and the Subcontractor hereby agrees to perform the Subcontract Work in full accordance with all of the requirements set forth in this regulation.

8. **OSHA RECORDABLE INCIDENT RATES**
   The Subcontractor will be required to submit on a monthly basis its OSHA recordable and lost day incident rates for this specific Project if specifically required by the Contractor's Project Manager or Project Superintendent.

9. **SAFETY PRECONSTRUCTION MEETNIG**
   It is mutually understood and agreed that the Subcontractor shall attend a safety preconstruction meeting to review all safety requirements as pertains to the completion of the work of their Subcontract. This shall take place on-site, prior to the start of work, with the Consigli safety representative.

10. **CONSIGLI SAFETY RULES AND REGULATIONS**
    The successful Bidder/Subcontractor, as a condition of employment, will be required to comply with all applicable Federal, State, County, Municipal, Client and Construction Manager SAFETY RULES AND REGULATIONS. **(NOTE: Federal OSHA Standards are referenced, however the more stringent of State, Owner or Local Safety Codes will also apply.)**

Subcontractors found in non-compliance with any of the applicable rules and regulation will receive a "Notice of Violation" either oral or written. Failure to abate the violation or continued failure to comply with the Basic Safety Rules and Regulations may result in a monetary fine. Monetary fines, if assessed, will only be used by the Construction Manager to fund programs at the Jobsite to promote Safety.

Following is a list of the Basic Safety Rules and Regulations, many of which carry the potential for a monetary fine and the amount of the fine which could be assessed:

- Subcontractor shall submit its company SAFETY PROGRAM/HAZCOM PROGRAM and designate its Jobsite Safety Coordinator prior to starting work. *Failure to do so may result in a $500.00 fine assessed to the Subcontractor.*
- All job related ACCIDENTS AND INJURIES shall be reported to the Consigli Construction Company's Project Superintendent immediately and a copy of all injury reports shall be submitted to the Project Superintendent within (72) hours of occurrence. *Failure to do so may result in a $500.00 fine to the Subcontractor.*
- Subcontractor's employees must report all UNSAFE CONDITIONS AND NEAR ACCIDENTS to their supervisor and the Jobsite safety officer so that corrective action can be taken.
- Subcontractor's employees shall attend any Jobsite SAFETY ORIENTATIONS as required. Subcontractor's supervisors shall attend Consigli's WEEKLY SAFETY MEETINGS. Subcontractor must hold a "Weekly Tool-Box Safety Meeting" and submit for record those employees who have attended, along with a list of topics and related information discussed. Failure to comply with any of the above may result in $500.00 fine assessed to the Subcontractor per written incident.
- Copies of CERTIFICATIONS FOR SPECIALIZED TRAINING required to perform certain types of hazardous work or operate certain tools and equipment may be required to be submitted prior to work commencing.
- Subcontractor shall provide all required PERSONAL PROTECTIVE EQUIPMENT (PPE) (i.e. head, hearing, eye and face protection) to his employees for their use in order to perform their work safely and in compliance with local and federal codes of safe practice and manufacturers recommendations. All equipment shall be in good working order and all defective equipment shall be discarded and removed offsite immediately. *Failure to do so may result in a $500.00 fine for each violating employee, assessed to the Subcontractor.*

- HARD HATS (ANSI Z89.1) shall be worn at all times on site. Alterations or modifications of hat or liner shall be prohibited. *Failure to wear hard hats may result in a $500.00 fine for each violating worker assessed to the Subcontractor.*
- SAFETY GLASSES (ANSI Z87.1) shall be worn 100% of the time. *Failure to do so may result in a $500.00 fine for each violating employee, assessed to the Subcontractor.*
- HEARING PROTECTION shall be worn in areas where noise levels exceed 90 DBA, where exposure to 85-90 DBA exceeds (8) hours per day, or where posted. *Failure to wear hearing protection when required may result in a $500.00 fine for each violating employee, assessed to the Subcontractor.*
- All workers must wear CLOTHING having adequate protection to the body. Sturdy work boots, shirts with sleeves and long pants must be worn. No sneakers, sandals, tank tops, cut-off shirts or shorts allowed. High visibility safety vests are required when working on the exterior of the building. *Failure to be properly clothed may result in a $500.00 fine for each violating worker, assessed to the Subcontractor.*
- Subcontractor must implement a RESPIRATORY PROTECTION PROGRAM per OSHA standards as required by their respective trades and working conditions in field. *Failure to do so may result in a $500.00 fine for each day that sub does not conform to OSHA standards.*
- "HORSEPLAY" on the Jobsite is strictly prohibited. No running on Jobsite unless extreme emergencies warrant. Fighting on construction premises will result in immediate dismissal of employee, who shall be excluded from all Consigli's construction projects.
- Subcontractor shall provide FALL PREVENTION barricades, covers, rails, etc. to protect all roof, floor or wall openings, pits, holes, etc., that have resulted from their work performance. Unsafe conditions must be corrected immediately. *Failure to do so may result in a $1,000.00 assessment to the Subcontractor.*
- Subcontractors must provide FALL PROTECTION (harnesses/shock-absorbing lanyards, etc.) as required for their employees where permanent or temporary fall prevention is not in place, and for compliance with OSHA . *Failure to do so may result in a $1000.00 fine assessed to the Subcontractor.*
- FIREARMS, ALCOHOLIC BEVERAGES OR ILLEGAL DRUGS are not allowed on site. Personnel, vehicles and equipment are subject to search upon entering or leaving and while on the site premises. The use of alcohol beverages or the use and possession of illegal drugs during the workday, either on site, during breaks or lunch, or before work, is prohibited. *Anyone caught using illegal drugs or alcohol, during any of these times is subject to immediate termination or dismissal from the site indefinitely and a $1000.00 fine may be assessed to the Subcontractor for each violating worker involved.*
- CAMERAS AND RECORDABLE DEVICES are not allowed unless approved through Consigli Construction Company project manager's office.
- All Subcontractors shall keep their respective areas clean and hazard free. HOUSEKEEPING will be done on a daily basis or more frequently if conditions warrant. Failure to do so may result in a back charge to the Subcontractors involved for clean-up directed by Consigli Construction Company.
- All TOOLS, whether company or personal, must be in good working condition. Defective tools must not be used and should be removed offsite (i.e. chisels with mushroom heads, hammers with split or loose handles, saws or grinders missing guards, etc.). *Failure to comply may result in a $500.00 fine assessed to the Subcontractor.*
- Ground Fault Circuit Interrupters (GFCI's) shall be used on all extension cords, electric tools and portable electric equipment powered from a temporary electric service or generator. Tools and equipment shall be inspected each week by a competent person for defects. If electrical power is used from permanent power system or existing building, the Subcontractor shall provide a GFCI system between his equipment and permanent power. Substitution of an "assured grounding program" in lieu of 100% GFCI protection requires

authorization from Consigli Construction Company and compliance to OSHA 1926.404(b)(iii), i.e. written program, competent person, daily inspections, tests, etc. *Failure to comply may result in a $500.00 fine assessed to the Subcontractor.*

- PERMITS, written and properly authorized may be required for work of any type including welding and open flame, electrical "hotwork", excavation, confined spaces, cranes, lockout/tagout, blasting, fire protection water, powder-actuated tool, etc. Check with Consigli Construction for work permits required. *Failure to do so may result in a $1,000 fine assessed to the Subcontractor.*
- Subcontractor must obtain HOTWORK PERMIT for all open flame work as required by the Project Superintendent/Jobsite Safety Coordinator. During welding, burning, soldering, cutting, grinding, or using gas heaters or salamanders, adequate fire prevention precautions must be implemented, consisting of removal of flammables and combustibles, protection of adjacent areas, appropriate fire extinguishers or standpipes, and similar measures. If these are not employed, then a fire watch, equipped with an approved portable fire extinguisher is required during, and for a sufficient time after, the welding, burning, cutting or grinding operation. *Failure to comply may result in a $1,000.00 fine assessed to the Subcontractor.*
- BURNING AND CUTTING EQUIPMENT shall be inspected daily before being used. All hoses and manifolds shall be removed from bottles and protective caps replaced at end of each day. *Failure to do so may result in a $500.00 fine assessed to the Subcontractor.*
- Crowfoot connections of COMPRESSED AIR HOSES shall be wired to prevent accidental disconnection. *Failure to do so may result in a $500.00 fine assessed to the Subcontractor.*
- LOCKOUT/TAGOUT procedures are in force and shall be followed to protect persons from injury due to inadvertent operation of power-driven equipment, opening of pipeline valves, or energizing of electrical circuits. Coordinate this procedure with Consigli Construction Company. *Failure to do so may result in a $1,000 fine assessed to the Subcontractor.*
- ELECTRICAL "HOTWORK" is not allowed without written approval from Consigli Construction Company. Proximity work to electrical equipment is also not allowed without written approval from Consigli Construction Company. *Failure to comply may result in a $1,000 fine assessed to the Subcontractor.*
- Subcontractor shall provide its own LADDERS, which must be in accordance with OSHA and ANSI specification. All ladders must be in safe condition without broken or defective rungs, rails and hardware. No metal ladder shall be used in or around any electrical work. Ladders shall be secured top and bottom and extend three feet (3') past the walking surface. *Failure to comply may result in a $500.00 fine assessed to the Subcontractor.*
- SCAFFOLDING of all types shall be provided, erected and used in accordance to OSHA 29CFR 1926, Subpart L. *Failure to do so may result in a $1,000 fine assessed to the Subcontractor.*
- CONFINED SPACES procedures are in force and require an entry permit from Consigli Construction Company. Confined spaces include manholes, vessels, duct work, etc., where such hazards as oxygen deficiency, hazardous gases, contamination, high temperatures, fire and difficulty in escaping are involved. *Failure to follow these procedures may result in a $1,000 fine assessed to the Subcontractor.*
- HAZARDOUS MATERIALS procedures are in force and protection of all personnel regarding acids, corrosives, flammables and toxics shall be per OSHA 29CFR 1926, Subpart D (Hazard Communication). *Failure to follow these procedures may result in a $1,000 fine assessed to the Subcontractor.*
- All WARNING SIGNS, barricades and tags will be used to the fullest extent and shall be obeyed.
- All EARTHMOVING AND COMPACTION EQUIPMENT must have working alarm, horns, and protective devices in compliance with OSHA 1926.602 standards. *Failure to comply may result in a $500.00 fine for each machine assessed to the Subcontractor.*

- All TRENCHES/EXCAVATIONS shall be in accordance with OSHA 29CFR 1926, Subpart P with particular emphasis on excavations over 5'0", and sloping requirements. "DIGSAFE", utility companies and facility owner must be notified for verification of utilities prior to digging. *Failure to do so may result in a $1000.00 fine assessed to the Subcontractor.*
- All CONCRETE AND MASONRY CONSTRUCTION shall be in accordance with OSHA 29CFR 1926, Subpart Q, with particular attention to general requirements of construction loads, guarding of reinforcing steel to eliminate the hazard of impalement, personal protective equipment, fall protection for erecting reinforcing steel and limited access zone for masonry construction. *Failure to follow these procedures may result in a $1,000.00 fine assessed to the Subcontractor.*
- ROOFING WORK shall be performed in accordance with OSHA 29CFR 1926.500 (g) with special emphasis for provision by the roofing contractor of a motion stopping safety system, warning lines and safety monitoring system. *Failure to do so may result in a $500.00 fine assessed to the Subcontractor.*
- All CRANES shall have a current Certification Sticker by independent crane certification company, have a current maintenance log, required swing radius protection, and operators licenses where required. *Failure to comply may result in a $1000.00 fine assessed to the Subcontractor who rents/leases/owns the crane.*
- FLAMMABLE LIQUIDS shall be stored in approved metal safety cans and contents shall be labeled by NFPA standards. Indoor storage of flammable or combustible liquids shall not exceed 25 gallons unless stored in approved cabinets. *Failure to do so may result in a $500.00 fine assessed to the Subcontractor.*
- VENTILATION METHODS shall be provided by the Subcontractor whenever hazardous substances such as dusts, fumes, mists, vapors or gases are produced in the course of the Subcontractor's work. Provide fans, ducts or other means and exhaust substances to the outside. See OSHA 1926.57 for details. *Failure to do so may result in a $1000.00 fine assessed to the Subcontractor.*
- SEXUAL HARASSMENT, including verbally or physically offensive behavior on the Jobsite, is prohibited. Failure to adhere to this policy may result in a $1,000 fine assessed to the Subcontractor and the dismissal of the offending employee(s) from the Jobsite.
- ALL OTHER SAFETY REQUIREMENTS, within OSHA regulations shall be complied with at all times by Subcontractor/Vendors of any tier and their employees. *Failure of Subcontractor/Vendor to comply with or failure to promptly abate any violation of OSHA regulations, not otherwise herein listed, when requested by Consigli Construction Company, may result in a $500 fine assessed to the Subcontractor/Vendor for each incidence of occurrence or unheeded request.*

NOTE: These Basic Safety Rules and Regulations highlight some of the major components and requirements of the Consigli Construction Company Safety Program. A complete Safety Program Manual will be made available with the Subcontract Agreement or upon request.

SECTION F: LEAN PROJECT RULES & REGULATIONS

1. All subcontractors will be required to comply with the CM's LEAN construction program
2. No materials shall be delivered to the site earlier than 3 days before said materials are to be installed/put into place. If materials have to be delivered before that 3 day time period, subcontractor shall get prior approval from Consigli Superintendent. Because of this, notification / scheduling is required for all deliveries to the site. Subcontractors must notify Contractor at least 24 hours in advance. Contractor has the right to refuse any deliveries not properly scheduled or due to logistical constraints as necessary.
3. All subcontractors' delivered materials shall be placed on wheeled carts, wheeled wracks or in wheeled bins so as to necessitate easy relocation in the event materials need to be moved. Materials/tools can be delivered and stored on pallets only if pallet jacks are delivered simultaneously with said delivery to provide for ready mobility.
4. All work stations shall be provided with wheeled trash bins for immediate placement of all debris produced as a part of the subcontractors operations. All trash will be immediately placed in wheeled containers provided by Consigli.
5. All subcontractors shall use rubber wheeled carts when moving material or removing trash from a building. Any damage caused by the Subcontractor shall be repaired at the cost of the Subcontractor. Back charges will be appropriately assessed for the cost of the repairs. No trash or materials shall be left on the floor.
6. Subcontractors shall, where feasible, elevate all electrical extension cords, hoses, or cables – removing them from all walking/working surfaces.
7. Storage of delivered materials in cardboard containers shall be discouraged. When materials must stay in cardboard containers, said containers shall be removed from the projects immediately after product is unpacked.
8. Subcontractor will participate in schedule development meetings as required by Consigli.
9. This is a Lean project and all Subcontractors will be required to participate in the Last Planner System including daily schedule/planning meetings when on site. This also includes daily stand up meetings with each subcontractor's foreman working onsite.

SECTION G: SITE LOGISTICS PLAN

See attached.

Install Stormwater Basin #2

Create New Access Road

Install Stormwater Basin #1

Create Permanent Parking Lot and Loop Road at Mass Bay

Fuller Middle School

Flagg Drive

Create Temporary Bus/Parent Staging Areas & Parking

Mass Bay Community College

McCarthy School

Flagg Drive

Normandy Rd

A

B

C

D

LEGEND

- Bus Staging for Pick-Up/Drop-Off
- Parent Staging for Pick-Up/Drop-Off
- Construction Access
- Emergency Access
- Wetland Boundary
- 30-FT No Alternation from Wetland Boundary
- Construction Gate
- Construction Fence with Scrim & Erosion Controls

PHASE 1 ENABLING

Summer 2019

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KEY MILESTONES

Start Excavation - 9/5/19
Start Steel Erection - 2/25/20
Complete Steel Erection - 6/16/20
Weathertight - 2/10/21
C of O - 7/28/21
Start FF&E - 7/8/21

No Build Zone
200-FT Riverfront Buffer
Temporary Play Area
Material Laydown & Storage
Topsoil Stockpile
Re-Use Soils Stockpile
Access to Stockpiles
Stormwater Basin #2
Stormwater Basin #1
20' Fire Access Lane Around Existing School
Fuller Middle School
20' Maintained for Emergency Vehicle Access (Shared within Construction Work Zone)
Contractor Parking (65 Spaces)
Temporary Erosion Control Basins (If Needed)
Contractor Parking (Approx 46 Spaces)
Pavement to Remain Until Fill Operation (Summer of 2020)
Mass Bay Community College
McCarthy School
Flagg Drive
Normandy Rd
A1
A2
A3
A4
B1
B2
B3
B4
CRANE A
CRANE B

LEGEND

- Bus Staging for Pick-Up/Drop-Off
- Parent Staging for Pick-Up/Drop-Off
- Construction Access
- Emergency Access
- Student Pedestrian Access
- Wetland Boundary
- 30-FT No Alternation from Wetland Boundary
- Construction Gate
- Construction Fence with Scrim & Erosion Controls
- 1 Consigli Field Office (In Existing School)
- 2 OPM/AE Field Office (In Existing School)
- 3 Subcontractor Offices
- 4 Portable Toilets
- 5 Dumpsters

PHASE 2 NEW CONSTRUCTION

Fall 2019 - Summer 2021

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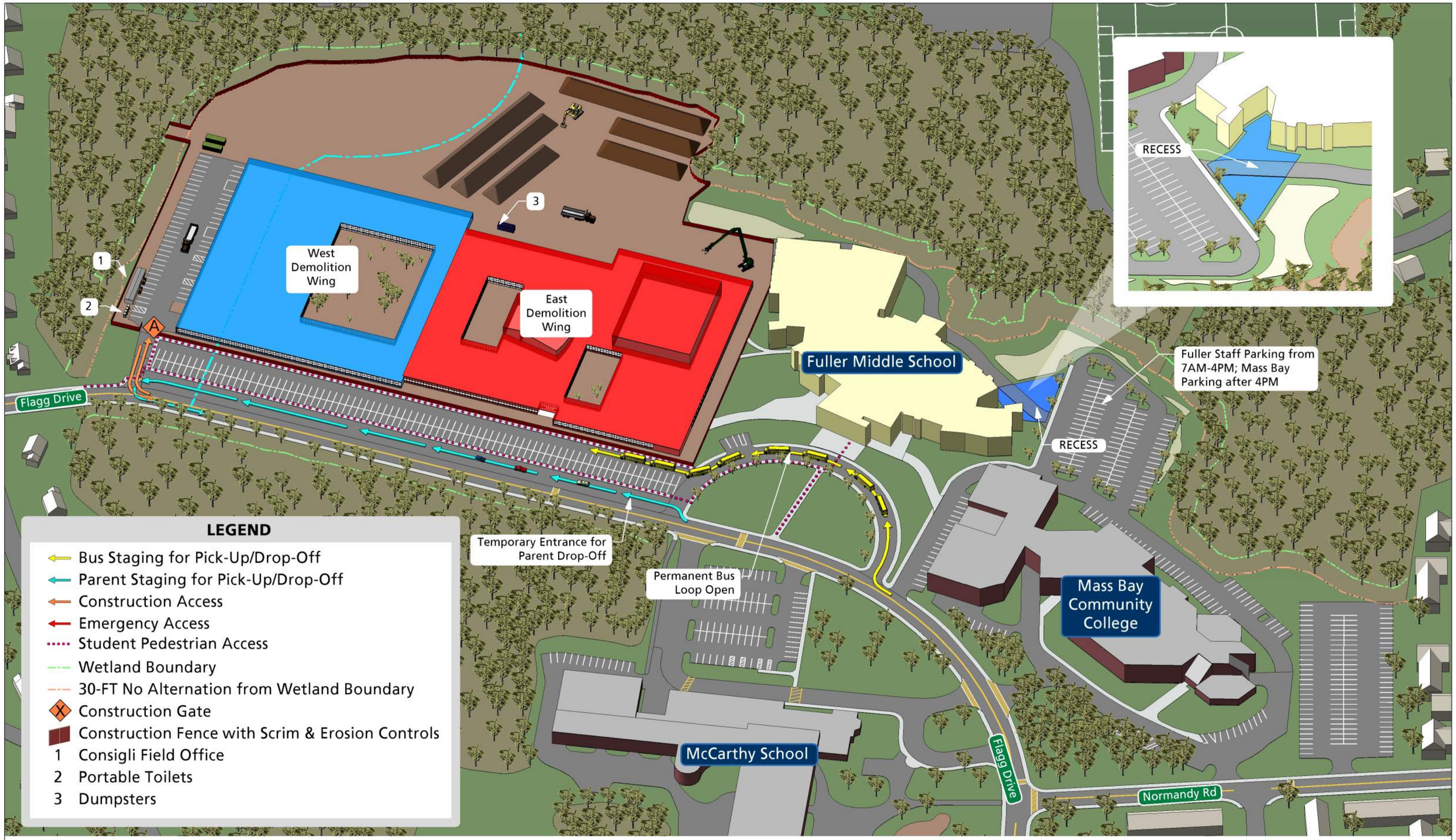

PHASE 3 DEMOLITION

Fall 2021

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Permanent Parent Drop-Off Open

Sitework & Field Construction

RECESS

New Parking Lot Open for Use

Fuller Middle School

Flagg Drive

Complete Sitework in Temporary Parking Area

Mass Bay Community College

McCarthy School

Flagg Drive

Normandy Rd

LEGEND

- Bus Staging for Pick-Up/Drop-Off
- Parent Staging for Pick-Up/Drop-Off
- Construction Access
- Emergency Access
- Student Pedestrian Access
- Wetland Boundary
- 30-FT No Alternation from Wetland Boundary
- Construction Gate
- Construction Fence with Scrim & Erosion Controls
- 1 Consigli Field Office
- 2 Portable Toilets
- 3 Dumpsters

PHASE 4 SITE FINISHES

Spring 2022

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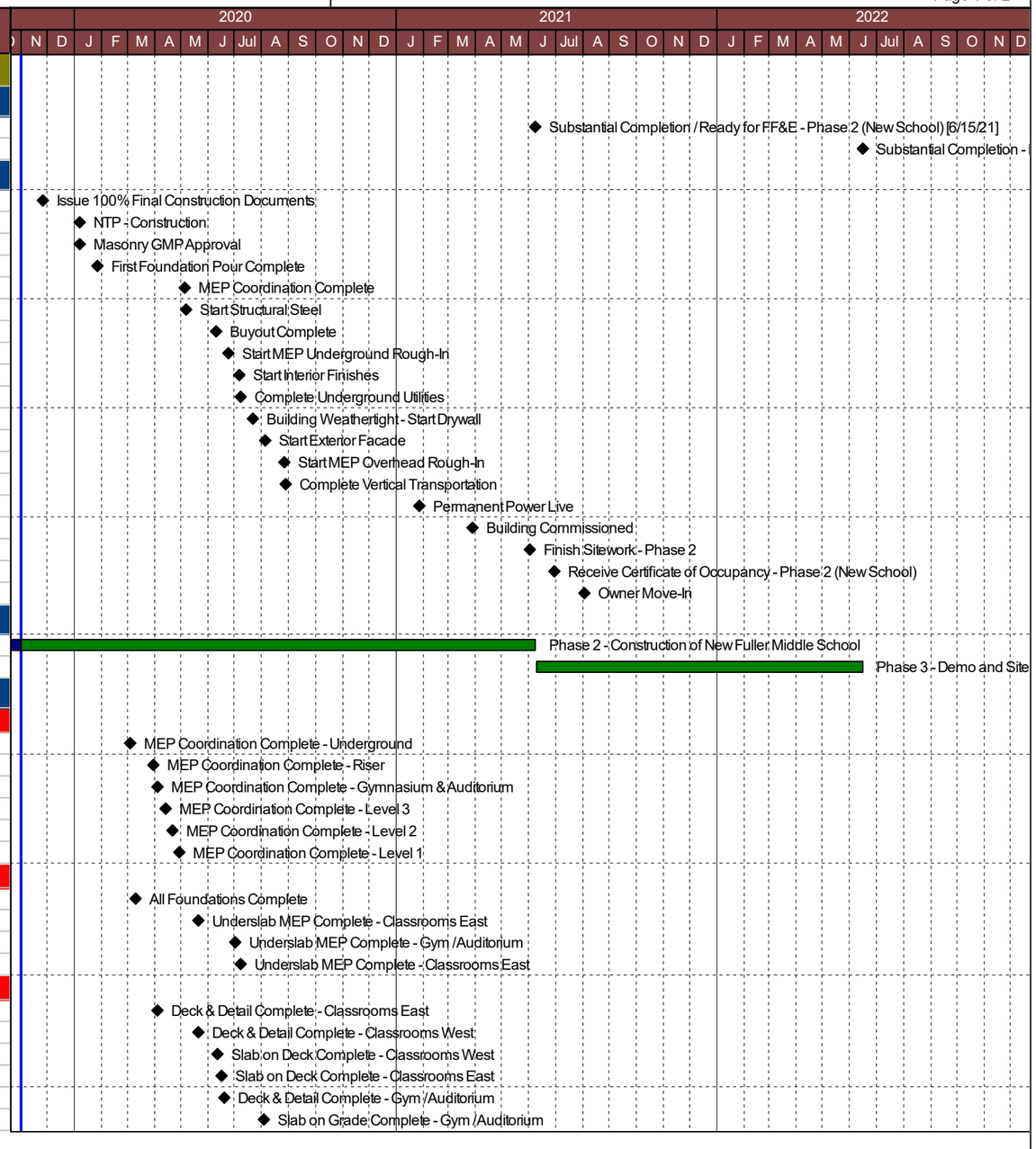
SECTION H: CONSTRUCTION MANAGER'S PROJECT SCHEDULE

See attached.

Activity ID	Activity Name	Orig Dur	Rem Dur	Start	Finish
Framingham: Fuller Middle School					
Contract Milestones					
A1180	Substantial Completion / Ready for FF&E - Phase 2 (New School) [6/15/21]	0	0		08-Jun-21*
A8150	Substantial Completion - Phase 3 (Demo Old School & Finish Sitework)	0	0		15-Jun-22
Project Milestones					
A1730	Issue 100% Final Construction Documents	0	0	25-Nov-19	
A8660	NTP - Construction	0	0	06-Jan-20	
A1140	Masonry GMP Approval	0	0		06-Jan-20
A8670	First Foundation Pour Complete	0	0		27-Jan-20
A8700	MEP Coordination Complete	0	0		05-May-20
A8690	Start Structural Steel	0	0	07-May-20	
A8720	Buyout Complete	0	0		10-Jun-20
A8680	Start MEP Underground Rough-In	0	0	23-Jun-20	
A8760	Start Interior Finishes	0	0	06-Jul-20	
A8750	Complete Underground Utilities	0	0		07-Jul-20
A8740	Building Weathertight - Start Drywall	0	0		21-Jul-20
A8710	Start Exterior Facade	0	0	04-Aug-20	
A8730	Start MEP Overhead Rough-In	0	0	26-Aug-20	
A8790	Complete Vertical Transportation	0	0		28-Aug-20
A8770	Permanent Power Live	0	0		26-Jan-21
A8780	Building Commissioned	0	0		29-Mar-21
A8800	Finish Sitework - Phase 2	0	0		01-Jun-21
A1150	Receive Certificate of Occupancy - Phase 2 (New School)	0	0		29-Jun-21
A8820	Owner Move-In	0	0	03-Aug-21	
Construction Summary					
A15670	Phase 2 - Construction of New Fuller Middle School	666	586	21-Aug-19 A	08-Jun-21
A15680	Phase 3 - Demo and Site Restoration	372	372	09-Jun-21	15-Jun-22
Construction Milestones					
MEP/FP Coordination					
MS10020	MEP Coordination Complete - Underground	0	0		04-Mar-20
MS10000	MEP Coordination Complete - Riser	0	0		30-Mar-20
MS10010	MEP Coordination Complete - Gymnasium & Auditorium	0	0		03-Apr-20
MS10030	MEP Coordination Complete - Level 3	0	0		13-Apr-20
MS10040	MEP Coordination Complete - Level 2	0	0		21-Apr-20
MS10050	MEP Coordination Complete - Level 1	0	0		28-Apr-20
Underground MEP/FP & Building Foundations					
MS10060	All Foundations Complete	0	0		10-Mar-20
MS10070	Underslab MEP Complete - Classrooms East	0	0		20-May-20
MS10080	Underslab MEP Complete - Gym /Auditorium	0	0		01-Jul-20
MS10090	Underslab MEP Complete - Classrooms East	0	0		07-Jul-20
Structural					
MS10100	Deck & Detail Complete - Classrooms East	0	0		03-Apr-20
MS10120	Deck & Detail Complete - Classrooms West	0	0		20-May-20
MS10140	Slab on Deck Complete - Classrooms West	0	0		11-Jun-20
MS10130	Slab on Deck Complete - Classrooms East	0	0		15-Jun-20
MS10110	Deck & Detail Complete - Gym /Auditorium	0	0		19-Jun-20
MS10150	Slab on Grade Complete - Gym /Auditorium	0	0		03-Aug-20



Start Date 09-May-18
Finish Date 21-Jun-22
Data Date 01-Nov-19
Run Date 21-Nov-19 13:51

Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Milestone

Consigli Construction Co., Inc.
Framingham: Fuller Middle School
Project Schedule - Updated 01-Nov-19

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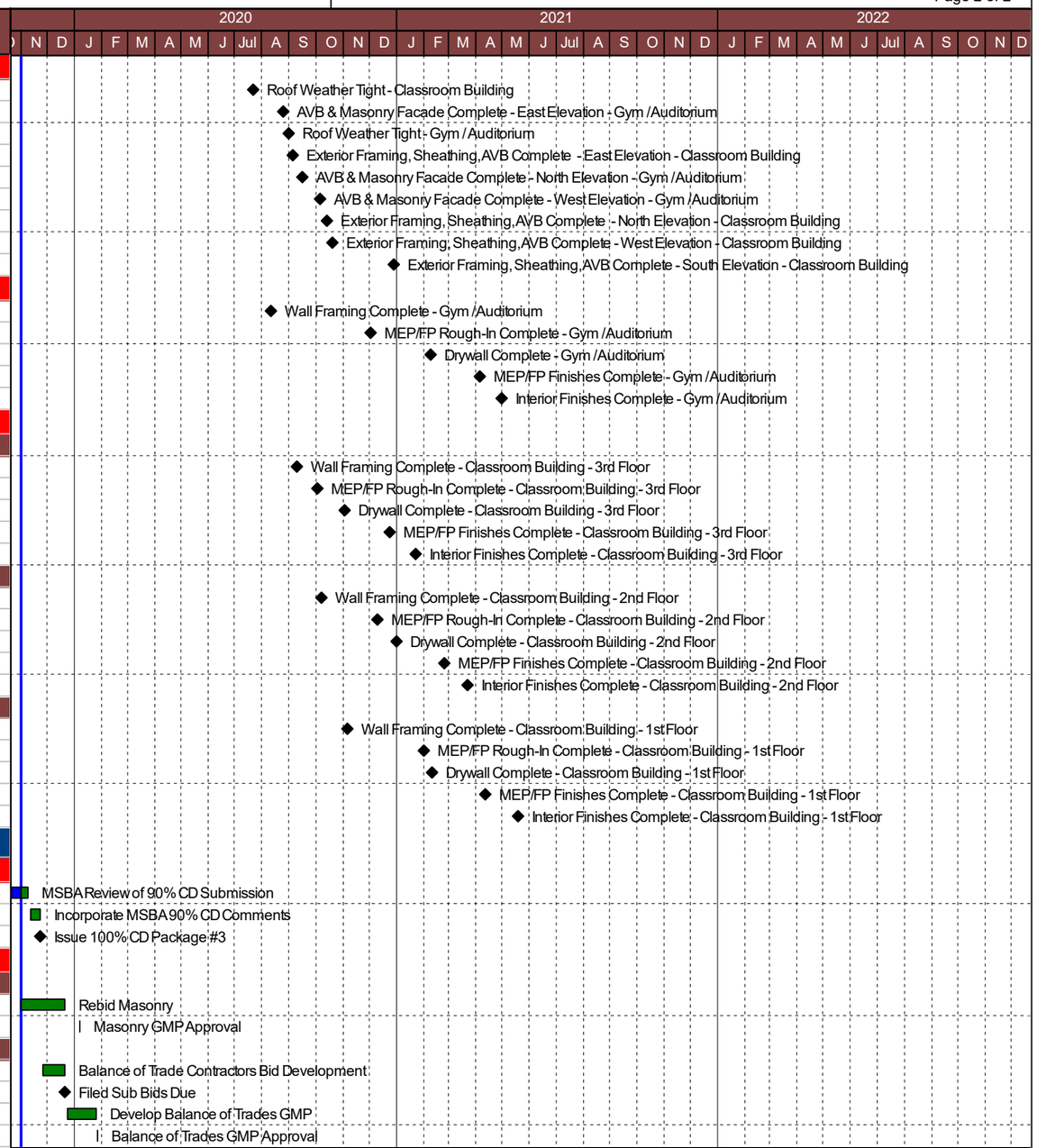
Activity ID	Activity Name	Orig Dur	Rem Dur	Start	Finish
Exterior Envelope					
MS10160	Roof Weather Tight - Classroom Building	0	0		21-Jul-20
MS10220	AVB & Masonry Facade Complete - East Elevation - Gym /Auditorium	0	0		24-Aug-20
MS10170	Roof Weather Tight - Gym / Auditorium	0	0		31-Aug-20
MS10180	Exterior Framing, Sheathing,AVB Complete - East Elevation - Classroom Building	0	0		04-Sep-20
MS10230	AVB & Masonry Facade Complete - North Elevation - Gym /Auditorium	0	0		15-Sep-20
MS10240	AVB & Masonry Facade Complete - West Elevation - Gym /Auditorium	0	0		06-Oct-20
MS10190	Exterior Framing, Sheathing,AVB Complete - North Elevation - Classroom Building	0	0		13-Oct-20
MS10200	Exterior Framing, Sheathing,AVB Complete - West Elevation - Classroom Building	0	0		20-Oct-20
MS10210	Exterior Framing, Sheathing,AVB Complete - South Elevation - Classroom Building	0	0		28-Dec-20
Gym / Auditorium					
MS10250	Wall Framing Complete - Gym /Auditorium	0	0		10-Aug-20
MS10260	MEP/FP Rough-In Complete - Gym /Auditorium	0	0		02-Dec-20
MS10270	Drywall Complete - Gym /Auditorium	0	0		08-Feb-21
MS10280	MEP/FP Finishes Complete - Gym /Auditorium	0	0		05-Apr-21
MS10290	Interior Finishes Complete - Gym /Auditorium	0	0		30-Apr-21
Classroom Building					
3rd Floor					
PR.NT.1000	Wall Framing Complete - Classroom Building - 3rd Floor	0	0		09-Sep-20
PR.NT.1010	MEP/FP Rough-In Complete - Classroom Building - 3rd Floor	0	0		02-Oct-20
PR.NT.1020	Drywall Complete - Classroom Building - 3rd Floor	0	0		02-Nov-20
PR.NT.1030	MEP/FP Finishes Complete - Classroom Building - 3rd Floor	0	0		23-Dec-20
PR.NT.1040	Interior Finishes Complete - Classroom Building - 3rd Floor	0	0		22-Jan-21
2nd Floor					
PR.NT.1050	Wall Framing Complete - Classroom Building - 2nd Floor	0	0		07-Oct-20
PR.NT.1060	MEP/FP Rough-In Complete - Classroom Building - 2nd Floor	0	0		09-Dec-20
PR.NT.1070	Drywall Complete - Classroom Building - 2nd Floor	0	0		31-Dec-20
PR.NT.1080	MEP/FP Finishes Complete - Classroom Building - 2nd Floor	0	0		23-Feb-21
PR.NT.1090	Interior Finishes Complete - Classroom Building - 2nd Floor	0	0		22-Mar-21
1st Floor					
PR.NT.1100	Wall Framing Complete - Classroom Building - 1st Floor	0	0		05-Nov-20
PR.NT.1110	MEP/FP Rough-In Complete - Classroom Building - 1st Floor	0	0		01-Feb-21
PR.NT.1120	Drywall Complete - Classroom Building - 1st Floor	0	0		10-Feb-21
PR.NT.1130	MEP/FP Finishes Complete - Classroom Building - 1st Floor	0	0		12-Apr-21
PR.NT.1140	Interior Finishes Complete - Classroom Building - 1st Floor	0	0		18-May-21
Design / Preconstruction					
Construction Documents					
A2220	MSBA Review of 90% CD Submission	15	6	21-Oct-19 A	08-Nov-19
A2230	Incorporate MSBA 90% CD Comments	9	9	12-Nov-19	22-Nov-19
A2240	Issue 100% CD Package #3	0	0		22-Nov-19
GMP Development					
Masonry GMP					
A9040	Rebid Masonry	34	34	01-Nov-19	20-Dec-19
A8650	Masonry GMP Approval	1	1	06-Jan-20	06-Jan-20
Balance of Trades GMP					
A16640	Balance of Trade Contractors Bid Development	19	19	25-Nov-19	20-Dec-19
A16650	Filed Sub Bids Due	0	0		20-Dec-19
A16660	Develop Balance of Trades GMP	22	22	23-Dec-19	24-Jan-20
A16670	Balance of Trades GMP Approval	1	1	27-Jan-20	27-Jan-20



SECTION J: TRUCK ROUTE PLAN

See attached.

CONSTRUCTION TRUCKING ROUTE
Fuller Middle School

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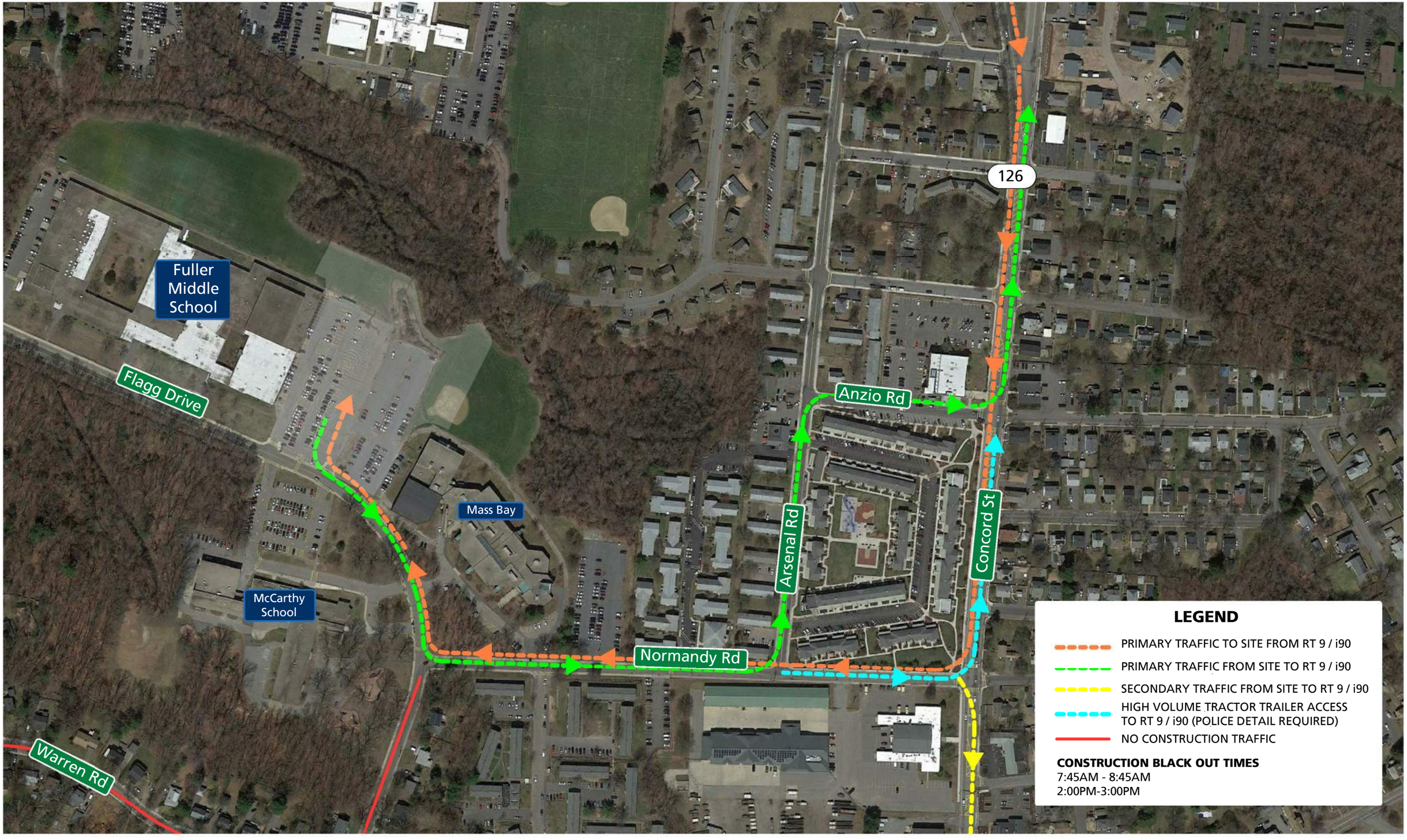

CONSTRUCTION TRUCKING ROUTE ENLARGED
Fuller Middle School

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SECTION K: SAMPLE INSURANCE CERTIFICATES

See attached.

EXHIBIT "J" – CONSIGLI STANDARD LIMITS
CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE OF A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
Subcontractor's Agent Name and Address	PHONE (A/C, NO. EXT):	PHONE (A/C, NO.):
	E-MAIL ADDRESS:	
	PRODUCER CUSTOMER ID#:	

INSURED	INSURERS AFFORDING COVERAGE		NAIC #
Subcontractor's Name and Address	INSURER A:	AM Best Rated A-, VII or better	
	INSURER B:	AM Best Rated A-, VII or better	
	INSURER C:	AM Best Rated A-, VII or better	
	INSURER D:	AM Best Rated A-, VII or better	
	INSURER E:	AM Best Rated A-, VII or better	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN. THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS. **Limits shown are as requested**

INSR LTR	TYPE OF INSURANCE	ADD'L INSRD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YY)	POLICY EXP (MM/DD/YY)	LIMITS	
	GENERAL LIABILITY ☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS MADE ☒ OCCUR ☒ RESIDENTIAL COVERAGE_____ ☒ **RIGGERS LIABILITY REQUIRED** __ GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☒ PRO-JECT ☐ LOC	X	X	ABC			EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$1,000,000 $100,000 $10,000 $1,000,000 $2,000,000 $2,000,000
	AUTOMOBILE LIABILITY ☒ ANY AUTO ☐ ALL OWNED AUTOS ☐ SCHEDULED AUTOS ☐ HIRED AUTOS ☐ NON-OWNED AUTO ☐ _____	X	X	ABC			COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$1,000,000
	☒ **UMBRELLA LIAB** ☒ OCCUR ☐ **EXCESS LIAB** ☐ CLAIMS MADE ☐ CLAIMS MADE ☐ DEDUCTIBLE ☒ RETENTION	X	X	ABC AGGREGATE LIMITS MUST BE PER PROJECT.			EACH OCCURRENCE AGGREGATE	$5,000,000 $5,000,000
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y / N ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? **N** **(Mandatory in NH)** If yes, describe under DESCRIPTION OF OPERATIONS below	N/A	X	INCLUDES EXEC. OFFICERS, SOLE PROP.			☒ WC STATU-TORY LIMITS ☐ OTH-ER E.L. EACH ACCIDENT E.L. DISEASE-EA EMPLOYEE E.L. DISEASE-POLICY LIMIT	 $1,000,000 $1,000,000 $1,000,000
	PROFESSIONAL **POLLUTION LIABILITY INSURANCE**	X	X	IF WORK INCLUDES DESIGN/TESTING IF WORK INCLUDES HAZARDOUS MAT OR DEMO			EACH OCCURRENCE/ AGGREGATE EACH OCCURRENCE/ AGGREGATE	$2,000,000/$2,000,000 $5,000,000/$5,000,000

DESCRIPTION OF OPERATIONS – JOB _____- PROJECT NAME – _____

Consigli Construction Co., Inc. (Owner – Name) other parties as required by contract are listed as additional insureds on a primary/non-contributing basis to named insured on the above referenced General Liability and Umbrella Liability policies as it relates to work performed at the captioned project. General Liability policy per ISO 12 07 form and includes coverage for "X, C, U" (hazards, collapse of building, blasting and damage to underground property), Completed Operations, Residential Construction coverage, and Contractual Liability. All policies referenced herein include a waiver of subrogation in favor of Consigli Construction Co., Inc. the Owner, and others where required by contract. Worker's Compensation applies in the state which work is performed.

GC Required Endorsements- Commercial General Liability endorsement are ISO Additional Insured Endorsement CG 20 10 (11/85 edition) or endorsements CG 20 33 (10/01 edition) AND CG 20 37 (10/01 edition) or CG 20 10 (10/01 edition) AND CG 20 37 (10/01 edition)
INSURED ENDORSEMENTS – Agent please list and attach insured Commercial General Liability Endorsements

CERTIFICATE HOLDER	CANCELLATION
Consigli Construction Co., Inc. 72 Sumner St. Milford, MA 01757	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED – OWNERS, LESSEES OR CONTRACTORS – SCHEDULED PERSON OR ORGANIZATION

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name of Person or Organization:
Consigli Construction Co., Inc. and all parties as required by the written contract.

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

A. **Section II – Who Is An Insured** is amended to include as an insured the person or organization shown in the Schedule, but only with respect to liability arising out of your ongoing operations performed for that insured.

B. With respect to the insurance afforded to these additional insureds, the following exclusion is added:

2. Exclusions

This insurance does not apply to "bodily injury" or "property damage" occurring after:

(1) All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the site of the covered operations has been completed; or

(2) That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

   □

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED – OWNERS, LESSEES OR CONTRACTORS – COMPLETED OPERATIONS

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name of Person or Organization:
Location And Description of Completed Operations: Any and all projects
Additional Premium:

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

Section II – Who Is An Insured is amended to include as an insured the person or organization shown in the Schedule, but only with respect to liability arising out of "your work" at the location designated and described in the schedule of this endorsement performed for that insured and included in the "products-completed operations hazard".

SECTION L.1: SAMPLE NON-TRADE CONTRACTOR LONG FORM AGREEMENT

See attached.

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Prequalification & Subcontract Review

Thank you for your interest in working with Consigli Construction Co., Inc.

Pre-qualification

In an effort to select the most highly qualified, safety conscious Subcontractors we have a comprehensive pre-qualification process. If not already pre-qualified with Consigli, please follow the below steps.

Step One: Let us know who you are

- Email prequal@consigli.com and provide your company name, contact person and email address

Step Two: Receive Request

- A request to complete Consigli's prequalification will be sent to the contact through iSqFt

Step Three: Complete & Submit the Prequal

- Complete the prequal form on iSqFt
- Information you will be asked for includes:
  - Organization information
  - Safety & Quality Information
  - References
  - Surety Letter
  - Sample Insurance Certificate – see contract for endorsements required
  - OSHA 300A Logs
  - Documentation of Worker's Comp EMR
  - Financial Statements
- Submit Prequal via the Dashboard on iSqFt

Subcontract Review

Attached is a Sample of our standard Subcontract Agreement. This Document defines our standard subcontract terms and conditions, Exhibits A and B, as well as the typical Subcontract format for all parts of this document such as, Exhibit C , Scope of Work and Exhibit G Project safety Requirements.

If your company is fortunate enough to be awarded work with Consigli, it will be expected that you fully execute a Subcontract which acknowledges these terms as part of the working agreement.

Please take this opportunity to review this contract and respond promptly with any concerns.

For questions pertaining to our Subcontract Agreement, please do not hesitate to contact one of the following listed members of our Purchasing Department:

Peter Capone, Director of Purchasing	508-458-0308	pcapone@consigli.com
Don O'Regan, Senior Purchaser	508-458-0468	doregan@consigli.com
Neal Sabourin, Senior Purchaser	508-458-0515	nsabourin@consigli.com
Jennifer Savoie, Senior Purchaser	508-458-0353	jsavoie@consigli.com
Joshua Sylvester, Purchaser/Precon Mgr	860-239-0253	jsylvester@consigli.com (CT Office)
Sunita Verma, Senior Purchaser	508-458-0406	sverma@consigli.com
Joe Vetrano, Senior Purchaser	508-458-0479	jvetrano@consigli.com
Mike Baker, Purchaser	508-458-0452	mbaker@consigli.com
Robert Eagles, Purchaser	508-458-0381	reagles@consigli.com
Kevin Morse, Purchaser	774-217-9102	kmorse@consigli.com (ME Office)
Robert McClintock, Assistant Purchaser	508-641-9937	rmcclintock@consigli.com
Justin Parker, Assistant Purchaser	774-217-0512	jparker@consigli.com

Barbara Moody, Subcontracts Manager	508-458-0344	bmoody@consigli.com
Alyssa Heuer, Contracts	508-473-2580	lzeytoonian@consigli.com
Cynthia Croxford, Contracts	860-239-0237	ccroxford@consigli.com (CT Office)
Emily Burnell, Contracts	207-791-2534	eburnell@consigli.com (ME Office)
Tracy Labonte, Insurance Administrator	508-458-0561	tlabonte@consigli.com

CONSIGLI
Est. 1905

Subcontract #SC-000-000

To:

Not Yet Bought

Date: 1/1/2000

Job: 000 Sample

Job Address:

Description: Sample Subcontract

Scope of Work:

Provide all labor, materials, equipment and supervision required to complete all of the Sample Subcontract for the project as specified and as shown and as further modified and/or clarified in accordance with the subcontract exhibits, as listed below, which are attached hereto and hereby made a part here of.

EXHIBIT "A" - SUBCONTRACT GENERAL CONDITIONS
EXHIBIT "B" - SUBCONTRACT SPECIAL CONDITIONS
EXHIBIT "C" - SCHEDULE OF WORK
EXHIBIT "D" - SUBCONTRACT PRICING
EXHIBIT "E" - PROJECT SCHEDULE REQUIREMENTS
EXHIBIT "F" - SCHEDULE OF DOCUMENTS
EXHIBIT "G" - PROJECT SAFETY REQUIREMENTS
EXHIBIT "H" - PROJECT SPECIFIC REQUIREMENTS
EXHIBIT "I" - RECYCLING ATTACHMENT
EXHIBIT "J" - INSURANCE REQUIREMENTS

EXHIBIT"L-1"-PROGRESS RELEASE OF LIEN WAIVER
EXHIBIT"L-2"-FINAL RELEASE OF LIEN WAIVER

1	30-001	$0.00
	Total Subcontract Amount:	**$0.00**

Retainage Percent: 5.00 or 10%

Bonds Required (Yes/No): No

Not Yet Bought Date

Consigli Construction Co., Inc. Date

Consigli Construction Co., Inc.
Construction Managers and General Contractors
72 Sumner Street, Milford, MA 01757 ● phone: (508)473-2580 ● fax: (508)473-3588 ● web: www.consigli.com
Hartford CT ● Portland ME ● Milford MA

Project Name
City, State – Job No.
SC-xxx-xxx Between Consigli Construction Co., Inc. and Subcontractor
EXHIBIT "A"
Subcontract General Conditions

ARTICLE 1 — WORK TO BE PERFORMED

A. In consideration of the Subcontract Price as stated in **Exhibit "D"** (the "Subcontract Price"), Subcontractor shall furnish and install all work, labor, materials, equipment, permits, approvals, and supervision, and shall assume, perform, and furnish everything necessary for the prompt execution and proper completion of the work described herein, including but not limited to tools, light, scaffolding and staging, ladders, hoisting, power, details, computations, and all other facilities unless expressly excluded in **Exhibit "C"-Schedule of Work**, all in complete accordance with the General Contract Documents as herein defined which are specifically incorporated herein and made a part hereof by reference, and further defined in **Exhibit "F" – Schedule of Documents** (collectively, the "Work"). Subcontractor represents and warrants that it is experienced and knowledgeable in the coordination and procurement of the various elements of the trades included in Subcontractor's Work. Subcontractor agrees to use its best skill and judgment in the performance of its Work and to cooperate with Contractor so that Contractor may fulfill its obligations to Owner.

B. Subcontractor agrees to be bound to Contractor by the General Contract Documents and all other instruments herein referred to and further to assume toward Contractor all the obligations and responsibilities pertaining to the Work that Contractor by the General Contract Documents has assumed to Owner, including the furnishing of such warranties and guarantees as are required in the General Contract Documents. Subcontractor shall comply with all rulings, orders, instructions, and operating procedures issued or promulgated by Contractor with respect to the Work. Subcontractor further agrees that Contractor shall have all rights, privileges, and immunities which Owner has in connection with its Contract with Contractor. Without limitation, Subcontractor expressly agrees that any "Required Subcontract Term" or similar provisions included in the General Contract Documents are incorporated herein by reference.

ARTICLE 2 — TIME OF PERFORMANCE

A. Time is of the essence of this Subcontract. Accordingly, Subcontractor shall commence the Work upon notice from Contractor and shall promptly and expeditiously perform the Work in accordance with the instructions of Contractor utilizing union or open shop labor, as agreed to in **Exhibit "C" –Schedule of Work**, which can work in harmony with Contractor and other subcontractors, provide approved materials, equipment, and tools in such quantities and of such types as required to meet the **Project Schedule Requirements defined in Exhibit "E"**.

B. Subcontractor shall complete its Work in sufficient time to allow Contractor and all other subcontractors to complete the entire Project within Contractor's planned schedule as further defined in **Exhibit "E" – Project Schedule Requirements**. If requested by Contractor, Subcontractor shall furnish a progress and/or recovery schedule to Contractor in such detail as Contractor requires to meet Subcontractor's obligations and to allow Contractor to fully assess Subcontractor's schedule impact on the overall Project Schedule.

C. If Contractor determines Subcontractor has not fulfilled its contractual obligations to meet the schedule requirements as defined in **Exhibit "E"** then Contractor shall have the following remedies:

1) Direct Subcontractor to take all actions necessary, including performance of the Work on overtime, shifts, weekends, holidays, etc., until such time that Subcontractor is no longer behind schedule;

2) Issue a deductive change order to remove all or portions of Subcontractor's remaining Work from this Subcontract and perform it directly or with other subcontractors;

3) Supplement Subcontractor's crew with additional qualified manpower. The cost for the additional manpower will be paid by Subcontractor or deducted from amounts otherwise due Subcontractor;

4) Deduct the cost of such delay from any payments due Subcontractor; or

5) Terminate this Subcontract if Subcontractor is in breach in accordance with **Article 14**.

D. In the event any delay in the completion of the Work is caused by Subcontractor which causes or results in added costs being incurred by Contractor, a sum equal to all such costs to the extent attributable to Subcontractor shall be chargeable to and paid by Subcontractor to Contractor.

E. Subcontractor understands and agrees that as the job progresses, Contractor will make changes to adjust and update the Project Schedule from time to time to meet job requirements, variations in weather, change orders or other causes, whether or not within the control of Contractor. Subcontractor shall promptly furnish all detail and data required by Contractor to prepare or update the Project Schedule. Any claim by Subcontractor for an extension in the time for performance shall be timely made as required by **Article 9** below and shall not be valid unless sufficient detail to justify the requested time extension is provided. When issued by Contractor, a revised Project Schedule shall supersede all other schedules previously issued. Subcontractor acknowledges that it is aware of the likelihood of changes to the Project Schedule and the impact of weather conditions and has anticipated same in scheduling, pricing and planning the Work. Subcontractor shall have no claim for an increase in the Subcontract Price for acceleration or delay, or claim for an extension of time, on account of any changes to the Project Schedule as provided herein except if and only to the extent Subcontractor submits a timely claim under **Article 9** of this Subcontract and Contractor obtains an extension of time relating to Subcontractor's Work from Owner.

ARTICLE 3 — INSURANCE AND BONDS

A. Subcontractor shall, at its sole expense, maintain in effect at all times during the performance of the Subcontract, insurance coverage with limits not less than those set forth in **Exhibit "J"** attached hereto (unless modified in **Exhibit "C"** of this Subcontract), under forms of policies satisfactory to Contractor and Owner.

B. Commercial General Liability coverage shall be written on ISO Occurrence Form CG 00 01 12/07 or a substitute form providing equivalent coverage and shall cover liability arising from premises, operations, independent contractors, products-completed operations, and personal and advertising injury. Coverage shall include: Broad Form Bodily Injury and Property Damage coverage including Ongoing Operations, Completed Operations and Contractual Liability coverage for claims as well as coverage for claims arising out of subsidence or earth movement. For Subcontractors working on residential projects (which shall include for rent and for sale dwellings of any type, including but not limited to dormitories and assisted living facilities), there shall be no exclusion for residential construction. For subcontractors furnishing or installing EIFS, there shall be no EIFS exclusion**.**

C. Any Commercial General Liability ("CGL") and Excess Umbrella policy obtained by Subcontractor to fulfill the insurance requirements of the Subcontract shall name Contractor and Owner, and any other parties so required by the General Contract Documents, as an "additional insured" on a primary and non-contributing basis. Acceptable CGL endorsements are (i) ISO Additional Insured Endorsement CG 20 10 (11/85 edition) or (ii) endorsements CG 20 33 (10/01 edition) AND CG 20 37 (10/01 edition) or CG 20 10 (10/01 edition) AND CG 20 37 (10/01 edition) or an endorsement providing equivalent coverage to the additional insureds. Non-ISO endorsements must provide coverage equivalent to ISO endorsements and be approved by Contractor. Such insurance shall by specific endorsement be deemed to be primary insurance to any similar insurance Contractor may obtain for its own benefit which shall be excess or secondary but not contributing insurance. This insurance for the additional insureds shall be as broad as the coverage provided for the named insured Subcontractor. If the CGL and Excess Umbrella coverage contains a General Aggregate Limit, such General Aggregate Limit for each shall apply separately to each project. In the event Subcontractor has in force any insurance with coverages broader and/or limits higher than the minimum coverage amounts specified in **Exhibit "J"** (a) such broader coverages and higher limits shall insure and be available to all additional insureds and (b) this Subcontract shall be deemed to require such broader coverages and higher limits. The Excess Umbrella insurance required by this Section, and any other insurance required by this Subcontract which is furnished via an excess/umbrella policy form, shall provide that (x) it covers any party as an additional insured who qualifies as such on the underlying insurance; (y) follows form for such additional insured coverage; and (z) the coverage afforded to such additional insured is primary and the additional insured's other insurance shall be non-contributing to any of the additional insured's other insurance, whether such other insurance be primary, excess/umbrella, self-insured, or on any other basis. Each such policy obtained by Subcontractor shall provide that the insurer shall defend any suit against the Additional Insured even if such suit is frivolous or fraudulent, so long as such suit arises or is alleged to arise from work of Subcontractor. A copy of each Additional Insured endorsement obtained by Subcontractor shall be attached to the Certificate of Insurance provided by Subcontractor. The CGL and Excess Umbrella polices obtained by Subcontractor shall not contain exclusions for liability assumed under contract for liability imposed by reason of statute or law. Subcontractor must obtain Contractor's prior written permission for deductibles or self-insured retentions greater than $50,000.00.

D. Subcontractor shall maintain CGL and Excess Umbrella coverage for itself and all additional insureds for the duration of the Project and maintain Completed Operations coverage for itself and each additional insured for at least 6 years (or the statutory period of repose under prevailing state law) after substantial completion of the entire Project or such longer time as required by the General Contract Documents.

E. Certificates of insurance acceptable to Contractor per **Exhibit "J"** shall be filed with Contractor prior to commencement of Subcontractor's Work (including a copy of the required Additional Insured Endorsement). These certificates and the insurance policies required by this **Article 3** shall contain a provision by endorsement that coverages afforded under the policies will not be cancelled or allowed to expire until at least 30 days prior written notice has been given to Contractor, except 10 days prior written notice of cancellation due to nonpayment of premium. In the event any carrier refuses or fails to provide such notice directly to Contractor, Subcontractor shall be obligated to provide such notice within ten (10) days of receipt of same and shall accept full and complete liability for all damages or losses suffered by Contractor on account of any such failure of notice or cancellation or expiration.

F. If any of the foregoing insurance coverages are required by **Exhibit "J" or** the General Contract Documents to remain in force after final payment, an additional certificate evidencing continuation of such coverage shall be submitted with the final application for payment. If any information concerning reduction of coverage is not furnished by the insurer, it shall be furnished by Subcontractor with reasonable promptness according to Subcontractor's information and belief.

G. Subcontractor agrees to furnish insurance which shall insure all its equipment and tools and any tools and equipment rented to Contractor for its use on other portions of the Contract or elsewhere which also lists Contractor as an additional insured. Subcontractor waives subrogation for damage to such equipment and tools. Subcontractor's insurance shall contain a waiver of subrogation consistent with this provision.

H. To the fullest extent permitted by law, Subcontractor waives all rights against Contractor and Owner as well as other parties as required by the General Contract Documents for recovery of all damages to the extent the damages are covered by CGL, Excess Umbrella, business auto liability or workers' compensation and employer's liability insurance maintained per requirements stated above (including any deductibles, coinsurance, or self-insured retentions). All policies obtained by Subcontractor pursuant to this Subcontract shall include waivers of subrogation consistent with this provision.

I. Workers' compensation insurance shall be provided for the state(s) in which work is to be performed as well as the state(s) where the workers may reside. If exposure to United States Longshore & Harbor Workers Act or Maritime Act or the Defense Base Act exists, policies will be endorsed to provide such coverage.

J. Subcontractor is responsible for verifying that its sub-subcontractors, truckers, vendors and suppliers of any tier maintain insurance in like form and amounts, including the additional insured requirements. If this work involves Structural Steel installation it is the responsibility of this Subcontractor to forward Contractor proof that Contractor is being included as additional insured on the erector's policy.

K. If Subcontractor leases employees through a labor services company, professional employer organization, or other such company, evidence of insurance must be provided through an Alternate Employer/Leased Employee endorsement naming Contractor, Owner, and Subcontractor on the

employment company's workers' compensation policy and a waiver of subrogation in favor of Contractor, Owner, and other parties required by the General Contract Documents.

L. Subcontractor shall be responsible for deductibles, coinsurance, and self-insured retentions on its own insurance coverages and for the costs of deductibles assessed against Contractor due to any act or omission of Subcontractor.

M. Subcontractor shall provide professional liability insurance in the amount of $2,000,000 per claim/aggregate **if** Work under this Subcontract includes any professional services, design assist, design-build, stamped drawings, or LEED certification services. Such coverage shall include a prior acts endorsement and shall be maintained for at least 6 years (or the statutory period of repose under prevailing state law) after completion of the Work or such longer time as required by the General Contract Documents.

N. Subcontractors whose Work includes demolition, abatement or remediation of hazardous materials as those terms are defined in federal, state or local law shall provide Pollution Liability limits of $5,000,000 per occurrence and $5,000,000 aggregate; including coverage for asbestos, lead, and PCBs. If Subcontractor's scope of Work includes transporting hazardous materials, the policy must extend pollution coverage to the transportation of hazardous materials or pollutants by waste hauling vehicles. If Subcontractor is subject to the *Motor Carrier Act of 1980*, then the Motor Carrier Act endorsement MCS-90 must be obtained and attached to the policy. Owner and Contractor shall be listed as additional insured on such policies.

O. Subcontractor and/or its sub-subcontractors shall carry Riggers Liability Insurance with limits no less than $1,000,000 per occurrence if Subcontractor's Work involves moving, lifting, lowering, rigging or hoisting of property or equipment belonging to others. Such insurance shall insure against physical loss or damage to the property or equipment. Owner and Contractor shall be listed as additional insured on such policies.

P. If Subcontractor performs any work or conducts any operations within 50 feet of any railroad (including light rail, fixed rail or any other rail system), Subcontractor's insurance shall be endorsed to delete any exclusion, including the Contractual Liability exclusion, for work performed within 50 feet of a railroad. A copy of such endorsement shall be provided to Contractor before work within 50 feet of the railroad commences. This shall apply to all such insurance whether primary, umbrella, or excess.

Q. All insurance, whether primary, umbrella, or excess, required by this Subcontract shall include contractual liability coverage that shall respond on a primary basis to claims against the Indemnified Parties defined in **Article 4, A** below, and any similar insurance obtained by such Indemnified Parties shall be secondary and non-contributory regardless of "Other" insurance provisions or rules of horizontal exhaustion.

R. If Subcontractor's means and methods for this Project include use of water craft or air craft, marine and aircraft liability insurance with limits no less than $5,000,000 per occurrence, including passenger liability, shall be provided if Subcontractor for any owned, leased, chartered, or hired watercraft or aircraft of any type used in the performance of this Subcontract. Owner and Contractor shall be listed as additional insured on such policies.

S. If Subcontractor shall fail to provide any or all of the required insurance described hereunder, Contractor may elect to procure said prescribed insurance in the name and at the expense of Subcontractor without limitation of any other rights that Contractor may have.

T. Subcontractor shall at its own expense, when required in **Exhibit "D"** of this Subcontract, procure and deliver to Contractor separate performance and payment bonds to secure Subcontractor's obligations under this Subcontract. Said payment and performance bonds shall be in an amount equal to 100% of the Subcontract Price and in form and from corporate sureties satisfactory to Contractor.

U. In the event Subcontractor shall fail to promptly provide such requested bonds or required insurance, Contractor may terminate this Subcontract and re-let the Work to another Subcontractor and all Contractor costs and expenses incurred thereby shall be paid by Subcontractor, including any price differential.

ARTICLE 4 — INDEMNIFICATION

A. To the fullest extent permitted by law, Subcontractor shall (1) defend, indemnify and hold harmless Contractor, Contractor's surety, Owner, and any other entity or individual as required by this Subcontract or by the General Contract Documents, and the principals, members, officers, directors, employees, agents, and consultants of each of them (the "Indemnified Parties"), from and against any and all demands, claims, causes of action, liabilities, losses, damages, and expense, including but not limited to attorneys' fees, for bodily injury, sickness, disease or death, or for injury or destruction of property, arising out of Subcontractor's performance of its Work under this Subcontract caused, in whole or in part, by the acts or omissions of Subcontractor, or any of Subcontractor's subcontractors, suppliers, or other persons or entities for whose acts Subcontractor may be liable; (2) assume, on behalf of the Indemnified Parties, the defense of any such demand, claim, cause of action, liability, loss, damage, or expense which may be brought against them or any of them; and (3) reimburse the Indemnified Parties for any attorneys' fees and expenses incurred by them with respect to any such claim, all regardless of whether or not such claim, liability, lien, demand or cause of action is caused in part by an Indemnified Party.

B. In claims against any person or entity indemnified under this Article brought by an employee of Subcontractor, Subcontractor's sub-subcontractors, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under this paragraph shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for Subcontractor or Subcontractor's sub-subcontractors under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. To the fullest extent permitted by law, Subcontractor further agrees to defend, indemnify, and hold harmless Contractor. Contractor's surety, and Owner from any and all demands, claims, causes of action, liabilities, losses, damages, or expense by any party arising out of or in consequence of the acceptability, fitness, sufficiency, performance, or non-performance of Subcontractor's Work or materials furnished, or for payment of any labor performed or material or equipment furnished in connection with improvements to real property or related to Subcontractor's Work by any party by or through Subcontractor. Subcontractor will defend all such claims at its own cost and expense and shall reimburse Contractor for all cost and expense arising out of such claim, including reasonable attorneys' fees.

D. To the fullest extent permitted by law, Subcontractor shall defend, indemnify, and hold harmless Contractor and its surety and Owner for any and all demands, claims, causes of action, liabilities, losses, damages, or expense, including reasonable attorneys' fees, arising out of infringement of any patent, copyright or other intellectual property rights by Subcontractor in connection with Subcontractor's Work, which may be brought against Contractor or Owner, and shall be liable to Contractor for all loss, including all costs, expenses and attorneys' fees, but shall not be responsible for such defense or loss when a particular design, process, product of a particular manufacturer or manufacturers is required by the General Contract Documents unless Subcontractor has reason to believe that a particular design, process or product required by the General Contract Documents may be an infringement of an intellectual property right, and failed to properly notify Contractor of such concern.

E. To the fullest extent permitted by law, Subcontractor agrees to protect, defend, indemnify, and hold harmless Contractor and its surety from the imposition of any required payments, fines and/or penalties by OSHA or any other government agency and Contractor shall have the right to deduct from the next periodic payment due Subcontractor all OSHA or other governmental payments, fines and/or penalties levied against Contractor and all expenses relating thereto arising out of or in consequence of the work of Subcontractor or any of its sub-subcontractors

ARTICLE 5 — TAXES, LICENSES, PERMITS, AND COMPLIANCE WITH PUBLIC LAWS

A. Subcontractor shall pay any and all taxes whatsoever levied against Contractor and Subcontractor or either of them on account or as a consequence of any operations conducted under this Subcontractor unless further defined in **Exhibit "B"-Subcontract Special Conditions** of this Subcontract as not required.

B. Subcontractor shall comply with Contractor's jobsite procedures and regulations and with all applicable local, State and Federal laws, rules and regulations and shall obtain all permits required (excluding the general building permit) for all of its Work. Subcontractor shall obtain and pay for all permits and inspections required for its Work and shall furnish any securities or deposits required to permit performance of its Work. Subcontractor shall, to the extent permissible under applicable law, comply with the provisions of any Project Labor Agreement that applies to work on a specific jobsite being performed under the Subcontract, if defined in **Exhibit "C"** of this Subcontract. Subcontractor shall pay rates of wages and shall observe hours of work and other economic terms and conditions of employment as required by this Subcontract, the General Contract Documents or required by law.

C. Subcontractor further warrants that it is familiar with and shall fully comply with, at its own expense, all provisions of the applicable Federal Occupational Safety & Health Act, Equal Employment Opportunity Programs, all Fair Employment Practices Laws, Affirmative Action Programs, Minority Manpower Programs, the Immigration Control and Reform Act of 1986 (IRCA), Workers Compensation Laws, and amendments and related laws, and all other federal, state, municipal, and other laws, regulations, and rulings. Subcontractor agrees, upon request by Contractor, to produce within five (5) days whatever documents or information is required by Contractor to establish Subcontractor's compliance with any applicable federal, state, municipal, or other regulatory laws, ordinances, or regulations.

D. Subcontractor alone is obligated to provide for the safety of its employees at the job site. Subcontractor agrees to perform the Work in a safe manner, to provide a safe place to work, and to abide by and enforce all applicable federal, state, and local safety laws, rules, or regulations governing the performance of the Work. Subcontractor shall furnish all apparel, materials, equipment, tools, labor, instruction, and supervision necessary for the safety of its employees and its compliance with the applicable safety laws, rules, or regulations. Subcontractor further agrees to cooperate with any other safety programs in effect on the job site. Contractor reserves the right to suspend Subcontractor's Work if, in Contractor's opinion, a safety violation exists.

E. If Subcontractor is performing Work as a Disadvantaged Business Enterprise, Small Business Enterprise, Women's Business Enterprise, Minority Business Enterprise, or Veteran's Business Enterprise and (1) Subcontractor is decertified for any reason or (2) all or part of the amounts paid to Subcontractor are disallowed by Owner or any governmental agency, then Contractor may immediately terminate this Subcontract under **Article 14 and/or 15**. If Subcontractor is an "other-than-Small Business Enterprise," then it shall comply with Subcontractor Utilization Plan requirements to the extent applicable to the Project.

F. Subcontractor shall at all times conduct all operations under this Subcontract in a manner to avoid risks of bodily harm to persons, damage to any property and fire. Subcontractor shall be solely responsible to take all precautions necessary and continuously inspect all work, materials and equipment to discover, determine and correct any such conditions which may result in any of the aforementioned risks.

ARTICLE 6 — PROSECUTION OF THE WORK

A. Subcontractor shall supply a sufficient number of skilled workers and ample quantities of approved material and equipment to perform the Subcontract. Subcontractor shall promptly replace and dismiss any worker to whom Contractor, Owner, or Architect objects. Subcontractor shall immediately commence the Work upon notice from Contractor and shall at all times prosecute the Work in complete harmony with the operations and forces of Contractor, including other subcontractors.

B. Subcontractor shall complete the Work in a first-class manner equal in all respects to the best standards of practice and to the full satisfaction of Owner, Architect, and/or Contractor in strict conformity with the General Contract Documents. Subcontractor shall supervise and direct its Work, and shall cooperate with Contractor in scheduling and performing its Work to avoid conflict, delay in or interference with the work of Contractor, other subcontractors or Owner's own forces. No exclusion or changes from the drawings, specifications or bid instructions contained in the General Contract Documents will be permitted unless submitted in writing and accepted in writing by Contractor.

C. Unless stated otherwise in **Exhibit "C" –Schedule of Work** or **Exhibit "E" –Project Schedule Requirements,** within five days of executing this Subcontract, Subcontractor shall provide to Contractor a Submittal Log detailing all products and portions of the Work requiring submission of shop drawings, product data, samples and similar submittals and stating lead time for all such products and portions of the Work.

D. Subcontractor shall promptly submit shop drawings, product data, samples and similar submittals required by the General Contract Documents with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of Contractor or other subcontractors. By submitting shop drawings, product data and samples, Subcontractor thereby represents that it has determined and verified all measurements, field

construction criteria, materials, catalog numbers and similar data, and that it has checked and coordinated each shop drawing and sample with the requirements of the Work and of the General Contract Documents.

E. In addition to shop drawings, catalogs, calculations, samples, etc., specified, Subcontractor shall prepare at its own expense and furnish promptly, whenever requested by Contractor shop drawings, manufacturer's data, templates, schedules, reports, samples or any other data that may be necessary in the opinion of Contractor for distribution among other Subcontractors and to Contractor for the proper prosecution of the Work. Subcontractor shall lay out its own Work and be responsible for the accuracy of same. Subcontractor shall exercise the utmost diligence to obtain all drawings, details, and information necessary to perform its Work and, if at any time, drawings or information have not been furnished, Subcontractor shall promptly inform Contractor in writing as to what drawings or information are required to expeditiously complete the Work. Subcontractor shall, before proceeding with any affected part of the Work, call to Contractor's attention in writing any errors in or inconsistencies between or in any of the Contract Documents and any other condition which will adversely affect its Work.

F. Suspension of work hereunder, for any unexcused cause, by Subcontractor for a period of more than forty-eight (48) hours, Sundays and holidays excepted, without prior written permission of Contractor, shall be deemed an abandonment of performance and shall be grounds for termination by Contractor upon twenty-four (24) hour notice.

G. Subcontractor shall cooperate fully with the other Subcontractors employed on the Work and shall so plan and conduct the Work, in accordance with Contractor's Project Schedule (as further defined in **Exhibit "E"**), to be performed hereunder as not to interfere with their operations or with those of Contractor. Subcontractor shall direct all communications on the Project to Contractor and will not communicate directly with the Owner, Architect, or their agents.

H. Contractor expressly reserves the right to determine the order and sequence of all work, including the Work, and phases thereof as herein provided for. Subcontractor agrees that its sole remedy for additional time and money on account of the order and sequence which is directed by Contractor shall be to recover additional compensation and a time extension only if and only to the extent Contractor is able to recover same from Owner.

I. Subcontractor agrees that Contractor, Owner and the Architect will each have the authority to reject Work which does not conform to the General Contract Documents. The Architect's decisions on matters relating to aesthetic effect shall be final and binding on Subcontractor unless stated otherwise in the General Contract Documents.

J. Subcontractor shall cooperate with Contractor, other subcontractors and Owner's own forces whose work might interfere with Subcontractor's Work. Subcontractor shall participate in the preparation of coordination drawings or the like in areas of congestion, specifically noting and advising Contractor of potential conflicts between the Work of Subcontractor and the work of Contractor, other subcontractors or Owner's own forces.

K. Subcontractor shall furnish a competent English-speaking superintendent or foreman at the jobsite (who shall be subject to the approval of Contractor) to supervise the Work. Subcontractor shall, upon execution of this Subcontract, designate in writing an official representative of Subcontractor, who shall have full authority to act on any and all matters pertaining to the execution of this Subcontract and whose acts will be binding upon Subcontractor.

L. Subcontractor shall not further subcontract its Work without written consent of Contractor. With respect to any Work that is further subcontracted by Subcontractor, and any supply agreements entered into by Subcontractor, all conditions of this Subcontract applying to Subcontractor shall be incorporated by reference into any sub-subcontract and supply agreement including, but not limited to, insurance requirements, plans, specifications, safety, indemnification, etc. and the sub-subcontractor and supplier shall assume towards Subcontractor all of the obligations and responsibilities which Subcontractor by the General Contract Documents assumes toward Contractor and Owner. In addition, each sub-subcontract and supply agreement shall contain a provision under which each sub-subcontractor and supplier consents to the assignment of all Subcontractor's rights under the sub-subcontract or supply agreement to Contractor if it so elects in writing.

M. Contractor may at any time by written order make changes in, additions to or deductions from the Work to be performed under this Subcontract and Subcontractor shall promptly proceed with the performance of the Work as so changed. For changes directed by Contractor, Subcontractor shall be entitled to an equitable adjustment in the Subcontract price based on actual net direct costs incurred plus an allowance for overhead and profit as set forth in **Exhibit "D"**, provided, however, as a condition precedent to any equitable adjustment Subcontractor must provide written notice to Contractor prior to commencing such changed Work. ANY CLAIM BY SUBCONTRACTOR FOR AN INCREASE IN THE SUBCONTRACT PRICE DUE TO CHANGES ORDERED BY CONTRACTOR AND/OR OWNER AND/OR CHANGED CONDITONS MUST BE SUBMITTED IN A TIMELY MANNER (PER **ARTICLE 10, A** BELOW) OR SUCH CLAIM SHALL BE WAIVED. UNDER NO CIRCUMSTANCES SHALL SUBCONTRACTOR COMMENCE WORK IT CONSIDERS TO BE EXTRA OR A CHANGE PRIOR TO WRITTEN NOTICE TO CONTRACTOR AND RECEIPT OF WRITTEN DIRECTION TO PROCEED FROM CONTRACTOR. SUCH NOTICE SHALL INCLUDE A DESCRIPTION OF THE CLAIMED EXTRA WORK AND PROJECTED PRICE AND SCHEDULE IMPACT. SUBCONTRACTOR WAIVES THE RIGHT TO PAYMENT FOR WORK PERFORMED IN VIOLATION OF THIS PROVISION.

N. Subcontractor hereby acknowledges and agrees that upon receipt from Contractor of a notification of a Change Order Request, Subcontractor will respond no later than seven (7) calendar days from the receipt thereof (unless a different time is stated in **Exhibit "C**") in writing as to the effect on the Subcontract Price and/or Project Schedule Requirements of said Change Order Request, and will provide full and complete detailed information to substantiate the effect. Should Subcontractor fail to respond within such seven (7) calendar days (or a different time as stated in **Exhibit "C"**), Contractor shall determine the cost and schedule impacts, if any, unilaterally and amend the Subcontract accordingly.

O. If at any time Subcontractor's actual progress is inadequate to meet the requirements of this Subcontract due to causes within Subcontractor's control, Contractor may notify Subcontractor who shall then provide a written recovery plan and take such steps required to improve its progress. If within a reasonable period as determined by Contractor (but in any event within three (3) business days), Subcontractor does not provide a written recovery plan and improve its performance to meet the Project Schedule Requirements set forth in **Exhibit "E"** as they have been adjusted by Contractor, Contractor may require an increase in Subcontractor's labor force, number of shifts, overtime operations, or weekend work, all without additional cost to Contractor. Neither such notice, nor Contractor's failure to issue such notice, shall relieve Subcontractor of

its obligation to achieve the quality of Work and the rate of progress required by this Subcontract. Project float provided for in the project schedule is for the exclusive use of Contractor and Contractor may backcharge Subcontractor for damages suffered by Contractor to the extent caused by a delay of Subcontractor in the performance of this Subcontract.

P. If Subcontractor determines that any previous work required to be performed under the General Contract Documents or any portion of work on which Subcontractor's Work is dependent is not in accordance with the General Contract Documents, Subcontractor shall, prior to commencing that portion of the Work, promptly notify Contractor in writing. Commencement of the Work in a particular area will be acknowledged as acceptance of the surfaces and conditions within that particular area and any further preparation, cleaning or maintaining of the area after acceptance will be Subcontractor's responsibility.

Q. Provided Subcontractor has been paid undisputed amounts due, Subcontractor hereby agrees to defend, indemnify and hold harmless Contractor, Owner and any applicable sureties from and against any laborer's, materialmen's, supplier's, or other similar lien or bond claim filed or asserted by Subcontractor or any of its sub-subcontractors, materialmen or suppliers (of any tier) in connection with the Work. In the event such lien or bond claim is filed, Subcontractor shall, upon forty-eight (48) hours' written notice, cause such lien or bond claim to be released and discharged, or file a bond to secure discharge of such lien or bond claim. In the event that Subcontractor shall fail to do so, Contractor shall have the right to withhold and/or pay to the third-party all sums necessary to obtain the release of such lien or claim and discharge or to file a bond in lieu of such lien (including reasonable attorneys' fees, bond or other premiums and costs). Contractor shall have the right to deduct all amounts so incurred from the Subcontract Price.

R. Subcontractor warrants and shall insure that all construction tools, equipment, temporary facilities and other items used by Subcontractor in accomplishing its Work, whether purchased, rented or otherwise provided by or to Subcontractor, are in a safe, sound and good condition and capable of performing the functions for which they are intended and are maintained in conformance with applicable laws, regulations, emissions standards, manufacturer's recommendations and good engineering practice.

S. Subcontractor shall not, without Contractor's and Owner's prior written consent, install or maintain any sign, trademark or advertisement or other identification symbol in or about the Project (including, but not limited to any tower cranes, man-lifts, scaffolding or similar equipment). Contractor and Owner shall have the right, at Subcontractor's expense and without notice to Subcontractor, to remove any sign, trademark, advertisement or other identification symbol installed in violation of this Paragraph.

T. It is understood and agreed that the Work provided for in the Subcontract constitutes only a part of the work being performed on this Project for Owner by Contractor and other subcontractors. Subcontractor therefore agrees to perform the Work called for in the Subcontract in such a manner that he will not injure or damage any other work performed by Contractor or any other subcontractor, and Subcontractor further agrees to furnish continuous and effective protection at all times for its own work-in-place and all materials stored for use under the Subcontract, and to bear and be solely liable for all loss and/or damage of any kind to or in connection with said Work and materials at any time prior to the final completion and acceptance thereof, unless said loss or damage is caused by the sole negligence of Contractor; and to pay or reimburse Contractor on account of any damage or injury to the work or property of Owner, Contractor and other subcontractors caused by or arising from the performance of its Work as provided in the Subcontract, including the cost of replacing, repairing, refinishing or restoring any work damaged, removed or displaced in the course of correcting or repairing work or replacing materials hereunder which are rejected by Owner or Architect or which are deemed to be at variance with the requirements of the Subcontract.

U. Subcontractor shall make a careful analysis and comparison of the drawings, specifications, and other documents listed in **Exhibit "C"** and **Exhibit "F**." Prior to starting its Work, Subcontractor shall conduct a visual inspection of the Project site to become familiar with local conditions and to correlate site observations with such documents. Should Subcontractor discover any errors, inconsistencies, or omissions in such documents or between the documents and the actual conditions, Subcontractor shall report such discoveries to Contractor in writing within three (3) business days. Contractor may then instruct Subcontractor as to the temporary or permanent measures to be taken, and Subcontractor shall comply with such instructions. If Subcontractor performs Work contrary to any applicable laws, statutes, ordinances, building codes, rules, or regulations, without notice to Contractor and advance approval by appropriate authorities, including Contractor, Subcontractor shall assume appropriate responsibility for such Work and shall bear all associated costs, charges, fees, and expenses. Nothing contained herein shall relieve Subcontractor of responsibility for its own errors, inconsistencies, or omissions.

ARTICLE 7 — PROTECTION OF PUBLIC AND OF PROPERTY

A. Subcontractor shall at its own expense:

1) Protect from injury all property and persons which may be affected by its operations hereunder and shall be fully responsible for all damages or expense to any person or any property arising from or in consequence of any act or omission of Subcontractor under this Subcontract.

2) Protect all Work performed by it hereunder until the satisfactory completion and acceptance of each operation or phase of the Work.

3) Protect all adjacent work or materials provided by others, from any damage occurring directly from the completion of the Work of this Subcontract or any damage caused by the negligent acts of any employees employed by this Subcontractor.

B. Subcontractor shall provide barricades and warning signs as necessary and as required for the protection of the items described above. Subcontractor shall also provide such police officers, watchmen, and flagmen as may be deemed necessary and shall receive no additional compensation therefore except to the extent that Contractor is reimbursed by Owner for the specific services of each said officer, watchman, or flagman.

C. To the extent that Subcontractor manufactures, processes, uses or stores toxic or hazardous substances at the Project Site, it must comply with the Massachusetts Right-To-Know-Law M.G.L c. 111F and the rules and regulations promulgated pursuant thereto ("Right-To-Know- Law") and any other similar laws in states other than Massachusetts. For purposes of the Right-To-Know-Law, Subcontractor is deemed to control that space where the Work is performed ("Work Area"). With respect to its Work Area, Subcontractor shall assume responsibility for compliance with the

Right-To-Know-Law. Since Subcontractor's Work Area is one among many at the Project site, Subcontractor shall also coordinate the implementation of the Right-To-Know-Law with Contractor and any other subcontractor(s) whose employees may be exposed to a toxic or hazardous substance, which Subcontractor is using in its Work Area.

D. To the fullest extent permitted by law, Subcontractor shall defend, indemnify and hold Contractor and Owner harmless for any liabilities, damages or claims, including reasonable attorneys' fees, for any discharge, dispersals, release or seepage of hazardous materials into the environment while owned by or while under the custody or control of Subcontractor.

ARTICLE 8 — MEASUREMENT AND PAYMENT

A. **EXCLUSIVE PROVISIONS FOR PROJECTS SUBJECT TO MASSACHUSETTS PROMPT PAY LAW: M.G.L.c. 149, §29E (General Contract >$3,000,000)**

1) Progress Payments

a) Prior to submission of the first application for payment, Subcontractor shall deliver to Contractor, for review and approval, a detailed breakdown of the Subcontract Price showing a Schedule of Values for the various parts of the Work. Once accepted, this Schedule of Values will be used as a basis for payment of Subcontractor's monthly requisition, unless the General Contract Documents provide another basis for the determination of the periodic payments.

b) Based upon applications for payment submitted to Contractor by Subcontractor, corresponding to applications for payment submitted by Contractor to the Owner and/or Architect and certificates for payment issued by the Architect, Contractor shall make progress payments on account of the Subcontract Price to Subcontractor as provided below and elsewhere in the Subcontract Documents.

c) The period covered by each application for payment shall be one calendar month ending on the last day of the month or as further defined in **Exhibit "D"**. Subcontractor represents and warrants with each requisition that all applicable payroll taxes and other withholding assessments have been paid, and that all employees have been properly classified for workers' compensation insurance purposes, and that the appropriate premiums have been paid to its insurance carrier. Subcontractor is an independent contractor and Contractor shall have no obligation with respect to payroll taxes, workers' compensation insurance, union benefits and other assessments.

d) Subcontractor's application for payment shall be submitted not sooner than the 20th of the month and not later than the 25th day of the month within which the Work was completed; provided that the first application for payment may be for a period that is up to forty-four (44) days in the event that the Work commenced within the last fourteen (14) days before the start of the of the first full calendar month after commencement of the Work. Any application for payment not received within the time period set forth herein shall be rejected as untimely and Subcontractor shall not be entitled to submit an application for payment until the following month. Subcontractor may not submit more than one application for payment in any thirty (30) day period. Any extra application for payment submitted within such thirty (30) day period shall be deemed null and void and Contractor shall have no obligation to respond to such extra application for payment.

e) Provided an application for payment is received by Contractor not later than the 25th day of a month, and subject to the approval of Contractor, Architect and/or Owner, Contractor shall include Subcontractor's Work covered by that application in the next application for payment which Contractor is entitled to submit. Unless the Project is enrolled for payment by Textura™ as provided in **Exhibit "D,"** all original signed and notarized requisitions should be mailed to 72 Sumner St., Milford, MA 01757. Provided that an application for payment is received by Contractor not later than the 25th day of a month, Contractor shall have twenty-two (22) days from timely receipt thereof to approve, reject, or approve in part and reject in part such application for payment. Any rejection or rejection in part shall be made by Contractor and/or Architect and/or Owner or other party as allowed by the General Contract Documents, in writing and shall include an explanation of the factual and contractual basis for the rejection or rejection in part and shall be certified as made in good faith. A rejection or rejection in part of an application for payment shall be subject to the dispute resolution procedures of this Subcontract and/or the General Contract Documents as appropriate. An application for payment that is neither approved nor rejected nor approved in part and rejected in part shall be deemed to be approved unless it is rejected before payment is due as provided in subparagraph h) below, in which case any prior deemed acceptance due to the passage of time alone shall be null and void and of no effect whatsoever. Neither Contractor's submission of Subcontractor's application for payment to Owner nor the inclusion by Contractor of amounts claimed due by Subcontractor in any application for payment submitted by Contractor to Owner shall constitute or be deemed acceptance of Subcontractor's Work, either in whole or in part.

f) If an application for payment is received after the application date fixed above, Subcontractor's Work covered by it shall be included by Contractor in the next application for payment submitted to the Architect, subject to review and approval of amounts claimed due.

g) Before issuance of each progress payment, Subcontractor shall submit evidence satisfactory to Contractor that all payrolls, bills for materials, equipment and subcontractors and all known indebtedness connected with Subcontractor's Work have been satisfied.

h) To the extent that an application for a progress payment is approved as provided above, Contractor shall include Subcontractor's Work covered by that application in the next application for payment which Contractor is entitled to submit to Owner and/or Architect or as otherwise provided in the General Contract Documents. Contractor shall pay Subcontractor within seven (7) days of receipt of funds from Owner but in any event not later than forty-five (45) days after approval of Subcontractor's application for payment, subject to the condition precedent set forth in subsection 3) below when applicable.

2) Final Payment

a) Subject to the conditions precedent set forth in the next subsection and the terms of **Exhibit "D"** attached, if applicable, final payment constituting the entire unpaid balance of the Subcontract Price, including retainage, shall be made by Contractor to Subcontractor when Subcontractor's Work is fully performed in accordance with the requirements of the Subcontract Documents, the Architect has issued a certificate for payment covering Subcontractor's completed Work and Contractor has received payment from Owner.

b) See additional requirements applicable to all Projects set forth in **Article 8, C** below.

3) Condition Precedent to Progress Payments and/or Final Payment

a) In each instance, and to the fullest extent allowed by law in the jurisdiction where the Project lies, Contractor's obligation to make progress payments and/or final payment to Subcontractor shall be expressly conditioned upon Contractor's receipt of such payment by Owner and no payment shall be due Subcontractor from Contractor, its payment bond surety, or its statutory lien bond surety unless or until, and then only to the extent, Owner has made such payment to Contractor.

b) Notwithstanding anything to the contrary set for herein, and in addition to and not in limitation of Contractor's rights and defenses under the prior subparagraph, with respect to progress and/or final payments, receipt of payment from Owner to Contractor shall, in each instance, be an express condition precedent to Contractor's obligation to pay Subcontractor and Subcontractor's right to receive payment from Contractor:

i. to the extent of amounts not received by Contractor from Owner because Subcontractor failed to perform in accordance with its obligations under this Subcontract and failed to cure such non-performance within the time required by this Subcontract after receipt of written notice, or

ii. to the extent of amounts not received by Contractor from Owner because Owner is or becomes insolvent within ninety (90) days after the date of submission of Subcontractor's application for payment for which payment is sought.

B. **FOR ANY PROJECTS <u>NOT</u> SUBJECT TO MASSACHUSETTS PROMPT PAY LAW: M.G.L.c. 149, §29E (General Contract <$3,000,000 or Project not in Massachusetts)**

1) Progress Payments

a) Prior to submission of the first application for payment, Subcontractor shall deliver to Contractor, for review and approval, a detailed breakdown of the Subcontract Price showing a Schedule of Values for the various parts of the Work. Once accepted, this Schedule of Values will be used as a basis for payment of Subcontractor's monthly requisition, unless the General Contract Documents provide another basis for the determination of the periodic payments.

b) Based upon applications for payment submitted to Contractor by Subcontractor, corresponding to applications for payment submitted by Contractor to the Owner and/or Architect and Certificates for payment issued by the Architect, Contractor shall make progress payments on account of the Subcontract Price to Subcontractor as provided below and elsewhere in the Subcontract Documents.

c) The period covered by each application for payment shall be one calendar month ending on the last day of the month or as further defined in **Exhibit "D"**. Subcontractor represents and warrants with each requisition that all applicable payroll taxes and other withholding assessments have been paid, and that all employees have been properly classified for workers' compensation insurance purposes, and that the appropriate premiums have been paid to its insurance carrier. Subcontractor is an independent contractor and Contractor shall have no obligation with respect to payroll taxes, workers' compensation insurance union benefits and other assessments.

d) Subcontractor's application for payment shall be submitted not sooner than the 20th of the month and not later than the 25th day of the month within which the Work was completed. Any application for payment not received within the time period set forth herein shall be rejected as untimely and Subcontractor shall not be entitled to submit an application for payment until the following month. Subcontractor may not submit more than one application for payment in any thirty (30) day period. Any extra application for payment submitted within such thirty (30) day period shall be deemed null and void and Contractor shall have no obligation to respond to such extra application for payment.

e) Provided an original application for payment is received by Contractor not later than the 25th day of a month, and subject to the approval of Contractor, Architect and/or Owner, Contractor shall include Subcontractor's Work covered by that application in the next application for payment which Contractor is entitled to submit. Unless the Project is enrolled for payment by Textura™ as provided in **Exhibit "D,"** all original signed and notarized requisitions should be mailed to 72 Sumner St., Milford, MA 01757. Neither Contractor's submission of Subcontractor's application for payment to Owner nor the inclusion by Contractor of amounts claimed due by Subcontractor in any application for payment submitted by Contractor to Owner shall constitute or be deemed acceptance of Subcontractor's application for payment, either in whole or in part. Receipt of payments by Contractor from Owner shall in each instance be an express condition precedent to the right of Subcontractor to receive payment from Contractor, its payment bond surety or its statutory lien bond surety. Subcontractor shall not be entitled to progress payments from Contractor, its payment bond surety or its statutory lien bond surety, unless, until and then only to the extent such payment has been received by Contractor from Owner.

f) If an application for payment is received after the application date fixed above, Subcontractor's Work covered by it shall be included by Contractor in the next application for payment submitted to the Architect subject to review and approval of amounts claimed due.

g) Before issuance of each progress payment, Subcontractor shall submit evidence satisfactory to Contractor that all payrolls, bills for materials, equipment and subcontractors and all known indebtedness connected with Subcontractor's Work have been satisfied.

2) Final Payment

a) Final payment constituting the entire unpaid balance of the Subcontract Price, including retainage, shall be made by Contractor to Subcontractor when Subcontractor's Work is fully performed in accordance with the requirements of the Subcontract Documents, the Architect has issued a certificate for payment covering Subcontractor's completed Work and Contractor has received payment from Owner.

b) Notwithstanding anything else set forth in this Subcontract, receipt of final payment by Contractor from Owner shall in each instance be an express condition precedent to the right of Subcontractor to receive final payment from Contractor, its payment bond surety or its statutory lien bond surety. Subcontractor shall not be entitled to final payment from Contractor, its payment bond surety or its statutory lien bond surety, unless, until and then only to the extent such payment has been received by Contractor from Owner.

c) See additional requirements applicable to all Projects set forth in **Article 8, C** below.

C. **MEASUREMENT AND PAYMENT TERMS APPLICABLE TO ALL PROJECTS**

1) Basis for Rejecting Current Applications for Payment and/or Revising Prior Applications for Payment

a) Contractor may withhold approval of an application for payment in whole or in part, to the extent reasonably necessary to protect the interests of Contractor and/or Owner and/or the Architect or as otherwise allowed by the General Contract Documents. Contractor may also withhold its approval or, because of subsequently discovered evidence, may nullify the whole or a part of a previously approved application for payment, to such extent as may be necessary in Contractor's opinion to protect Contractor and/or Owner and/or Architect from loss for which Contractor may be exposed, including but not limited to loss resulting from acts and omissions because of:

i. defective Work not remedied;
ii. third-party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to Contractor is provided by Subcontractor;
iii. failure of Subcontractor to make payments properly to sub-subcontractors or suppliers or otherwise for labor, materials or equipment;
iv. reasonable evidence that the Work cannot be completed for the unpaid balance of the Subcontract Price;
v. damage to Contractor, Owner or a separate contractor;
vi. reasonable evidence that the Subcontract Work will not be completed within the Contract Time as defined in the General Contract Documents and/or **Exhibit "E"**, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
vii. failure to carry out the Work in accordance with the General Contract Documents; or
viii. any other material breach of any term of this Subcontract.

b) When the above reasons for withholding approval are removed, approval will be made for amounts previously withheld. If Contractor withholds approval for payment for the reason set forth in subparagraph (iii) above, Contractor may, at its sole option, issue joint checks to Subcontractor and to any sub-subcontractor or material or equipment supplier or union benefit fund to whom Subcontractor failed to make payment for Work properly performed or material or equipment suitably delivered. If Contractor makes payments by joint check, Contractor shall notify Subcontractor and Subcontractor will reflect such payment on the next application for payment.

2) Subcontractor shall maintain books, records and other compilations of data pertaining to the performance of the Work and the determination of quantities, progress payments and retainage in such detail to properly substantiate payment under this Subcontract. All such records shall be kept for a period of six years or for such longer period as specified in the General Contract Documents. All document retention periods start on the first day after final payment under this Subcontract. If any litigation, claim, negotiation, audit or other action involving the records is commenced prior to the expiration of the applicable retention period, all records shall be retained until completion of the action and resolution of all issues resulting there from, or until the end of the applicable retention period, whichever is later. Contractor shall have the right to examine the books, records, and other compilation of data which pertains to the performance of the Work and the determination of quantities, progress payments and retainage and shall have the right to adjust the payments and/or retainage should the books, records and other compilations fail to substantiate such payments. Subcontractor shall have the burden to substantiate the payments.

3) No partial payment, or certificate thereof, shall constitute the acceptance or approval by Contractor of the Work or material for which the partial payment is made. No partial payment shall constitute a waiver by Contractor of any right to require fulfillment of the entire scope of the Subcontract. Neither the final payment nor any partial payment, nor any certificate for either, shall constitute acceptance by Contractor of defective work or improper materials or of any element of Subcontractor's performance determined to be at variance with the Subcontract Documents and/or the General Contract Documents as required.

4) In the event Subcontractor is directed to perform extra work on a time and material basis, Subcontractor shall be responsible for obtaining verification of time and material slips from an authorized representative of Contractor. All slips for time and material work must be delivered to Contractor not later than the first work day of the week following the week in which the time and material work was performed or the time required by the General Contract Documents, if sooner.

5) In addition to any other conditions precedent set forth in the General Contract Documents for release of retainage and/or final payment, Subcontractor shall execute and deliver to Contractor prior to final payment: (i) a consent of surety (when applicable), (ii) an affidavit listing all sub-subcontractors, materialmen, and union benefits payments (where applicable) and certifying that there are no liens, claims or demands by sub-subcontractors, materialmen, laborers, other employees or third persons, (iii) a certificate from the appropriate state and local taxing authority evidencing payment of all applicable taxes, and (iv) all "deliverables" as defined in M.G.L. c. 29F(a), including but

not limited to as-built drawings, maintenance manuals and warranties necessary or required in connection with the Work. On Projects subject to the Massachusetts Retainage Law, the Schedule of Values shall include a line item for "deliverables" equal to two and one-half percent (2.5%) of the Subcontract Price.

6) Subcontractor's acceptance of final payment shall constitute full and final settlement of all obligations of Owner and Contractor to Subcontractor with respect to this Subcontract, except those claims which Subcontractor has specifically reserved in writing, with amounts of each such claim specified. Failure to specify the amount of any claim so reserved shall constitute a waiver of such claim.

7) Every progress application for payment submitted by Subcontractor shall include an executed Subcontractor Progress Release of Lien in the form attached as **Exhibit "L-1"** and the application for final payment shall include an executed Subcontractor Final Release of Lien in the form attached as **Exhibit "L-2."** An executed waiver form delivered by Subcontractor to Contractor via email in portable document format (.pdf) shall be deemed an original for all purposes. However, Contractor may, in its discretion, notify Subcontractor in any circumstance that it will require authentication of any electronic transmissions or require that Subcontractor deliver original documents prior to acceptance of applications for payments, lien waivers, or other documents contemplated herein.

ARTICLE 9 — DELAY

A. Subcontractor shall have no claim for damages for delays, hindrances, interference, and obstructions to its Work, or other such events no matter how or by whom caused. In case of such delays, hindrances, interference, or obstructions not due in any part to Subcontractor's fault, Subcontractor shall be entitled only to such extension of time of performance as may be allowed by Contractor provided that Subcontractor has given written notice within five (5) days of the commencement of the delay in form and substance to the satisfaction of Owner and Contractor.

ARTICLE 10 — CLAIM OF SUBCONTRACTOR

A. Subcontractor may make claim for the additional direct extra costs of labor and material incurred due to an increase in the scope of its Work due to changes or modifications to General Contract Documents provided it shall have first complied with all the applicable terms and provisions in the General Contract Documents pertaining to submission of claims, changes, and modifications and this **Article 10**. Subcontractor expressly waives all claims for indirect or consequential damages including but not limited to loss of productivity, interference, compression, impact, and unabsorbed home office overhead. Unless the General Contract Documents provide a shorter claim period, all claims by Subcontractor for direct costs of extra work shall be made not later than ten (10) days after the event or condition giving rise to the claim occurs or is first observed (except in the case claims for additional time due to delay which shall be reported within five (5) days as provided above). In no event shall Contractor become or be liable to Subcontractor on account of any such claims in excess of the amount actually received by Contractor from Owner on account of such claim.

B. This clause applies only with respect to a written claim by Subcontractor seeking an increase in the Subcontract Price on a Project Subject to the Massachusetts Prompt Payment Act: Contractor shall provide a written response to such claim not more than thirty-seven (37) days after the later of (i) the commencement of the performance of the work on which the request is based or (ii) the submission of such written claim. In the event that Contractor neither approves nor rejects such claim within such thirty-seven (37) day period, then such claim shall be deemed approved and may be submitted for payment within the next application for payment (on a percentage of completion basis), unless it is rejected by Contractor before the date payment is due on such application for payment, in which case any prior deemed acceptance due to the passage of time shall be null and void and of no effect whatsoever. A rejection of such a claim, whether in whole or in part, shall be made by Contractor in writing, shall include an explanation of the factual and contractual basis for the rejection and shall be certified as made in good faith. A rejection in whole or in part shall be subject to the dispute resolution process set forth in this Subcontract.

C. The existence of any dispute, controversy or claim between Contractor and Subcontractor shall not occasion or permit any delay in the prosecution of the Work or claimed extra or other work, and Subcontractor agrees to proceed with its Work and the disputed claimed extra work without delay and without regard to such dispute, controversy or claim or the pendency of any proceeding in relation to the same. In the event Contractor disputes whether any work is in fact extra work or is otherwise the responsibility of Subcontractor, Subcontractor's sole remedy shall be to complete the disputed work and the Work promptly as directed under protest and make claim as provided elsewhere in this Subcontract and in accordance with the General Contract Documents when applicable. Failure of Subcontractor to comply with the provisions of this paragraph of the Subcontract shall constitute a material breach of the same with all the remedies to Contractor provided for in Section 14 of these Subcontract General Conditions.

D. ANY CLAIM BY SUBCONTRACTOR FOR AN INCREASE IN THE SUBCONTRACT PRICE DUE TO CHANGES ORDERED BY CONTRACTOR AND/OR OWNER AND/OR CHANGED CONDITIONS MUST BE SUBMITTED IN A TIMELY MANNER (PER **ARTICLE 10, A**) OR SUCH CLAIM SHALL BE WAIVED. UNDER NO CIRCUMSTANCES SHALL SUBCONTRACTOR COMMENCE WORK IT CONSIDERS TO BE EXTRA OR A CHANGE PRIOR TO WRITTEN NOTICE TO CONTRACTOR AND RECEIPT OF WRITTEN DIRECTION TO PROCEED FROM CONTRACTOR. SUCH NOTICE SHALL INCLUDE A DESCRIPTION OF THE CLAIMED EXTRA WORK AND PROJECTED PRICE AND SCHEDULE IMPACT. STRICT COMPLIANCE WITH THE REQUIREMENTS OF THIS ARTICLE SHALL BE AN EXPRESS CONDITION PRECEDENT TO ANY ACTION OR PROCEEDING COMMENCED BY SUBCONTRACTOR AGAINST CONTRACTOR FOR ANY AND ALL CLAIMS ARISING OUT OF OR RELATED TO THIS SUBCONTRACT.

ARTICLE 11 — CLAIMS AGAINST SUBCONTRACTOR

A. Subcontractor shall promptly pay or discharge all bills, obligations, and charges incurred in connection with the prosecution of any of its Work hereunder and shall, to the extent permitted by law, promptly take all necessary steps to hold Contractor fully harmless and indemnified from any cost, attorneys' fees, loss, or damage arising therefrom. Any such costs paid by Contractor on behalf of Subcontractor shall be deducted from sums due Subcontractor hereunder.

B. Contractor may, in its sole discretion, issue joint, multi-party or direct checks to any lower tier subcontractor or supplier without incurring any contractual obligation to the lower tier subcontractor or supplier for unpaid invoices.

C. Immediately upon request from Contractor, Subcontractor will provide a listing will all backup documentation of all sub-subcontractors and suppliers with contract amounts.

D. Nothing in this Article is intended to limit Contractor's right and remedies under this Subcontract, the General Contract Documents, or as provided by law and/or equity.

ARTICLE 12 — SUPPLEMENTAL DOCUMENTATION REQUIREMENTS

A. Subcontractor shall, on request of Contractor, furnish certified payrolls, certified materials' certificates, documentation required by State or Federal Wage and Hour Laws, Prevailing Wage Laws, Equal Employment Opportunity and Affirmative Action programs or environmental protection laws and rules of the federal and state government or such further documentation as may be required by Contractor to establish that Subcontractor has kept current in its payments to sub-subcontractors, material suppliers, workers, governmental agencies, or labor organizations and otherwise complied with all General Contract Documents. Contractor shall have the right to interview and question Subcontractor's employees in order to establish compliance regarding worker classification, payment of wages, prevailing wages, safety protection and/or instruction, as EEO and Affirmative Action verification, and any other legal or regulatory requirement. Any payments due to Subcontractor may be retained by Contractor to assure Subcontractor's compliance with the provisions of this Article.

ARTICLE 13 — ASSIGNMENT

A. Neither this Subcontract nor any of the funds due or becoming due hereunder may be assigned or sublet by Subcontractor without the prior written consent of Contractor.

B. Contractor may assign the Subcontract. Subcontractor hereby consents to such assignment and agrees to be bound to the assignee, by the terms of the Subcontract. Subcontractor further agrees to be bound by any assignment of subcontract provisions of the General Contract Documents.

ARTICLE 14 — REMEDIES OF CONTRACTOR

A. Subcontractor stipulates and agrees that each of the terms, conditions and covenants set forth herein constitutes a material condition of this Subcontract. In the event of any material breach by Subcontractor of any condition of this Subcontract or of the General Contract Documents Contractor may, after providing Subcontractor written notice of the breach or breaches by email and Subcontractor's failure to cure said breach or breaches within seventy-two (72) hours from the date of such written notice (or, in the case of abandonment, twenty-four (24) hours' notice as provided in **Article 6, F** above), deem Subcontractor in default and, in addition to all other remedies available under the law:

1) Complete Subcontractor's Work or supplement Subcontractor's forces at Subcontractor's expense and, in any event, deduct from any payment otherwise due or becoming due all sums chargeable to Subcontractor and damages due to such breach; and/or

2) Withhold further payments otherwise due or becoming due Subcontractor; and/or

3) Terminate the Subcontract for default; and/or

4) Take any other steps Contractor deems necessary to cure any default by Subcontractor and deduct any cost incurred by Contractor in so proceeding to from amounts due or to become due to Subcontractor.

In any case, Subcontractor shall be liable to Contractor for all costs Contractor incurs as a result of Subcontractor's failure to perform this Subcontract in accordance with its terms. Subcontractor's failure to perform shall include the failure of its suppliers and/or sub-subcontractors of any tier to perform. Subcontractor's liabilities shall include, but not be limited to: (a) damages and other delay costs payable by Contractor to Owner (including but not limited to that portion of any liquidated or other delay damages assessed by Owner against Contactor due to the fault or neglect of Subcontractor); (b) Contractor's costs to complete Subcontractor's Work and any increased costs of performance, such as extended general conditions and other increased costs resulting from Subcontractor-caused delays or improper Work (plus overhead markup of 15%); (c) warranty and re-work costs (plus overhead markup of 15%); (d) liability to third parties; (e) attorneys' fees and related costs incurred by Contractor in any proceeding against Subcontractor or its sureties to enforce any of Contractor's rights as provided herein; and (f) costs of compliance, expense and damages, including but not limited to fines and penalties assessed against Contractor incurred as a result of violations of safety or any other laws rules, codes or relations by Subcontractor.

B. Upon a termination for default, Contractor may take immediate possession of all equipment, materials, tools, and appliances at the site or sites of the Subcontract Work and may complete said Work either with its own forces or by the employment of any other person, firm, or corporation. No further payment shall be or become due Subcontractor following such termination for default. When the Work is wholly completed, Subcontractor shall pay Contractor all costs of completing the Work and all damages of every kind or nature caused by said termination less the amount of any balances due Subcontractor.

C. In the event Contractor is a party to any legal proceeding on account of any acts or conduct of Subcontractor, Subcontractor agrees to pay Contractor all reasonable expenses including attorneys' fees incurred in connection with the legal proceeding.

D. This Subcontract may be terminated by Contractor if Subcontractor is not approved by Owner as Subcontractor for the Work described herein if such approval is required by Owner. Subcontractor shall not be entitled to any payments in the event of such termination.

E. Any sum or sums chargeable to Subcontractor under any provision of this Subcontract (except to the extent of personal injury or other damages covered by Subcontractor's insurance where Subcontractor's insurer acknowledges coverage and assumes all liability without reservation) may, at the election of Contractor, be deducted from any payments otherwise due or to become due to Subcontractor under this or any other subcontract between Contractor (including any subsidiary or affiliate of Contractor, any entity which is at least fifty percent owned or controlled by the owners of Contractor, or any joint venture in which Contractor or any of the foregoing is a venturer) and Subcontractor (including any

subsidiary or affiliate of Subcontractor, any entity which is at least fifty percent owned or controlled by the owners of Subcontractor or any joint venture in which Subcontractor or any of the foregoing is a venturer) with any remaining amounts due to Contractor to be paid by Subcontractor, or Contractor may sue Subcontractor (and its surety) and recover damages.

F. In the event that Subcontractor becomes insolvent, or is adjudged a bankrupt, or files for protection under Chapter 7 or 11 of the Bankruptcy Act, or makes an assignment for the benefit of creditors or if a Receiver is appointed to administer its affairs or it becomes otherwise disabled from performing this Subcontract in accordance with its terms, Contractor may immediately terminate this Subcontract by written notice to Subcontractor.

ARTICLE 15 — CONVENIENCE TERMINATION

A. Contractor may notify Subcontractor to discontinue the Work or any part thereof for the convenience of Contractor. Such notice shall be given to Subcontractor in writing, and, thereupon, Subcontractor shall discontinue such Work or such part thereof as Contractor so designates.

B. If, following a termination of Contractor by Owner, Contractor notifies Subcontractor to discontinue the Work, or any part thereof, Contractor shall pay and Subcontractor shall accept, as full payment for all Work done and materials provided, the amount of compensation actually received by Contractor from Owner on account of the Work actually completed by Subcontractor subject to any claims of Contractor against Subcontractor.

C. If, in the absence of a termination of Contractor by Owner, Contractor notifies Subcontractor to discontinue the Work, or any part hereof, Contractor shall pay, and Subcontractor shall accept as full payment for all Work done and materials provided, the following sums:

1) For all completed items of work for which there are unit prices provided in the Contract, the Contract unit prices as specified in **Article 1** or in Schedules to this Subcontract.

2) For all unpaid work on completed or partially-completed items, an amount based on the percentage of completion of Subcontractor's Work actually achieved and accepted, including approved change orders and all credits due Contractor, plus a termination for convenience fee equal to one-half percent (1/2%) of the original Subcontract Price (the "Termination Fee"), provided, notwithstanding anything else set forth in this Subcontract, in no event shall the amount due or paid Subcontractor on account of a termination for convenience exceed the Subcontract Price multiplied by the percentage of completion achieved by Subcontractor plus the Termination Fee, regardless of its actual costs. Any dispute between Contractor and Subcontractor regarding the amount properly due Subcontractor on a termination for convenience shall be subject to the Dispute Resolution provision in **Article 16**. With respect to any disputed work or cost related to a dispute over the amounts due upon a termination for convenience, upon request of Contractor, Subcontractor shall furnish itemized statements of the cost of Work performed and shall give Contractor access to all accounts, bills, payroll records, and vouchers relating thereto.

D. In the case of a termination for convenience, Subcontractor shall not be paid, and neither Subcontractor nor any entity claiming through Subcontractor, shall have any claim for loss of anticipated profits, for loss of expected reimbursement, or for any increased expenses resulting directly or indirectly from the discontinuance of any or all Work or from unbalanced allocation among any items of this Subcontract relating to overhead expense on the part of Subcontractor or for any other cause**.** To the extent that Subcontractor has claims for disputed extra work or otherwise, Subcontractor shall make such claims in accordance with those provisions of the General Contract Documents and this Subcontract as are applicable. Nothing in this Article shall be considered a waiver by Contractor of any other provision of the General Contract Documents or this Subcontract or any other defenses pertaining to such claims.

ARTICLE 16 — DISPUTE RESOLUTION

A. Subcontractor agrees to be bound by and to strictly adhere to the requirements of any provisions in the General Contract Documents relating to notice, submission, processing, and resolution of claims or disputes. Compliance with these provisions shall be an express condition precedent to Subcontractor's right to make a claim against Contractor. Notwithstanding the foregoing and in consideration of $10.00 included in the Subcontract Price, the receipt of which is hereby acknowledged, any and all claims or disputes arising out of or relating to this Subcontract or breach thereof shall be decided, at the sole option of Contractor, either by submission to (1) arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association or (2) judicial decision by the Superior Court in the Commonwealth of Massachusetts sitting in Boston or the United States District Court for the District of Massachusetts, Subcontractor hereby agreeing to both jurisdiction and venue of same; provided, however, the determination by Owner, the Architect, or any Court, Board of Arbitration, or other tribunal pursuant to the provisions of the General Contract Documents with respect to any dispute or claim relating to this Subcontract or the Work performed or to be performed hereunder shall be binding upon Subcontractor, and Subcontractor agrees to accept such determination, provided Subcontractor shall have been given reasonable notice of such dispute, proceeding, or litigation and opportunity to defend or present claims. Accordingly, at the sole option of Contractor, Subcontractor agrees that any action under any bond, including but not limited to actions under the Miller Act, 40 U.S.C. §270a *et seq.* or similar state law to bring a civil action against Contractor and/or its surety with respect to such matters as involve common issues of law and fact regarding the positions and interests of Owner shall be stayed until the conclusion of Contractor's dispute with Owner. Subcontractor shall be bound by any findings or decisions in such proceedings. At the sole option of Contractor, any legal proceeding with Subcontractor shall be consolidated with any other legal proceeding relating to the work under the General Contract. THE PARTIES EXPRESSLY AGREE TO WAIVE ALL RIGHTS TO TRIAL BY JURY. IN THE EVENT THAT CONTRACTOR EXERCISES THE OPTION TO HAVE A DISPUTE RESOLVED IN COURT, SUCH CASE SHALL BE HEARD BY A JUDGE, JURY-WAIVED.

B. In any dispute resolution process involving Contractor's surety, Contractor's surety shall have and shall be entitled to raise any and all defenses available to Contractor under this Subcontract or at law.

C. Contractor and Subcontractor agree that for all disputes under this Subcontract, responsible persons selected by each party will meet in good faith (including exchange of all necessary documentation) to resolve the issue between them within fifteen (15) days of the written request of either party. The parties further agree that, as a condition precedent to instituting legal action against each other or their sureties, at the sole option of

Contractor, they shall participate in non-binding mediation in Boston, Massachusetts pursuant to the Construction Industry Mediation Rules of the American Arbitration Association.

ARTICLE 17 — SUBCONTRACTOR DESIGN SERVICES

A. Whenever the General Contract Documents specifically require Subcontractor to furnish, as part of its Work, design or engineering services or certifications of any kind, including design included in a building information model if included in the Work, Subcontractor shall cause such services or certifications to be provided by a properly licensed design professional in accordance with the standard of care, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other Submittals prepared by such professional. Contractor shall be entitled to rely upon the adequacy, accuracy, and completeness of such services and such information. Subcontractor shall furnish a certificate of insurance from each design professional certifying to professional liability insurance coverage for such design profession in an amount not less than $2.0 million or such greater amount as required by the General Contract Documents. To the fullest extent permitted by law, Subcontractor shall defend, indemnify and hold Contractor harmless from all claims, damages or losses, including reasonable attorneys' fees, arising out of or related to any errors or omissions in design, or to any claim for infringement or misappropriation of any other person's intellectual property arising out of such design, in addition to any other claims for which indemnification is required hereunder.

ARTICLE 18 — WARRANTY

A. Subcontractor shall strictly comply with all warranty requirements of the General Contract Documents applicable to the Work. In addition, Subcontractor warrants to Owner, Contractor, and Architect that materials and equipment furnished under this Subcontract will be of good quality and new unless otherwise required or permitted by the General Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform to the requirements of the General Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. This warranty shall be in addition to and not in limitation of any other warranty or remedy required by law or by the General Contract Documents.

B. Subcontractor further agrees to furnish any special warranties in accordance with the General Contract Documents for the Subcontract Work as a condition precedent to final payment.

C. Unless the General Contract Documents have more stringent requirements, within seven (7) day of receipt by Subcontractor of a written notice of a warranty claim, Subcontractor shall return to the site to respond to a warranty claim, provided that in the event the failure of an item under warranty creates an ongoing or imminent threat to life safety or the damage to physical property, then Subcontractor shall respond in not less than twenty-four (24) hours.

ARTICLE 19 — LABOR HARMONY

A. It is understood that Contractor is signatory to collective bargaining agreements with both the Carpenters Union and the Laborer's Union. Other trades will be awarded by Contractor and labor will be employed on the Project without discrimination as to whether employees of any subcontractors are members or non-members of any labor organization. Subcontractor accepts this Subcontract with these understandings. Subcontractor agrees to provide union labor to the extent required by the collective bargaining agreements to which Contractor is signatory (this shall include, but not be limited using union Carpenters for metal or composite panels and siding and punched windows), and will work in harmony with all labor on the Project. There shall be no manifestations on the Project site of any dispute between any labor organization and Subcontractor. Subcontractor agrees to employ workers, agents, suppliers and subcontractors who will perform the Work under this Subcontract whether or not other workers on the Project are members or non-members of any labor or collective bargaining organization. Should any workers performing any portion of the Work engage in a strike or other work stoppage or cease to work due to picketing or a labor dispute of any kind, said circumstances shall be deemed a failure to perform the Work on the part of Subcontractor subject to the conditions and terms set forth in **Article 14** above.

B. Should there be a work stoppage or slowdown caused by a strike, picketing, boycott or by a voluntary or involuntary cessation of work by employees of Subcontractor or of any supplier of Subcontractor or of any sub-subcontractor, which in the judgment of Contractor and the mutual agreement with Subcontractor will cause, or is likely to cause, unreasonable delay in the progress of construction, then upon forty-eight (48) hours' written notice Contractor shall have the right to declare Subcontractor in default of this Subcontract and to take such steps as are necessary to finish the uncompleted portion of Work and all other remedies under **Article 14** above.

ARTICLE 20 — NO WAIVER

A. No action or failure to act by Owner, Contractor or Architect, shall constitute a waiver of any right or duty afforded any of them under the General Contract Documents, nor shall any such action or failure to act constitute an approval of or acquiescence to any breach under this Subcontract except as may be specifically agreed to in writing by Contractor.

ARTICLE 21 — USE OF ELECTRONIC FILES

A. As a convenience to Subcontractor, Contractor may provide electronic files, including drawings, specification sections, and other documents, in electronic format to assist Subcontractor in preparing shop drawings and other submittals required for the Work and for preparing as-built or record drawings. If so provided, such electronic files shall be used only as a supplement to previously issued paper General Contract Documents. The furnishing of electronic files does not relieve Subcontractor of its obligation to fully comply with the General Contract Documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate Subcontractor's Work with that of other trades.

B. By providing electronic files, Contractor does not convey any license or right, including copyright, in the original documents, or any right to prepare derivative documents.

C. The use or re-use of any electronic files by Subcontractor or on Subcontractor's behalf shall be at Subcontractor's sole risk and without liability to Contractor. Subcontractor shall indemnify, defend and hold Contractor, its clients, consultants and employees harmless against all damages, liabilities, losses or expenses arising out of or relating to Subcontractor's use of the electronic files furnished through Contractor

D. Electronic files furnished pursuant to this Article are not General Contract Documents. No representation is made by Contractor as to the accuracy, completeness, or condition of the electronic files that may be furnished pursuant to this **Article 21**, and differences may exist between these files and the paper General Contract Documents due to corruption, viruses, or other anomalies. In the event of a discrepancy, the hard copies of General Contract Documents shall govern. Subcontractor accepts responsibility for any and all loss or damage arising from the copying, loading or use of such electronic data by Subcontractor and agrees to waive any such claims against Contractor.

E. If during the course of performing the Work Subcontractor transfers electronic files furnished pursuant to this **Article 21** to a third-party, Subcontractor agrees to obtain written confirmation that such third-party agrees to the terms and conditions set forth in this **Article 21** prior to transfer thereof and as a condition of their use.

F. Subcontractor agrees to execute such other and further documents relating to the use of electronic files as reasonably required by the Architect or Owner.

ARTICLE 22 — NON-DISCRIMINATION

A. It is Contractor's policy not to discriminate against any employee or applicant for employment because of race, color, religion, gender or gender identity, sexual orientation, age, disability, veterans' status, or national origin. Additionally, it is Contractor's policy to take affirmative action and promote a system which ensures that equal opportunity is the working procedure and end result without discrimination in promotions, raises and layoffs.

B. Subcontractor acknowledges and will conform to Contractor's policies stated herein. Whenever required by law or contract, Subcontractor will comply with all applicable Federal, State and Local Laws, Rules and Regulations for Equal Employment Opportunity, including but not limited to Executive Order 11246 as amended and the Equal Employment and Affirmative Action clauses of 41 CFR §§ 60-1.4(a), 60-300.5(a) and 60-741.5(a) and all other provisions contained within the General Contract Documents.

ARTICLE 23 — POLICY AGAINST EMPLOYEE HARASSMENT AND INTIMIDATION

A. Contractor's company policy will not tolerate harassment of any employee regardless of race, color, religion, gender or gender identity, sexual orientation, age, disability, veteran status or national origin, and will back this policy with appropriate sanctions, including dismissal if necessary. This policy applies to any type of harassment, not only sexual harassment.

B. It is illegal and against Contractor's policies for any employee, male or female, to sexually harass another employee by: (i) making unwelcomed sexual advances or requests for sexual favors or other verbal or physical conduct of a sexual nature, a condition of any employee's continued employment , or (ii) making submission to or rejections of such conduct the basis for employment decisions effecting the employee, or (iii) creating and intimidating, hostile or offensive working environment by such conduct.

C. Each Subcontractor's foreman or supervisor will be held responsible for the prevention of harassment of any employee on the Project site by Subcontractor's employees or sub-subcontractors. Harassment of any employee for any reason on or off the job site is a matter of serious concern. Contractor's policy is to provide a meaningful work experience for all employees. Interference with the policy will result in immediate corrective action. This applies to on-site employees of Contractor, Subcontractor and their suppliers.

D. Any employee who believes he or she has been the subject of harassment or intimidation should report the alleged act immediately (within 48 hours after the alleged harassment occurs) to Contractor's job superintendent and Contractor's Human Resources Department. An investigation of all complaints will be undertaken immediately. Any supervisor, agent or other employee who has been found by Contractor after appropriate investigation to have harassed another employee will be subject to appropriate sanctions depending on the circumstances, from a warning up to and including termination.

E. Contractor recognizes that the question of whether a particular action or incident is a purely personal, social relationship or is harassment, requires a factual determination based on all facts in this matter. Contractor recognizes also that false accusations can have serious effects on innocent individuals. Contractor will not tolerate false reports or intimidation of those making true reports.

F. All Subcontractor's employees shall act responsibly to establish a pleasant working environment free of discrimination and harassment. Subcontractor acknowledges and shall conform to Contractor's Policy Against Employee Harassment and Intimidations.

ARTICLE 24 — ENTIRE CONTRACT

A. This Subcontract and the attached exhibits and schedules shall constitute the entire contract between the parties and shall supersede any proposals or agreements and may not be altered or amended in any respect by writing duly executed at the point of change by the parties hereto.

ARTICLE 25 — SEVERABILITY

A. Any article or provision of this Subcontract, which may be deemed in violation of law, shall not affect in any manner the remaining provisions of this Contract.

B. This Subcontract is intended to incorporate by reference all applicable provisions of law which by law are required to be incorporated in this Subcontract.

ARTICLE 26 — ELECTRONIC SIGNATURES/PORTABLE DOCUMENT FORMAT VERSIONS AS ORIGINALS

This Subcontract shall be effective as of the date first written above. Scanned copies of this Subcontract as executed, signature pages, executed change orders or modifications, and/or lien waivers delivered via email in portable document format (.pdf) shall be deemed originals for all purposes and the same shall be binding and enforceable. The burden of proof of delivery shall be upon the party initiating the transmission. However, Contractor may, in its discretion, notify Subcontractor in any circumstance that it will require authentication of any electronic transmissions or require that Subcontractor deliver original, wet-signature documents prior to acceptance of this Subcontract, any change orders or modifications hereto, and any applications for payments, lien release forms, or other documents contemplated herein.

Project Name
City, State – Job No.
SC-xxx-xxx Between Consigli Construction Co., Inc. and Subcontractor

EXHIBIT "B"
Subcontract Special Conditions

1. **SALES TAX INCLUSION -** This project addressed herein is **TAX EXEMPT / TAXABLE** therefore, all state of MA sales and usage taxes shall be **excluded /included** in the Subcontract price. If you are an out of state Subcontractor you must submit Sales and Use tax form and bonds. You can find all required information on the Mass.Gov website (Business tab).

2. **EXECUTED SUBCONTRACTS AND INSURANCE CERTIFICATES** – Subcontractors and Vendors will not be authorized to mobilize or remain on site without providing Contractor with a fully executed Subcontract a/or Material Purchase Agreement along with the required Insurance Certificates and renewal certificates.

3. **SIGNAGE** – It is mutually understood and agreed that Subcontractors and Vendors will not be allowed to display company and/or affiliation signage on the project site.

4. **CO-LOCATION**

   a. Consigli may elect to co-locate the coordination team at the project site for discrete 2-3 day sessions, up to 5 times during the coordination process.
   b. Co-location is defined as the coordination team (subcontractors, Consigli staff, design team designates) working on site in a common space. Subcontractors will actively produce/develop their coordination drawings and coordinate with the other responsible subcontractors to resolve conflicts while on site.
   c. Each entity will bring their own hardware/software, Consigli will be responsible for providing a common platform/methodology to share files and assist in identifying conflicts.
   d. The co-located team shall meet daily to plan and monitor the progress of the Work and the work of Contractor and other subcontractors, and shall document decisions and questions through the established project processes.

Project Name
City, State – Job No.
SC-xxx-xxx Between Consigli Construction Co., Inc. and Subcontractor
EXHIBIT "C"
Schedule Of Work

SCOPE OF WORK – The Scope of the Subcontract Work includes all labor, materials, equipment and supervision required for the completion of all of the **TRADE Work** for the above referenced project in strict accordance with the contract documents listed below.

1. **CONTRACT DOCUMENTS** – All work shall be completed in strict accordance with the below listed specification sections (and the specified related sections), without exception. No deviations from the specifications regarding materials and execution shall be tolerated. Where contradictions occur between drawings and specifications, the more stringent requirement shall apply. The documents are further described in **Exhibit "F", the "Schedule of Documents",** a copy of which is attached hereto and made part hereof.

   A. Agreement between Owner and Contractor, including General Conditions

   B. Contract Drawings, as prepared by Architect dated date of drawings.

   C. Project Specifications, as prepared by Architect dated date of drawings, including but not limited to the following:

      1)

   D. Addenda as prepared by Architect

      1)

2. **SCOPE OF WORK** – The Scope of the Subcontract Work also includes, but is not limited to, the following items:

   A.

3. **ADDITIONAL TRADE-SPECIFIC REQUIREMENTS** – The following items are also included and have been mutually understood and agreed upon:

   A.

4. **ADDITIONAL PROJECT-SPECIFIC REQUIREMENTS** – The following items are also included and have been mutually understood and agreed upon:

   A. It is mutually understood and agreed that Subcontractor has made a complete and comprehensive review of all of the contract drawings and specifications and has figured into the Subcontract price all Work required to provide complete and proper working systems in accordance with "Intent" of the General Contract Documents.

   B. Subcontractor shall be responsible for clean-up of trash and debris to Contractor's dumpsters on a daily basis. If Subcontractor does not comply, said Subcontractor will be given one (1) verbal warning and (48) hours to correct the situation. Upon such time that Subcontractor does not correct the problem, said Subcontractor will be subject to back charges for the cost associated with Contractor providing subsequent cleaning services.

   C. It is understood that Consigli recycles excess materials per the Environmental Protection Committee's recycling attachment (**Exhibit "I"**). Therefore, Subcontractor is responsible for separating waste into designated dumpsters. Any subcontractor that does not comply with this direction will be liable to pay for the dumpster which will be considered mixed use or construction debris per **Exhibit "I."**

   D. All Work shall be completed in strict accordance with all governing codes, standards and regulations. All Work shall further conform to the requirements and interpretations of local authorities having jurisdiction over the Project. If authorities having local jurisdiction determine that project documents do not meet current governing codes, standards and regulations, this Subcontractor shall notify General Contractor before commencement of Work. It shall also be the

responsibility of this Subcontractor to secure all approvals and permits necessary to proceed with its scope of Work and to obtain all permits necessary for Owner to occupy the facilities for their intended use.

E. It is mutually understood and agreed that the Subcontract Price includes the cost of all materials required to complete the scope of Work of the Subcontract and any associated price increases that may occur over the course of completing the Work of this Subcontract.

F. Provisions for protection of the Work of this Subcontract, areas of Work, and adjacent work.

G. All field measurements and verification necessary to complete Work of this Subcontract.

H. Contractor will provide a list of all Owner utility or service shutdowns required to complete their work within 15 days of award. List will be compressive and specify each shut down required and not be general in nature. Examples include specific water shutdowns, power shut downs, and any other shutdowns that would impact the Owner's operation.

I. Provisions for all layout as required to complete the Work of this Subcontract from control provided by Contractor.

J. Repair of existing work disturbed as a result of the completion of the Work of this Subcontract.

K. All costs associated with hook-up to the temporary power panel and/or utility power distribution shall be the responsibility of Subcontractor. In the event that Subcontractor plans on having a trailer located on the Project site, then Subcontractor shall also be responsible for all mobilization costs, demobilization costs, and associated utility and power hook-up costs as well as the removal of any temporary utility and power hook-ups noted above, at the project completion.

L. Task lighting as required to complete the Work of this Subcontract. Temporary construction lighting within OSHA standards shall be provided by others.

M. All offsite storage costs required by this Subcontractor.

N. Provisions for all submittals, warrantees, maintenance manuals, training and other closeout requirements as specified.

O. Subcontractor is responsible to issue daily reports to Contractor's Superintendent on a weekly basis.

P. Subcontractor's onsite Foreman or Supervisor must attend the Pre-Operations meeting.

Q. Subcontractor's on-site personnel will be required to attend weekly project mandatory meetings with Contractor's on-site personnel, and other appropriate parties when directed by Contractor's Project Manager. Absence from required meetings will result in liquidated damages of $500.00 per incident.

R. This project will utilize Contractor controlled project management website for all project documentation. This data base, known as Procore, will be accessed through the internet and will be updated in real time by project team members such as the architect or Contractor. This Subcontractor will be issued a user name and password and will be expected to obtain drawings, sketches RFIs, meeting minutes, coordination drawings, schedule updates, change information, etc. via this database. Contractor will notify subcontractors as relevant items are added. It will be the responsibility of this contractor to regularly check and review updated documents as they are added to the database.

S. This project will utilize electronic processing of Change Orders via Docusign Electronic Signature. All subcontractors will be required to sign all Change Orders using this process.

T. It is mutually understood and agreed that the project at hand may involve renovation of existing building(s). If this is the case, the existing building(s) may contain lead, asbestos, or other hazardous materials. Therefore, it shall be the responsibility of the Subcontractor to thoroughly review the existing site conditions, existing building elements and any environmental reports and/or surveys prior to commencing Work. If it is confirmed that hazardous materials of any kind

exist, it shall be the responsibility of Subcontractor to train all employees with respect to protection from said hazardous materials in accordance with all applicable OSHA standards and regulations prior to commencing Work on site.

5. **EXCLUSIONS** – The following items are excluded from the Scope of Work of this Subcontract:

   A. Exclusions (placeholder)

Project Name
City, State – Job No.
SC-xxx-xxx Between Consigli Construction Co., Inc. and Subcontractor
EXHIBIT "D"
Subcontract Pricing

1. **SUBCONTRACT PRICE** – It is mutually understood and agreed that the Subcontract price for completing the Work of this Subcontract is **$xxx,xxx** including/excluding tax

   Contact Person_____ > If New Sub: Company Address _____

   Phone
   E-Mail_____

   Cost Code(s) _____ Value_____

   DATE OF AWARD TO SUBCONTRACTOR _____

2. **TEXTURA ™ CPM PAYMENT MANAGEMENT SYSTEM**

   A. All Project Payment Applications and all supporting documents (including but not limited to waivers of lien and sworn statements) shall be in electronic format and shall be submitted to Consigli using the Textura™ CPM payment management system. Subcontractor shall be responsible for the fees and costs associated with Subcontractor's use of the Textura™ CPM payment management system. Subcontractor shall include a similar requirement in all sub-subcontracts or purchase orders entered by Subcontractor.

   1) Fees to Subcontractors are calculated as 0.18% (18 basis points) of total contract value (including net change orders), with a minimum fee of $50 and a maximum fee of $2,500. Fees to Subcontractors' subcontractors and suppliers are a fixed fee of $100 per subcontract or supplier contract.

3. **ALLOWANCE FOR OVERHEAD AND PROFIT ON CHANGES –** Allowable mark-up for overhead and profit, which shall include all management and supervision above the level of working foreman, general conditions and required insurances, shall be __% for self-performed work and ___ % for subcontracted work.

4. **SUBCONTRACTOR BONDS OR SUBCONTRACTOR DEFAULT INSURANCE ("SDI")PROGRAM**

   ☐ Subcontractor shall furnish a Performance and Payment Bond in a form and from a surety satisfactory to Contractor in the amount of the full value of the Subcontract Agreement. Premiums for said bond are to be paid by Subcontractor, and the costs for same are included in the Subcontract Price. Having satisfied all conditions of awards as set forth elsewhere in these documents, Subcontractor shall, within a five (5) day period, furnish Performance and Payment Bonds. In the event that Subcontractor fails to provide the required bonds within five (5) days, or within such extended period as Contractor may grant, Contractor may revoke its award this Subcontract seek damages from Subcontractor.

   ☐ This Project has been included in the Contractor SDI program. All Subcontractors with a Subcontract value of $25,000 or more must pre-qualified prior to completing any work on this project. Subcontractor agrees to provide all financial and other information needed for Contractor to pre-qualify Subcontractor. In the event that Contractor, in its sole discretion, chooses to require Performance and Payment Bonds for Subcontractor in lieu of enrolling Subcontractor in to the SDI program, Subcontractor shall provide such bonds and the parties shall proceed in accordance with the prior paragraph.

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5. **RETAINAGE**

1) On Projects **not subject to the Massachusetts Retainage Law, M.G.L. c. 149, §29F**, Contractor shall withhold **10%** retainage from the total value of the Subcontract price until Substantial Completion of the project or acceptance of Subcontractor's Work by Owner, Architect and Contractor.

2) On Projects subject to the Massachusetts Retainage Law, M.G.L. c. 149, §29F, retainage withheld pursuant to this Subcontract shall be equal to **5%** of the value of each application for payment and shall be released as follows:

A. Provided that all conditions precedent to progress and final payment set forth in **Articles 8A and 8C** of the Subcontract General Conditions and the applicable terms and conditions of General Contract Documents, if any, retainage shall be paid in the next application for payment submitted after Substantial Completion of the entire Work as defined in the General Contract Documents, subject to the following hold-backs, if applicable: (i) for incomplete or missing deliverables, the reasonable value of the deliverables, which shall not exceed two and one-half percent (2.5%) of the Subcontract Price; (ii) one hundred fifty percent (150%) of the amount necessary to complete or correct Subcontractor's punch list items and defective work; and (iii) the reasonable value of claims (and any forecast of costs, expenses and attorneys' fees to be incurred as a result of such claims). In the event that, following Substantial Completion of the entire Work, Contractor determines that it is entitled to continue to withhold retainage, Contractor shall provide to Subcontractor a written description of the incomplete or defective work items and incomplete, incorrect or missing deliverables, the factual and contractual basis for the claims and the value attributable to each incomplete or defective work item, deliverable and claim, all certified as made in good faith. Retention not previously released shall be released when all conditions precedent to final payment have occurred.

B. Not later than seven (7) days following receipt of a punch list from Owner, Contractor shall supplement the such punch list (if deemed appropriate by Contractor in its sole discretion) and forward such punch list to Subcontractor along with a certification that Subcontractor's punch list, as supplemented, has been made in good faith. Subcontractor shall correct and complete of punch list items of Work within thirty (30) days and assist Contractor in conducting final inspections. Any disputes regarding the appropriateness or completion of any punch list items shall be subject to the dispute resolution process set forth in **Article 16** of the Subcontract General Conditions.

C. Provided Subcontractor shall have completed its punch list, Subcontractor may submit an application for payment for retainage upon the 67th day following the date established for Substantial Completion of the entire Project.

6. **SCHEDULE OF VALUES** – Subcontractor will be required to cooperate with Contractor and Owner to develop a detailed breakdown of its Subcontract Price in order to show the division of costs between several parts of the Work and in the manner and form required by both Contractor and Owner showing also breakouts of labor, material, overhead, general conditions and profit. It is understood and agreed that this will also apply to all Subcontractor's lower tier sub-subcontractors. One projects subject to the Massachusetts Retainage Law, the Schedule of Values shall include a line item for "deliverables" as defined by M.G.L. c.149 §29F(a) equal to 2.5% of the Subcontract Price

7. **ALTERNATES** – In the event that Contractor, subject to the approval of Owner and/or the Architect, modifies the Scope of the Subcontract Work to include any or all of the following changes, Subcontractor will make the modifications as directed and the Subcontract price will be increased or decreased, as the case may be, in accordance with the lump sum and/or unit prices as set forth below each item, which includes all applicable costs of construction, insurance, overhead and profit:

Alternate Pricing:

	Description of Modification	Add/Deduct
A.	N/A	**$0.00**

Unit Rates:

	Description of Work	Unit Rate
A.	N/A	**$0.00**

Project Name
City, State – Job No.
SC-xxx-xxx Between Consigli Construction Co., Inc. and Subcontractor
EXHIBIT "E"
Project Schedule Requirements

1. **CONSTRUCTION SCHEDULE** - Subcontractor hereby acknowledges and agrees that it has been made aware of and hereby agrees to comply with the following schedule for the Subcontract Work:

   A. Submittals and Shop Drawings shall be provided no later than _____after receipt of notice to proceed.

   B. Lead time on materials after approvals shall be no longer than _____.

   C. Mobilization and start of construction will occur the week of_____.

   D. Milestones:

      1) Work shall be completed by _____

      2) Work shall take no longer than _____weeks.

   E. Complete all Work in accordance with Contractors Construction Schedule.

      1) Subcontractor will participate in schedule development meetings are required by Consigli Construction Co., Inc.

   F. This is a Lean Project and Subcontractor will participate in the Last Planner Systems including daily schedule/planning meetings when on site.

   It is also mutually understood and agreed that these dates represent the intention of Contractor and Subcontractor and that in the event the actual dates are adjusted to suit project conditions, Subcontractor will adjust its sequence and duration to timely complete its Work in accordance with the adjusted schedule.

Project Name
City, State – Job No.
SC-xxx-xxx Between Consigli Construction Co., Inc. and Subcontractor
EXHIBIT "F"
Schedule of Documents

1. **AGREEMENT BETWEEN OWNER AND CONTRACTOR—**copy on Consigli FTP site and/or Procore

2. **CONTRACT DRAWINGS & SPECIFICATIONS**:
   (as prepared by *fill in Architect*)

   In accordance with the attached Document and Specification Log dated _____, _____Pages

3. **MISCELLANEOUS DOCUMENTS:**

Project Name
City, State – Job No.
SC-xxx-xxx Between Consigli Construction Co., Inc. and Subcontractor
EXHIBIT "G"
Project Safety Requirements

1. **HEALTH AND SAFETY HAZARD AWARENESS** - Subcontractor recognizes that it and its Subcontractors, suppliers and employees have the obligation to comply with all federal and/or state safety and health laws and regulations. Subcontractor specifically acknowledges that it has the primary responsibility to prevent and/or correct all health and safety hazards within the operations for which it and its employees or its Subcontractors and their employees are responsible. Subcontractor further acknowledges that it and its Subcontractors, suppliers and employees have special expertise in recognition and prevention of such hazards in the operations for which they are responsible and that Contractor does not have such expertise and is relying upon such expertise by Subcontractor and its Subcontractors, suppliers and employees. Contractor retains the right to direct Subcontractor to eliminate all hazards of which Contractor has actual knowledge, but the recognition and abatement of such hazards are the responsibility of Subcontractor and its Subcontractors, suppliers and employees. Subcontractor agrees to indemnify Contractor and all other Subcontractors for all costs and penalties incurred, including attorney fees, as a result of hazards created by Subcontractor, its Subcontractors, suppliers and employees. Subcontractor hereby certifies that it will not allow on the project site any Subcontractor, supplier and/or employee of any of them who is not fully trained in all safety aspects of the Subcontract Work and who is not expert in the operations comprising the Subcontract Work.

2. **OSHA REQUIREMENTS** - Subcontractor hereby acknowledges that it is familiar with the Federal Regulation 29CFR Part 1926 - Safety and Health Regulations for Construction. In compliance with that regulation, Contractor has developed a written Hazard Communication Program identifying the requirements for hazardous material identification. Subcontractor hereby agrees to conform with the requirements of the OSHA regulations and to follow the procedures set forth in Contractor's Communication Standard identified herein and in accordance with those regulations and that standard shall forward to Contractor's office to the attention of the Safety Manager copies of all "Safety Data Sheets" for materials being brought onto the jobSite. The Material Safety Data Sheets shall be accompanied by a letter of transmittal stating the name of Subcontractor, the name and location of the jobsite, description of what Material Safety Data Sheets are being sent and any special precautionary measures that should be taken when using these materials.

3. **BASIC SAFETY RULES AND REGULATIONS** - Subcontractor hereby agrees to comply completely during the performance of the Subcontract Work with all of Contractor's designated safety programs for the project.

4. **ACCIDENT REPORTING** - Subcontractor hereby acknowledges and agrees to orally notify Contractor's Project Superintendent within twenty-four (24) hours after any of Subcontractor's employees and/or equipment and/or motor vehicles or any of its lower tier subcontractor's and/or supplier's employees and/or equipment and/or motor vehicles are involved in a jobsite accident or injury. Further, Subcontractor also hereby acknowledges and agrees to provide Contractor with a completed first report of injury within five (5) days after any of Subcontractor's or any of its lower tier subcontractor's or supplier's employees are injured in a jobsite accident.

5. **OSHA TRAINING** – All Subcontractors' personnel shall have OSHA 10 hour construction training and certification prior to working on any Consigli Construction Co. Project site. All supervisory shall have OSHA 30 hour Construction Training and Certification. Personnel that are not trained will be asked to leave the project site until certification is obtained.

6. **CRANE SAFETY POLICY** – When mobilizing cranes on site for completion of their respective work, all Subcontractors shall comply with Contractor's Crane Safety Policy, including but not limited to, third party independent inspection of all Lattice Boom and Tower Cranes during set up and prior to operation.

7. **OSHA REQUIREMENTS FOR EXCAVATION** - Subcontractor hereby acknowledges and certifies that it is familiar with Federal Regulation 29 CFR, Part 1926, Subpart P – Excavations. Subcontractor hereby agrees to perform the Subcontract Work in full accordance with all of the requirements set forth in this regulation.

8. **OSHA RECORDABLE INCIDENT RATES** - Subcontractor will be required to submit on a monthly basis its OSHA recordable and lost day incident rates for this specific Project if specifically required by Contractor's Project Manager or Project Superintendent.

9. **SAFETY PRECONSTRUCTION MEETING** – It is mutually understood and agreed that Subcontractor shall attend a safety preconstruction meeting to review all safety requirements as pertains to the completion of the Work of their Subcontract. This shall take place on-site, prior to the start of Work, with the Consigli safety representative. Subcontractor's onsite Foreman shall be required to attend.

10. **CONSIGLI SAFETY RULES AND REGULATIONS** – The successful Bidder/Subcontractor, as a condition of employment, will be required to comply with all applicable Federal, State, County, Municipal, Client and Construction Manager SAFETY RULES AND REGULATIONS. **(NOTE: Federal OSHA Standards are referenced, however the more stringent of State, Owner or Local Safety Codes will also apply.)**

11. **100% 6FT. FALL PROTECTION** – Contractor has adopted a 100% Six Foot Fall Protection policy on this Project. All work over six feet in height will have a fall protection system in place. Instances were fall protection may create an unsafe condition will be dealt with on a case-by-case basis. Subcontractors shall include in the scope of their work compliance with 100% Six Foot Fall Protection standards for all work activities as detailed in Contractor's Site Specific Safety Manual, which is incorporated by reference in this Subcontract Agreement.

12. **FALL PROTECTION REMOVAL/ACCESS –** If for any reason fall protection must be removed or access is needed to roof decks, controlled access zones, or any areas that do not have the permanently affixed fall protection measures (guardrail systems) and the Consigli Superintendent is not notified in a timely manner, then the Superintendent can require the non-compliant party to then complete a "Fall Protection Access Permit". The permit shall be completed by Subcontractor and returned to the Consigli Project Site Office.

13. **LEAN PROJECT RULES AND REGULATIONS**

OVERVIEW

A. This is a Lean project, so all Subcontractors are required to participate in Consigli's Lean design and construction program.

B. All Subcontractors' project managers and foremen will participate in short term planning meetings as required by Consigli, including but not limited to Pull Planning, Make Ready Planning / Roadblocks Log updates, and Weekly Commitment Planning and Learning meetings.

C. All Subcontractors' foremen working on-site shall participate in Daily Stand-Up meetings to coordinate work, identify roadblocks to current and impending on-site activities, collaborate on strategies for removing those roadblocks, and identify opportunities for improving throughput and workflow.

MATERIALS MANAGEMENT

D. All Subcontractors will deliver all materials just in time for installation. Subcontractors must obtain prior approval from Consigli's Superintendent at least 48 hours in advance to schedule all material deliveries to the site. No materials shall be delivered to the site earlier than 72 hours before said materials are to be installed/put into place. If materials have to be delivered before that 72-hour window, the Subcontractor shall get prior approval from Consigli's Superintendent. Consigli has the right to refuse any deliveries not properly scheduled or due to logistical constraints as necessary.

E. All Subcontractors shall place delivered materials on wheeled carts, wheeled racks, or in wheeled bins to enable easy relocation in case materials need to be moved. If there are designated material laydown areas (e.g., "Subcontractor parking spots") and project-specific storage/staging rules, Subcontractors shall store/stage their materials accordingly. Subcontractors may deliver and store materials/tools on pallets only if pallet jacks are delivered simultaneously and kept with said delivery to enable immediate mobility of materials.

F. All Subcontractors shall use rubber wheeled carts when moving material or removing trash from a building. Any damage caused by the Subcontractor shall be repaired at the cost of the Subcontractor. Back charges will be appropriately assessed for the cost of the repairs.

G. All Subcontractors shall, where feasible, elevate all electrical extension cords, hoses, or cables to remove them from all walking/working surfaces.

TRASH REMOVAL

H. All Subcontractors shall provide wheeled trash bins in workstations for immediate placement of all debris produced as a part of the Subcontractors' on-site installation operations. All Subcontractors will cut anything larger than 6' down to size prior to placing it into trash bins. All Subcontractors will sweep their work areas each day. No trash or materials shall be left on the floor.

I. All Subcontractors shall dump wheeled containers into Consigli-supplied dumpsters on a daily basis.

J. Storage of delivered materials in cardboard containers is discouraged. When materials must arrive or stay in cardboard containers, all Subcontractors shall remove said containers from the project immediately after the products are unpacked.

Subcontractors found in non-compliance with any of the applicable rules and regulation will receive a "Notice of Violation" either oral or written. Failure to abate the violation or continued failure to comply with the Basic Safety Rules and Regulations may result in liquidated damages. Liquidated damages, if assessed, will only be used by the Construction Manager to fund programs at the Jobsite to promote Safety.

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SC-xxx-xxx Between Consigli Construction Co., Inc. and Subcontractor

Following is a list of the Basic Safety Rules and Regulations, many of which carry the potential for liquidated damages and the amount of the liquidated damages which could be assessed:

A. Subcontractor shall submit its company SAFETY PROGRAM/HAZCOM PROGRAM and designate its Jobsite Safety Coordinator prior to starting work. **Failure to do so may result in a $500.00 liquidated damage assessment to Subcontractor.**

B. All job related ACCIDENTS AND INJURIES shall be reported to the Consigli Construction Company's Project Superintendent immediately and a copy of all injury reports shall be submitted to the Project Superintendent within (72) hours of occurrence. **Failure to do so may result in a $500.00 liquidated damage assessment to Subcontractor.**

C. Subcontractor's employees must report all UNSAFE CONDITIONS AND NEAR ACCIDENTS to their supervisor and the Jobsite safety officer so that corrective action can be taken.

D. Subcontractor's employees shall attend any Jobsite SAFETY ORIENTATIONS as required. Subcontractor's supervisors shall attend Consigli WEEKLY SAFETY MEETINGS. Subcontractor must hold a "Weekly Tool-Box Safety Meeting" and submit for record those employees who have attended, along with a list of topics and related information discussed. **Failure to comply with any of the above may result in $500.00 liquidated damage assessment to Subcontractor per written incident.**

E. Copies of CERTIFICATIONS FOR SPECIALIZED TRAINING required to perform certain types of hazardous work or operate certain tools and equipment may be required to be submitted prior to work commencing.

F. Subcontractor shall provide all required PERSONAL PROTECTIVE EQUIPMENT (PPE) (i.e. head, hearing, eye and face protection) to his employees for their use in order to perform their work safely and in compliance with local and federal codes of safe practice and manufacturers recommendations. All equipment shall be in good working order and all defective equipment shall be discarded and removed offsite immediately. **Failure to do so may result in a $500.00 liquidated damage assessment to Subcontractor for each violating employee.**

G. HARD HATS (ANSI Z89.1) shall be worn at all times on site. Alterations or modifications of hat or liner shall be prohibited. **Failure to wear hard hats may result in a $500.00 liquidated damage assessment to Subcontractor for each violating worker.**

H. SAFETY GLASSES (ANSI Z87.1) shall be required to be worn 100% of the time on all Jobsites and also inside or around existing manufacturing facilities. Otherwise, safety glasses are required to be worn per item "G" listed above. **Failure to do so may result in a $500.00 liquidated damage assessment to Subcontractor for each violating employee.**

I. GLOVES All Subcontractor personnel performing work with their hands shall be required to wear gloves that are appropriate to the task. When not performing actual work with their hands, employees will be required to have gloves available for immediate use.

J. HEARING PROTECTION shall be worn in areas where noise levels exceed 90 DBA, where exposure to 85-90 DBA exceeds (8) hours per day, or where posted. **Failure to wear hearing protection when required may result in a $500.00 liquidated damage assessment for each violating employee, assessed to Subcontractor.**

K. All workers must wear CLOTHING having adequate protection to the body. Sturdy work boots, shirts with sleeves and long pants must be worn. No sneakers, sandals, tank tops, cut-off shirts or shorts allowed. **Failure to be properly clothed may result in a $500.00 liquidated damage assessment to Subcontractor for each violating worker.**

L. Subcontractor must implement a RESPIRATORY PROTECTION PROGRAM per OSHA standards as required by their respective trades and working conditions in field. **Failure to do so may result in a $500.00 liquidated damage assessment for each day that Subcontractor does not conform to OSHA standards.**

M. "HORSEPLAY" on the Jobsite is strictly prohibited. No running on Jobsite unless extreme emergencies warrant. Fighting on construction premises will result in immediate dismissal of employee, who shall be excluded from all Consigli construction projects.

N. Subcontractor shall provide FALL Protection anytime work over 6' is conducted. **Failure to do so may result in a $1000.00 liquidated damage assessment to Subcontractor.**

O. Subcontractors must provide FALL PROTECTION (harnesses/shock-absorbing lanyards, etc.) as required for their employees where permanent or temporary fall prevention is not in place. **Failure to do so may result in a $1000.00 liquidated damage assessment to Subcontractor.**

P. FIREARMS, ALCOHOLIC BEVERAGES OR ILLEGAL DRUGS are not allowed on site. Personnel, vehicles and equipment are subject to search upon entering or leaving and while on the site premises. The use of alcohol beverages or the use and possession of illegal drugs during the workday, either on site, during breaks or lunch, or before work, is prohibited. **Anyone caught using illegal drugs or alcohol, during any of these times is**

subject to immediate termination or dismissal from the site indefinitely and a $1000.00 liquidated damage assessment may be made to Subcontractor for each violating worker involved.

Q. CAMERAS AND RECORDABLE DEVICES are not allowed unless approved through Consigli Construction Company project manager's office.

R. All Subcontractors shall keep their respective areas clean and hazard free. HOUSEKEEPING will be done on a daily basis or more frequently if conditions warrant. Failure to do so may result in a back charge to Subcontractors involved for clean-up directed by Consigli Construction Company.

S. All TOOLS, whether company or personal, must be in good working condition. Defective tools must not be used and should be removed offsite (i.e. chisels with mushroom heads, hammers with split or loose handles, saws or grinders missing guards, etc.). **Failure to comply may result in a $500.00 liquidated damage assessment to Subcontractor.**

T. TOOL LANYARDS, when deemed necessary by the Contractor to insure safe working conditions, Subcontractors shall provide their personnel with OSHA approved tool lanyard or tethers for any and all overhead work.

U. Ground Fault Circuit Interrupters (GFCI's) shall be used on all extension cords, electric tools and portable electric equipment powered from a temporary electric service or generator. Tools and equipment shall be inspected each week by a competent person for defects. If electrical power is used from permanent power system or existing building, Subcontractor shall provide a GFCI system between his equipment and permanent power. All temp lighting will be attached by non-conductive wiring and bulbs shall be protected on all sides. All extension cords shall be 12 gauge minimum. **Failure to comply may result in a $500.00 liquidated damage assessment to Subcontractor.**

V. PERMITS, written and properly authorized may be required for work of any type including welding and open flame, electrical "hotwork", excavation, confined spaces, cranes, lockout/tagout, blasting, fire protection water, powder-actuated tool, etc. Check with Consigli Construction for work permits required. **Failure to do so may result in a $1,000 liquidated damage assessment to Subcontractor.**

W. Subcontractor must obtain HOTWORK PERMIT for all open flame work as required by the Project Superintendent/Jobsite Safety Manager. During welding, burning, soldering, cutting, grinding, or using gas heaters or salamanders, adequate fire prevention precautions must be implemented, consisting of removal of flammables and combustibles, protection of adjacent areas, appropriate fire extinguishers or standpipes, and similar measures. If these are not employed, then a fire watch, equipped with an approved portable fire extinguisher is required during, and for a sufficient time after, the welding, burning, cutting or grinding operation. **Failure to comply may result in a $1,000.00 liquidated damage assessment to Subcontractor.**

X. BURNING AND CUTTING EQUIPMENT shall be inspected daily before being used. All hoses and manifolds shall be removed from bottles and protective caps replaced at end of each day. **Failure to do so may result in a $500.00 liquidated damage assessment to Subcontractor.**

Y. Crowfoot connections of COMPRESSED AIR HOSES shall be wired or whip checks installed to prevent accidental disconnection. **Failure to do so may result in a $500.00 liquidated damage assessment to Subcontractor.**

Z. LOCKOUT/TAGOUT procedures are in force and shall be followed to protect persons from injury due to inadvertent operation of power-driven equipment, opening of pipeline valves, or energizing of electrical circuits. Coordinate this procedure with Consigli Construction Company. **Failure to do so may result in a $1,000 liquidated damage assessment to Subcontractor.**

AA. ELECTRICAL "HOTWORK" is not allowed without written approval from Consigli Construction Company. Proximity work to electrical equipment is also not allowed without written approval from Consigli Construction Company. **Failure to comply may result in a $1,000 liquidated damage assessment to Subcontractor.**

BB. Subcontractor shall provide its own LADDERS, which must be in accordance with OSHA and ANSI specification. All ladders must be in safe condition without broken or defective rungs, rails and hardware. No metal ladder shall be used in or around any electrical work. Ladders shall be secured top and bottom and extend three feet (3') past the walking surface. Ladders shall be rated 1A minimum. **Failure to comply may result in a $500.00 liquidated damage assessment to Subcontractor.**

CC. SCAFFOLDING of all types shall be provided, erected and used in accordance with Consigli Safety and Health Chapters as they apply. **Failure to do so may result in a $1,000 liquidated damage assessment to Subcontractor.**

DD. CONFINED SPACES procedures are in force and require an entry permit from Consigli Construction Company. Confined spaces include manholes, vessels, duct work, etc., where such hazards as oxygen deficiency, hazardous gases, contamination, high temperatures, fire and difficulty in escaping are involved. **Failure to follow these procedures may result in a $1,000 liquidated damage assessment to Subcontractor.**

EE. HAZARDOUS MATERIALS procedures are in force and protection of all personnel regarding acids, corrosives, flammables and toxics shall be per OSHA 29CFR 1926, Subpart D (Hazard Communication). **Failure to follow these procedures may result in a $1,000 liquidated damage assessment to Subcontractor.**

FF. All WARNING SIGNS, barricades and tags will be used to the fullest extent and shall be obeyed.

GG. All EARTHMOVING AND COMPACTION EQUIPMENT must have working alarm, horns, and protective devices in compliance with OSHA 1926.602 standards. **Failure to comply may result in a $500.00 fine for each machine assessed to Subcontractor.**

HH. All TRENCHES/EXCAVATIONS shall be in accordance with OSHA 29CFR 1926, Subpart P with particular emphasis on excavations over 5'0", and sloping requirements. "DIGSAFE", utility companies and facility owner must be notified for verification of utilities prior to digging. Subcontractor shall complete a written excavation checklist. **Failure to do so may result in a $1000.00 liquidated damage assessment to Subcontractor.**

II. All CONCRETE AND MASONRY CONSTRUCTION shall be in accordance with OSHA 29CFR 1926, Subpart Q, with particular attention to general requirements of construction loads, guarding of reinforcing steel to eliminate the hazard of impalement, personal protective equipment, fall protection for erecting reinforcing steel and limited access zone for masonry construction. **Failure to follow these procedures may result in a $1,000.00 liquidated damage assessment to Subcontractor.**

JJ. All CRANES shall have a current Certification Sticker by independent crane certification company, have a current maintenance log, required swing radius protection, and operator's licenses where required. **Failure to comply may result in a $1000.00 liquidated damage assessment to Subcontractor who rents/leases/owns the crane.**

KK. FLAMMABLE LIQUIDS shall be stored in approved metal safety cans and contents shall be labeled by NFPA standards. Indoor storage of flammable or combustible liquids shall not exceed 25 gallons unless stored in approved cabinets. A fire extinguisher shall be placed in the immediate vicinity of flammable liquid storage and compressed gases. **Failure to do so may result in a $500.00 liquidated damage assessment to Subcontractor.**

LL. VENTILATION METHODS shall be provided by Subcontractor whenever hazardous substances such as dusts, fumes, mists, vapors or gases are produced in the course of Subcontractor's work. Provide fans, ducts or other means and exhaust substances to the outside. See OSHA 1926.57 for details. **Failure to do so may result in a $1000.00 liquidated damage assessment to Subcontractor.**

MM. SEXUAL HARASSMENT, including verbally or physically offensive behavior on the Jobsite, is prohibited. **Failure to adhere to this policy may result in a $1,000 liquidated damage assessment to Subcontractor and the dismissal of the offending employee(s) from the Jobsite.**

NN. ALL OTHER SAFETY REQUIREMENTS, within OSHA regulations shall be complied with at all times by Subcontractor/Vendors of any tier and their employees. **Failure of Subcontractor/Vendor to comply with or failure to promptly abate any violation of OSHA regulations, not otherwise herein listed, when requested by Consigli Construction Company, may result in a $500 liquidated damage assessment to Subcontractor/Vendor for each incidence of occurrence or unheeded request.**

NOTE: These Basic Safety Rules and Regulations highlight some of the major components and requirements of the Consigli Construction Company Safety Program. A complete Safety Program Manual will be made available with the Subcontract Agreement or upon request.

Project Name
City, State – Job No.
SC-xxx-xxx Between Consigli Construction Co., Inc. and Subcontractor
EXHIBIT "H"
Project Specific Requirements

1. Subcontract corporate advertising / branding is not allowed on the project site
2. No smoking shall be allowed on site
3. No abusive or inappropriate language will be tolerated
4. No one shall physically abuse any individual on our project site
5. All workers food scraps and trash must be disposed of into a waste basket or dumpster at all times
6. No radios or any other musical instruments are allowed on site
7. All deliveries need to be coordinated with the jobsite superintendent 48 hours in advance to schedule all material deliveries to the site. If lean project, please refer to Exhibit G for further clarification.
8. Normal working hours are Monday – Friday 7:00 am – 3:30 pm. or as directed by the job superintendent as required by project
9. All subcontractors shall use rubber wheeled carts when moving material or removing trash from a building. Any damage caused by Subcontractor shall be repaired at the cost of Subcontractor. Back charges will be appropriately assessed for the cost of the repairs. If this is a lean project, please refer to Exhibit G for further clarification.
10. Please check with project superintendent to verify parking on or near the site.
11. Subcontractor participation shall be required for all Safety Pre-construction planning meetings.
12. All Subcontractors shall be responsible for submission of an "Activity Hazard Analysis/Job Hazard Analysis for each and every task within all definable features of work. Said pre-task safety plans shall be prepared prior to subcontractor Safety pre-construction meeting. Any additional tasks or changes in operations, not considered at the time of the safety pre-construction meeting, shall require additional or updated AHA's or JHA's accordingly.
13. All Subcontractors shall be responsible for supplying their employees with drinking water during work hours as required to sustain the wellness of their employees during their daily work activities.
14. **If this Sub contractor is providing the structural steel for this project** Subcontractor shall provide a (2) line safety cable railing system at the perimeter of each floor or, roof level and all floor opening as required per local, state, federal regulations. The (2) line Safety system shall consist of 3/8" aircraft grade cable with no span between stanchions/columns greater than 12 feet. Each straight run of cable (both top and mid cables) shall have turnbuckles installed. Termination of cables shall occur at stanchions and columns only and shall be done with 3 Crosby clamps
15. **If this Sub contractor is providing a lattice boom or tower crane for this project**, it is mutually understood and agreed that this sub-contractor shall have all lattice boom or tower cranes inspected and certified, by a qualified third part certification agency ON SITE, following the assembly and erection of crane on site, prior to the start of work.
16. Any subcontractors staffed with 20 or more workers (30 workers for drywall trade) on site shall be required to have their Safety Manager visit the site on a weekly basis to inspect their operations for identification of safety and health related non-compliance issues. Follow up correspondence shall be forwarded to the Consigli Corporate Safety Director within 24 hours of site visit.

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EXHIBIT "I"
ENVIRONMENTAL PROTECTION COMMITTEE RECYCLING ATTACHMENT

It is mutually understood and agreed that Consigli Construction Company shall provide separate containers for the disposal of materials as categorized below:

METAL LOADS

- Steel
- Copper
- Aluminum
- File Cabinets
- Metal Desks (with wood tops acceptable)
- Machinery
- Motors
- Pipes
- Metal Chairs
- Brass
- NO paper, NO plastic, NO trash of any kind

CLEAN WOOD WASTE

- Whole or broken pallets
- Fencing
- Wood scraps
- Wood crates
- NO paper, NO plastic, NO trash of any kind

CONCRETE LOADS

- Concrete (maximum 4' diameter)
- Some dirt acceptable
- NO paper, NO plastic, NO trash of any kind

C & D LOADS

- Any type of construction debris
- Any type of painted wood
- Tree branches
- Stumps

YARD WASTE

- Grass
- Leaves
- Brush Cuttings (1" diameter maximum)
- MUST BE "Dirt and Trash Free"
- Excavated shrubs with stumps are acceptable only if dirt free, washed and under 20 lbs.
- If dumpster has stumps OVER 20 lbs. or the load is dirty, the entire load will be charged back as a C & D load

ALL LOADS ARE SUBJECT TO INSPECTION

If any dumpsters are rejected, Subcontractors responsible for contamination are subject to liquidated damages of $750

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ACORD

EXHIBIT "J" – CONSIGLI STANDARD LIMITS

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE OF A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
Subcontractor's Agent Name and Address	PHONE (A/C, No. Ext):	PHONE (A/C, No.):
	E-MAIL ADDRESS:	
	PRODUCER CUSTOMER ID#:	

INSURED	INSURERS AFFORDING COVERAGE		NAIC #
Subcontractor's Name and Address	INSURER A:	AM Best Rated A-, VII or better	
	INSURER B:	AM Best Rated A-, VII or better	
	INSURER C:	AM Best Rated A-, VII or better	
	INSURER D:	AM Best Rated A-, VII or better	
	INSURER E:	AM Best Rated A-, VII or better	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN. THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS. **Limits shown are as requested**

INSR LTR	TYPE OF INSURANCE	ADD'L INSRD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YY)	POLICY EXP (MM/DD/YY)	LIMITS	
	GENERAL LIABILITY ☒ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS MADE ☒ OCCUR ☒ RESIDENTIAL COVERAGE_____ ☒ **RIGGERS LIABILITY REQUIRED** __ GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☒ PRO-JECT ☐ LOC	X	X	ABC			EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$1,000,000 $100,000 $10,000 $1,000,000 $2,000,000 $2,000,000
	AUTOMOBILE LIABILITY ☒ ANY AUTO ☐ ALL OWNED AUTOS ☐ SCHEDULED AUTOS ☐ HIRED AUTOS ☐ NON-OWNED AUTO ☐ _____	X	X	ABC			COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$1,000,000
	☒ **UMBRELLA LIAB** ☒ OCCUR ☐ **EXCESS LIAB** ☐ CLAIMS MADE ☐ DEDUCTIBLE ☒ RETENTION	X	X	ABC AGGREGATE LIMITS MUST BE PER PROJECT.			EACH OCCURRENCE AGGREGATE	$5,000,000 $5,000,000
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y / N ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? **N** **(Mandatory in NH)** If yes, describe under DESCRIPTION OF OPERATIONS below	N/A	X	INCLUDES EXEC. OFFICERS, SOLE PROP.			☒ WC STATU-TORY LIMITS ☐ OTH-ER E.L. EACH ACCIDENT E.L. DISEASE-EA EMPLOYEE E.L. DISEASE-POLICY LIMIT	$1,000,000 $1,000,000 $1,000,000
	PROFESSIONAL **POLLUTION LIABILITY INSURANCE**	X	X	IF WORK INCLUDES DESIGN/TESTING IF WORK INCLUDES HAZARDOUS MAT OR DEMO			EACH OCCURRENCE/ AGGREGATE EACH OCCURRENCE/ AGGREGATE	$2,000,000/$2,000,000 $5,000,000/$5,000,000

DESCRIPTION OF OPERATIONS – JOB _____ - PROJECT NAME – _____

Consigli Construction Co., Inc., Owner (name Owner) and other parties as required by contract are listed as additional insureds on a primary/non-contributing basis to named insured on the above referenced General Liability and Umbrella Liability policies as it relates to work performed at the captioned project. General Liability policy per ISO 12 07 form and includes coverage for "X, C, U" (hazards, collapse of building, blasting and damage to underground property), Completed Operations, Residential Construction coverage, and Contractual Liability. All policies referenced herein include a waiver of subrogation in favor of Consigli Construction Co., Inc., Owner, and others where required by contract. Worker's Compensation applies in the state which work is performed.

GC Required Endorsements- Commercial General Liability endorsement are ISO Additional Insured Endorsement CG 20 10 (11/85 edition) or endorsements CG 20 33 (10/01 edition) AND CG 20 37 (10/01 edition) or CG 20 10 (10/01 edition) AND CG 20 37 (10/01 edition)
INSURED ENDORSEMENTS – Agent please list and attach additional insured Commercial General Liability Endorsements

CERTIFICATE HOLDER	CANCELLATION
Consigli Construction Company 72 Sumner St., Milford, MA 01757	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE

Project Name
City, State – Job No.
SC-xxx-xxx Between Consigli Construction Co., Inc. and Subcontractor
L-1 Progress Release of Lien Waiver - SAMPLE
WAIVER AND PAYMENT AFFIDAVIT

GENERAL CONTRACTOR: CONSIGLI CONSTRUCTION CO., INC. 72 Sumner St., Milford, MA 01757

SUBCONTRACTOR / MATERIAL SUPPLIER: _____

PROJECT: _____

Total Contract Amount: $ _____ Total Amount Previously Paid: $ _____ Amount Paid This Date: $ _____

The undersigned acknowledges that it has been paid the amount set forth above and it has been paid all sums due for all labor, services, equipment or materials furnished by the undersigned or on behalf of the undersigned to or in connection with the project and the undersigned hereby releases, discharges, relinquishes and waives any and all claims, suits, bond claims, liens, and rights of lien for all work, labor, services, equipment or materials furnished or performed in connection with construction located at the project through ___/___/__ whether such claims, demands and rights arise pursuant to a written or oral contract or otherwise. This release does not cover any retention, if any, or labor, services equipment or materials furnished after that date.

The undersigned hereby certifies, as an inducement to Consigli Construction Co., Inc. to pay funds to it under its Subcontract or Material Purchase Agreement (MPA) for work performed prior to __/___/__, and acknowledging that Consigli Construction Co., Inc. will rely upon such representation that all bills for labor, materials, equipment rental, taxes, fringes and benefits and all other charges arising out of performance of the Subcontract or MPA through the date above have been fully paid by the undersigned, except as follows:

Name	Address & Phone # & Contact Person	Amount Due
_____	_____	_____
_____	_____	_____
_____	_____	_____

The undersigned further agrees that if it does not promptly pay the above and furnish Consigli Construction, Co., Inc. with releases (Form 2) from the above parties, then Consigli Construction, Co., Inc. shall be authorized to make payment to the above by jointly payable checks and deduct the amount due from sums due Subcontractor or supplier under the Subcontract or MPA.

The undersigned warrants that all subcontractors, suppliers, equipment lessors, labor, taxes, union benefits and fringes applicable to this project have been paid in full through the date set forth above and agrees to defend, indemnify and hold Consigli Construction Co., Inc. and all sureties harmless against any loss arising from the nonpayment thereof.

The undersigned certifies or declares under the penalty of law that the foregoing is true and correct.

Ex ecuted as a sealed instrument this _____day of_____, 201__.

Subcontractor/ Material Supplier Company Name: _____

Subcontractor/ Material Supplier:_____ Printed Name: _____ Title: _____
Duly Authorized Signature

Witness Name, Printed and Signature: _____

Project Name
City, State – Job No.
SC-xxx-xxx Between Consigli Construction Co., Inc. and Subcontractor
L-2 - Final Release of Lien Waiver - SAMPLE
WAIVER AND PAYMENT AFFIDAVIT

GENERAL CONTRACTOR: CONSIGLI CONSTRUCTION CO., INC. 72 Sumner St., Milford, MA 01757

SUBCONTRACTOR / MATERIAL SUPPLIER: _____

PROJECT: _____

Total Contract Amount: $ _____ Total Amount Previously Paid: $ _____ Amount Paid This Date: $ _____

The undersigned acknowledges that it has been paid the amount set forth above and it has been paid all sums due for all labor, services, equipment or materials furnished by the undersigned or on behalf of the undersigned to or in connection with the project and the undersigned hereby releases, discharges, relinquishes and waives any and all claims, suits, bond claims, liens, and rights of lien for all work, labor, services, equipment or materials furnished or performed in connection with construction located at the project through ___/___/__ whether such claims, demands and rights arise pursuant to a written or oral contract or otherwise. This release does not cover any retention, if any, or labor, services equipment or materials furnished after that date.

The undersigned hereby certifies, as an inducement to Consigli Construction Co., Inc. to pay funds to it under its Subcontract or Material Purchase Agreement (MPA) for work performed prior to __/___/__, and acknowledging that Consigli Construction Co., Inc. will rely upon such representation that all bills for labor, materials, equipment rental, taxes, fringes and benefits and all other charges arising out of performance of the Subcontract or MPA through the date above have been fully paid by the undersigned, except as follows:

Name	Address & Phone # & Contact Person	Amount Due
_____	_____	_____
_____	_____	_____
_____	_____	_____

The undersigned further agrees that if it does not promptly pay the above and furnish Consigli Construction, Co., Inc. with releases (Form 2) from the above parties, then Consigli Construction, Co., Inc. shall be authorized to make payment to the above by jointly payable checks and deduct the amount due from sums due Subcontractor or supplier under the Subcontract or MPA.

The undersigned warrants that all subcontractors, suppliers, equipment lessors, labor, taxes, union benefits and fringes applicable to this project have been paid in full through the date set forth above and agrees to defend, indemnify and hold Consigli Construction Co., Inc. and all sureties harmless against any loss arising from the nonpayment thereof.

The undersigned certifies or declares under the penalty of law that the foregoing is true and correct.

Ex ecuted as a sealed instrument this _____day of_____, 201__

Subcontractor/ Material Supplier Company Name: _____

Subcontractor/ Material Supplier:_____ Printed Name: _____ Title: _____
Duly Authorized Signature

Witness Name, Printed and Signature: _____

SECTION L.2: SAMPLE TRADE CONTRACT

See attached.

FSC-xxxx-xxx

TRADE CONTRACTOR AGREEMENT

THIS AGREEMENT MADE THIS ____ DAY OF _____, 20__, by and between Consigli Construction Co., Inc. a corporation organized and existing under the laws of Massachusetts a partnership consisting of N/A an individual doing business as N/A hereinafter called the "Construction Management At Risk Firm" and *(insert Subcontractor Name)* a corporation organized and existing under the laws of *(insert State Sub Located)* an individual doing business as N/A hereinafter called the "Trade Contractor".

WITNESSETH that the Construction Management At Risk Firm and the Trade Contractor for the considerations hereafter named, agree as follows:

(1) The Trade Contractor agrees to furnish all labor and materials required for the completion of all work specified in Section No(s). *(list each spec section owned)* of the specifications for *(insert scope of work)* and the plans referred to therein and addenda No.___ for the *(insert exact project name)* all as prepared by *(insert Architect)* designer. All work shall be in accordance with the contract documents listed on Exhibit A; and the detailed Scope of Work listed on Exhibit B. The Construction Management At Risk Firm agrees to pay the Trade Contractor as full payment for all the work in Exhibit B the sum of *(spell out dollars)* $ _____. This price includes the following alternates: Nos. _____

(A) The Trade Contractor agrees to be bound to the Construction Management At Risk Firm by the terms of the hereinbefore described plans; specifications (including all general conditions stated therein) and addenda No. _____, and to assume to the Construction Management At Risk Firm all the obligations and responsibilities that the Construction Management At Risk Firm by those documents assumes to the *(Awarding Authority)* hereinafter called the "Public Agency," except to the extent that provisions contained therein are by their terms or by law applicable only to the Construction Management At Risk Firm.

(B) The Construction Management At Risk Firm agrees to be bound to the Trade Contractor by the terms of the hereinbefore described documents and to assume to the Trade Contractor all the obligations and responsibilities that the Public Agency by the terms of the hereinbefore described documents assumes to the Construction Management At Risk Firm, except to the extent that provisions contained therein are by their terms or by law applicable only to the Public Agency.

(2) The Construction Management At Risk Firm agrees to begin, prosecute and complete the entire work specified by the Public Agency in an orderly manner so that the Trade Contractor will be able to begin, prosecute, and complete the work described in this Trade Contract; and, in consideration thereof, upon notice from the Construction Management At Risk Firm, either oral or in writing, the Trade Contractor agrees to begin, prosecute and complete the work described in this Trade Contract in an orderly manner and in accordance with the Project Schedule attached as Exhibit C as it may be reasonably modified from time to time by agreement of the Construction Management At Risk Firm and the Trade Contractor.

(3) The Trade Contractor agrees to furnish to the Construction Management At Risk Firm, on execution of this Trade Contractor Agreement and prior to commencing the work, evidence of workers' compensation insurance as required by law and evidence of public liability and property damage insurance of the type and in limits required to be furnished to the Public Agency by the Construction Management At Risk Firm.

(4) The Construction Management At Risk Firm agrees that no claim for services rendered or materials furnished by the Construction Management At Risk Firm to the Trade Contractor shall be valid unless written notice thereof is given by the Construction Management At Risk Firm to the Trade Contractor during the first ten (10) days of the calendar month following that in which the claim originated.

(5) This Trade Contractor Agreement is contingent upon the execution of an amendment to the contract between the Construction Management At Risk Firm and the Public Agency for the work of the Trade Contractor.

(6) If the trade contractor should be adjudged a bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials, or if he should fail to make prompt payment to sub-trade subcontractors or for material or labor, or persistently disregard laws, ordinances or the instructions of the Construction Management At Risk Firm, or otherwise be guilty of a substantial violation of any provision of the contract, then the Construction Management At Risk Firm may, without prejudice to any other right or remedy and after giving the Trade Contractor and his surety seven days' written notice, terminate the employment of the Trade Contractor and take possession of the premises and of all materials, tools, and appliances thereon and finish the work by whatever method he may deem expedient. In such case the Trade Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the trade contract price shall exceed the expense of finishing the work including compensation for additional architectural, managerial and administrative services, such excess shall be paid to the Trade Contractor. If such expense shall exceed such unpaid balance, the Trade Contractor shall pay the difference to the Construction Management At Risk Firm. The Construction Management At Risk Firm and Trade Contractor shall have the right to seek damages for breach of this Trade Contract without terminating this Trade Contract or ceasing performance hereunder.

(7) The following exhibits are incorporated into their subcontract:

Exhibit A: Contract Documents

- Document Log dated _____, ____ Pages

Exhibit B: Detailed Scope of Work - as specified in project specifications and addenda's

Exhibit C: Project Schedule dated _____, _____ Pages

(8) IN WITNESS WHEREOF, the parties hereto have executed this agreement the date and year first above-written.

SEAL

ATTEST_____ _____ Date_____

Trade Contractor - _____

SEAL

ATTEST _____ _____ Date_____

CM at Risk Firm–Consigli Construction Co. Inc.

EXHIBIT "B"
Detailed Scope of Work

1. **SCOPE OF WORK** – The Scope of the Subcontract Work includes all labor, materials, equipment and supervision required for the completion of all of the **TRADE WORK** for the above referenced project in strict accordance with the following documents which are further described in the Document Log a copy of which is attached hereto and made a part hereof:

   A. Contract Drawings as prepared by _____, dated _____

   B. Project Specifications as prepared by _____,dated_____, including but not limited to the following:

      1) Specification Sections(s)

         - Division 1 and Supplemental Conditions
         - _____(list specs)

SECTION M: SAMPLE CHANGE ORDER FORM

See attached.

CONSIGLI CHANGE ORDER COVERSHEET

2043: Fuller Middle School

CONSIGLI
Est. 1905

CONSIGLI EXTRA NUMBER: (CONSIGLI TO INPUT)			
SUBCONTRACTOR:			
SUB'S CHANGE NUMBER:			
CIRCLE ONE:	TIME & MATERIALS	PRICE PROPOSAL	OTHER
PR/CCD/ASI #			
DESCRIPTION OF THE WORK:			
TOTAL COST OF LABOR:			
TOTAL COST OF MATERIAL:			
TOTAL COST OF EQUIPMENT:			
TOTAL PASS-THROUGH COSTS:			
TOTAL MARKUP:			
TOTAL COST OF CHANGE:			

SIGNATURE

DATE

*** Attach subcontractor's standard change order form with detail required per specifications & CM's Supplemental Instructions

Document 00 22 14
LIST OF PREQUALIFIED BIDDERS

1.1 GENERAL

A. The Awarding Authority has followed the procedures for the Pre-Qualification of Trade Contract Bidders for this Project, in accordance with the provisions of M.G.L. c.149, §§ 44D½ and 44D¾..

1.2 PREQUALIFIED TRADE CONTRACT BIDDERS

A. Prequalified Trade Contractors: In accordance with M.G.L. C149A §8, Trade Contract Bidders have been prequalified by the Prequalification Committee for all Trade Categories of Work required for this Project. Only those Trade Contractors listed herein have been prequalified by the Prequalification Committee, and are allowed to bid on this Project.

1. This Document with the following List of Prequalified Contractors is part of the Procurement and Contracting Requirements for the Project. This document provides information for the Bidder's convenience and is not part of the Contract Documents.
2. Breakdown of Trade Contractors is listed by Trade.

B. List of Prequalified Trade Contractors.

Trade	Company
MASONRY	Costa Brothers Masonry Empire Masonry Corp. Fernandes Masonry Lighthouse Masonry Marmelo Bros. Construction Sullivan and Narey Construction Company, Inc.
MISCELLANEOUS & ORNAMENTAL IRON	Avid Iron Works EDM Construction North Shore Steel Roman Iron Works, Inc. SMJ Metal Company, Inc. The Berlin Steel Construction Company United Steel Inc. V&G Iron Works, Inc.

WATERPROOFING, DAMPPROOFING & CAULKING	ACME Waterproofing Co., Inc. Beacon Waterproofing & Restoration Inc. Chapman Waterproofing Company Folan Waterproofing & Construction Co., Inc. Gleeson Powers, Inc. P.J. Spillane Co., Inc. Superior Caulking & Waterproofing Co., Inc. The Waterproofing Company LLC
ROOFING	Capeway Roofing Systems, Inc. Feeley McAnespie, Inc. Gibson Roofs, Inc. Greenwood Industries J.D. Rivet & Co., Inc. John F. Shea Co., Inc. Rockwell Roofing, Inc. Silktown Roofing Stanley Roofing Company, Inc Titan Roofing Inc.
METAL WINDOWS	A & A Window Products, Inc. Chandler Architectural Products, Inc. Cherry Hill Glass Co., Inc. GVW, INC Kapiloff's Glass, Inc. Lambrian Construction Corporation Lizotte Glass, Inc. Lockheed Window Corp. R&R Window Contractors Inc.
GLASS & GLAZING	A & A Window Products, Inc Aluminum & Glass Concepts, Inc. Chandler Architectural Products, Inc. Cherry Hill Glass Co., Inc. GVW, INC Kapiloff's Glass, Inc. Lizotte Glass, Inc. Lockheed Window Corp. R&R Window Contractors Inc

TILE	Ayotte & King For Tile, Inc., Capital Carpet & Flooring Specialists, Inc. High Point Interiors, Inc. Joseph Cohn & Son M. Frank Higgins & Co., Inc. Pavilion Floors, Inc.
ACOUSTICAL CEILING	American Contractors Corp. Central Ceilings, Inc. Conn Acoustics, Inc. H. Carr & Sons, Inc. K & K Acoustical Ceilings Inc. The Cheviot Corporation
RESILIENT FLOORING	Ayotte & King For Tile, Inc. Capital Carpet & Flooring Specialists, Inc. CJM Services, Inc. M. Frank Higgins & Co., Inc. Pavilion Floors, Inc.
PAINTING	Bello Painting Co Inc Color Concepts Inc. Dandis Contracting Inc Homer Contracting LLC John W. Egan Co., Inc. King Painting Inc O'Byrne Painting & Contracting Inc. New Generation Paintino, Inc.
ELEVATORS	Eagle Elevator Company Delta Beckwith Elevators

FIRE PROTECTION	Carlysle Engineering, Inc. City Point Fire Protection Cogswell Sprinkler Co., Inc. Covenant Fire Protection, Inc. Encore Fire Protection Johnson Controls Rustic Fire Protection, Inc. Wolverine Fire Protection Co. Xcel Fire Protection Inc. Yankee Sprinkler Co.
PLUMBING	Araujo Bros. Plumbing and Heating Charles M. Moran Plumbing & Heating E. Amanti & Sons, Inc. Grasseschi Plumbing & Heating, Inc. Harold Brothers N.B. Kenney Company , Inc. Patrick J. Kennedy & Son, Inc. William F. Lynch Co., Inc.
HVAC	CAM HVAC& Construction Inc. E. Amanti & Sons, Inc. General Mechanical Contractors, Inc. Harold Brothers J.F. White KMD-Bonner Mechanical N.B. Kenney Company, Inc. Patrick J. Kennedy & Son, Inc. Veterans Developm ent Corpo ration Inc. William F. Lynch Co., Inc.
ELECTRICAL	Annese Electrical Services LeVangie Electric Co., Inc. Lynnwell Associates, Inc. Systems Contracting Inc. Wavne J Griffin Electric, Inc.

End of Document

Document 00 31 32

GEOTECHNICAL DATA

1.1 SUMMARY

A. Subsurface soil investigations have been made and findings are indicated on the following pages. This report entitled " *Geotechnical Data and Engineering Report* ", dated 3 May 2019 was prepared by RSE Associates, Inc., 63 Pleasant Street, Suite 3000, Watertown, MA 02472 and is bound herewith.

B. The data contained herein is for general information. The Contractor is required to read the soils report and visit the site to determine the character of the materials to be encountered. The Architect and Owner will not assume responsibility for variations in subsoil quality or condition.

1.2 CONTENTS

A. The attached 141 pages include as part of this document the following:

1. Table of Contents.
2. Introduction.
3. Geotechnical Field Program and Laboratory Tests.
4. Site and Subsurface Conditions.
5. Foundation Recommendations.
6. Construction Considerations.
7. Closure.
8. Tables 1 through 3.
9. Figures 1 through 17.
10. Appendices A through D.

End of Document

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RSE ASSOCIATES Inc.

Geotechnical Data and Engineering Report

Fuller Middle School
31 Flagg Drive
Framingham, MA 01702

Prepared for

Mr. Philip Gray
Jonathan Levi Architects
266 Beacon Street
Boston, MA 02116

Prepared by
RSE Associates, Inc.
63 Pleasant Street
Suite 300
Watertown, MA 02472

Project Number: 17143-01

3 May 2019

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1. INTRODUCTION

This project involves the demolition of the existing Fuller Middle School building and the construction of a new 3-story school building at 31 Flagg Drive, Framingham, Massachusetts. The general project location is shown on Figure 1. RSE Associates was contracted by Jonathan Levi Architects to perform geotechnical services and provide foundation recommendations for the proposed building in accordance with our proposals dated 20 December 2018 and 29 March 2019.

Early phases of geotechnical subsurface investigations and geotechnical assessment associated with this project were performed by McPhail Associates in 2018. McPhail's Foundation Design Report dated 10 September 2018 is included as Appendix A of this report. Based on review of previously completed geotechnical borings at the site and current building design, an RSE-supervised supplemental field program, involving two days of drilling, was performed on 18 - 19 April 2019. Six geotechnical borings with SPT sampling and two monitoring wells were installed under this RSE supplemental geotechnical field investigation program. This report, prepared by Lucy C. Jen, Ph.D., P.E. summarizes our documentation of geotechnical subsurface conditions encountered during the field program, laboratory test results, existing background site information, previous site investigation data, and our foundation recommendations[1] for this project.

1.1 Site Description

USGS topographical maps from 2018, 1965, 1950, and 1894 are included as Figures 1, 2, 3, and 4, respectively. As shown on these topographical maps, the project site is approximately ¼ mile north of Learned Pond and approximately ¾ mile west of Tom Hill in the Town of Framingham, Massachusetts.

Prior to 1958, this parcel was part of the Massachusetts State Muster Grounds (see Figure 4). The existing school building was completed in 1959 (according to town records) with a brook to the northwest and swamp/marsh bounding the parcel to the north, east, and southeast (see Figures 1, 2 and 3).

Town of Framingham Assessor's records show most of the Fuller Middle

[1] Environmental site characterization/geoenvironmental engineering issues are beyond the scope of this study and not addressed in this report.

School is on parcel 102-82-8137-000 that is approximately 19 acres (see Figure 5). As shown on recent aerial photograph of the school (Figure 6), Fuller Middle School is bounded by residential neighborhood to the west with two paved parking lots to the east and grassed area to the north. The parking lot immediately adjacent to the existing Fuller Middle School is at approximately 1 to 2 feet lower than the adjacent parking lot to the east, adjacent to the Mass Bay Community College building. An existing low retaining wall divides the two parking areas and maintains the grade change. The baseball field east of the parking lots is approximately 6 inches higher than the adjacent parking lot. According to town records, Mass Bay Community College (19 Flagg Drive), located to the southeast of Fuller Middle School, was completed in 1975. Miriam F. McCarthy School, to the south, was completed in 1994. Massachusetts State Police Framingham Barracks (450 Worcester Road) occupies the abutting parcel to the north.

1.2 Project Description and Proposed Construction

The existing Fuller Middle School Building is a single-story building founded on piles with 201,238 SF of finished area. The building originally housed Framingham South High School (1958-1991) and has served the Framingham community for over 60 years. Due to structural deficiencies and inefficient and inoperable systems, the existing building will be demolished after the completion of the new building as part of this project. Parking lot and athletic fields will be constructed within the footprint of the existing building after building demolition.

Current design shows the new three-story building located to the east of the existing building (see Figure 7) with most of the new building occupying current paved parking lots. The eastern tip of the new building extends to the infield of the existing baseball field, located to the north of Mass Bay Community College. Northern portion of the new building, housing an 8,000 SF gymnasium and 420-seat auditorium, extending into currently grassed field beyond the existing paved parking lot. The top of ground floor/lowest level slab for the new building is at El. 165.5 (NAVD88). A raised sloped lawn and a bus ramp, referenced as the Amphitheater by the Project, are planned on the south side/entrance of the building making floor 2 (El. 179.5 ft, NAVD88) as the entry level. After the completion of the new building and demolition of the existing building, new parking lot and athletic fields will be constructed on the western portion of the parcel (see Figure 7). This geotechnical investigation and evaluation focus on addressing foundation needs of the proposed new three-

story building and earthwork requirements related to the Amphitheater.

1.3 Site Geology

Bedrock geologic map (Figure 8) indicates that bedrock consists of granodiorite (dg), quartzite (pCw) and mixed rock (PzpCmr). The mixed rock (PzpCmr) consists of quartz, conglomerate, porphyritic lava, and fine-grained crystal tuff. Similar to most of eastern Massachusetts, this area is characterized as highly faulted terrane. An E-W fault is mapped on the bedrock geologic map and it bisects the project site (Figure 8) with upthrown side on the north and downthrown side on the south.

Surficial geologic maps (Figures 9 and 10) indicate presence of swamp and coarse deposits. Swamp deposit is present in poorly drained areas and typically described as "brownish-black muck, peat, silt, and sand". The coarse deposits in this area are deposits of glacial Lake Charles consisting of mixtures of gravel, sand, and silt. Due to the coalescing and overlapping deltas, the distribution of materials is likely heterogeneous across the site.

2. GEOTECHNICAL FIELD PROGRAM AND LABORATORY TESTS

Previous geotechnical subsurface investigations at this site were performed in 1955 and 2018. Locations of previous borings are shown as Figure 11. Corresponding 1955 and 2018 boring logs are included in McPhail Associates' Final Foundation Engineering Report dated 10 September 2018, included as Appendix A.

Review of McPhail's report showed that the proposed building footprint assumed in McPhail's assessment (Figure 11) deviated from the current proposed building location. Figure 12 includes an overlay of the current building location as well as locations of the RSE supplemental borings. The RSE supplemental geotechnical field program was conducted on 18-19 April 2019. Six geotechnical borings (RB-1, RB-2, RB-4, RB-5, RB-6 OW, and RB-7 OW) extending to depths of 31 feet, 26 feet, 16 feet, 36 feet, 11 feet and 11 feet, respectively, were completed in this two-day program. These six borings were drilled by Northern Drill Services from Northborough, Massachusetts using a tracked Mobile B-48 rig. As noted by the boring number, observation wells were installed at RB-6 OW and RB-7 OW.

Approximate locations[2] of the completed boring are shown on Figure 12. Borings RB-1 and RB-2 are located along the northern extent of the proposed building in the grassed area north of the existing parking lot; Boring RB-4 is located near eastern edge of the building in the infield of the existing baseball field. Borings RB-5 and RB-6 OW are located in the existing paved parking lot east of the existing Building. Boring RB-7 OW is located in the grassed area north of the existing boring. Boring RB-3 was marked on the west side of the existing baseball field but was not drilled due to time constraint.

Previous and current supplemental field and laboratory test programs are described in the following sections.

2.1 Previous Geotechnical Borings and Laboratory Testing

Logs corresponding to the original borings (34) performed in 1955 for the design of the existing school building were summarized on Drawing No. X-2 dated 25 May 1956 by Samuel Glaser Associates of Boston (see Appendix A)[3]. Depth of borings ranged between 13.5 feet and 40 feet. Note that Standard Penetration Tests (SPT) were not performed as part of this 1955 investigation because a

[2] The approximate locations are based on field measurements (by RSE staff) of boring locations relative to fixed landmarks/references at the site. More detailed description of the boring locations is provided on the boring logs.

[3] Elevations shown on 1956 drawings refers to Framingham Town Base. Current project vertical datum is NAVD88 = Framingham Town Base + 3.254 ft.

smaller diameter sampler was use. Notes on Drawing X-2 indicated that the blow counts correspond to driving an 1-in OD sampling pipe using a 140 lb weight falling thirty inches to advance the pipe by one foot.

In 2018, McPhail performed a total of 18 borings. McPhail's preliminary borings (9[4]) were performed by Northern Drill Services on February 21-22 and April 19, 2018. McPhail's supplemental borings (8) were performed by Carr-Dee Corp. on July 26-27, 2018. SPT sampling in accordance with ASTM D1586 were performed. Correspondence with McPhail in 2019 confirmed that SPT tests were performed using automatic hammers by both Northern Drill Services as well as Carr-Dee. Boring logs and laboratory tests from McPhail's investigation are included in Appendix A.

2.2 RSE Supplemental Geotechnical Borings

All six borings (RB-1, RB-2, RB-4, RB-5, RB-6 OW, and RB-7 OW) RSE Supplemental borings were advanced using rotary wash drilling with 4"-diameter casings. Standard Penetration Test (SPT) sampling in soil were performed in accordance with ASTM D1586 using a 140-lb automatic hammer with sampling interval of 5 feet. Soil samples were collected, placed in glass jars, and currently stored in RSE's office in Watertown, Massachusetts. Boring logs for the six borings are included as Appendix B.

2.3 RSE Supplemental Laboratory Testing

Four samples (RB-1 S5, RB-1 S6, RB-2 S4, and RB-5 S8) were submitted to TerraSense of Totowa, NJ for sieve analysis (ASTM D422). Results of the sieve analyses are included as Appendix C.

[4] Boring B-106A was drilled adjacent to B-106, after B-106 was terminated at 4.5 ft due to obstruction. This report considers B-106 and B-106A as one boring, B-106.

3. SITE AND SUBSURFACE CONDITIONS

3.1 Existing Site and Adjacent Buildings

Figure 6 shows an aerial photograph of the project site and adjacent neighborhoods. The western edge of the new three-story building is approximately 20-ft from the existing school building. Mass Bay Community College building is more than 45 ft south of the new building. Buildings at Miriam McCarthy School and the Massachusetts State Police Framingham Barracks are more than 450 ft from the new school building. Residential buildings to the east of Fuller Middle School (on Guadalcanal Rd and John J Brady Drive) are also more than 450 ft away. Though residential buildings to the west of Fuller Middle School are more than 1,000 ft from the new school building, closest residential building is within 250 ft of the existing Fuller School Building.

3.2 Flood Zone

Figure 13 shows the Flood Insurance Rate Map covering this area (Map 25017C0516F, 7 July 2014). This map indicates that this site is outside special flood hazards areas subject to inundation by the 1% annual chance of flood. Area just west of Stoney Brook Road is designated Zone AE with flood elevation of El. 156 ft (NAVD 88). Area surrounding the existing Fuller School building, included proposed building location, is identified as "Other Flood Areas". This is likely related to poor drainage and presence of swamp deposits in this area. Proper grading and drainage design may minimize future flooding risks.

3.3 Subsurface Soil Conditions

Boring logs for the six RSE Supplemental geotechnical borings are included as Appendix B. Previous borings completed in 2018 (17) and 1955 (34) are included in Appendix A.

Summary of the N-values versus depth from seventeen 2018 borings as well as six RSE supplemental borings are tabulated as Table 1. Table 2 includes the same N-values data but tabulated versus elevation and sorted by boring location. The subsurface conditions encountered at the boring locations consist of fill, organics, glacial lacustrine, and glacial outwash. Top of rock was not encountered at all boring locations; subsequently, rock coring was not performed as part of this investigation. Consistent with the surficial geologic map, the subsurface conditions are relatively heterogeneous.

The *fill* stratum consists of topsoil and man-placed fill. Topsoil is present for borings located in grassed area and compacted fill is present below paved parking

area. Fill consists of very loose to very dense brown to gray sand with varying amounts of gravel with few to little sandy silt. The N-values range from 2 to over 54 blows per foot. Most of the fill, 2 ft to 8 ft in thickness, was likely placed as part of earthwork activities associated with the original building construction in the late 1950's. Site grading prior to the construction of the existing building is shown as Figure 14. It appears that the 1950's grading activities involved excavation of two small hill at the site and backfilling of low-lying areas/swamps around these two hills in order to level the site.

An *organic* stratum, 1 ft to 9 ft thick, was encountered below the fill stratum at 12 of the 23 borings (B-101, B-102, B-103, B-104, B-107, B-202, B-203, B-205, B-206, RB-1, RB-2, and RB-7 OW). Top of the organic stratum varies from El. 161 to El. 156 and bottom of the organic stratum is generally at or above El. 155; however, at RB-1, organic stratum extended down to El. 149. This organic stratum consists of organic sand, organic silt, and/or varying amount of peat. N-values range from 1/24" to over 20 blows per foot. Organics with N-values greater than 4 are generally sand with trace organic matters while organics with lower N-values are organic silt with few to little peat. Review of the thirty-four 1955 boring logs and original site grade indicates that organics are generally present in borings with original (1955) ground surface at or below El. 158 (Framingham Town Base), which is El. 161.25 NAVD88. Figure 15 shows areas of the site that was originally at or below El. 161.25 NAVD. This area reflects the estimated extent of organics at this site and shows that most of the proposed building is underlain by varying thickness of organics. General Notes #1 on 1956 Drawing X-1 (Figure 14) required peat to be excavated from all driveways, parking areas, and walkways. 23 borings performed in 2018 and 2019 do show organics below paved areas; however, organics encountered below paved areas are organic sand or silt, not peat. Presence of peat was encountered at boring locations in/abutting grassed areas. It appears that removal of organics in the original earthwork was limited to parking area and did not extend to grassed area, consistent with General Notes #1 on 1956 Drawing X-1.

At borings B-102, B-204, RB-2, RB-4, RB-6 and RB-7, pockets of *glacial lacustrine* deposit were encountered below the fill or organics. Glacial lacustrine deposit consists of brown to gray silty sand or sandy silt with trace to few gravel and clay. N-values range from 6 to 28 blows per foot. Photographs of material recovered in the SPT sampler are included on boring logs in Appendix B.

Glacial outwash deposit is present below the fill, organics, and glacial lacustrine deposits. Glacial outwash consists of brown to gray, fine to coarse well graded sand with trace to few silt and few to some gravel. N-values range from 5 to 47 blows per foot. Photographs of materials recovered in the SPT sampler are included on boring logs in Appendix B.

Visual-manual descriptions of the soil were made in accordance with ASTM D2488. The relative amount by dry weight of minor components is identified by the following terms in accordance with Note 16 of ASTM D2488:

- Trace – < 5%
- Few – 5 to 10%
- Little – 15 to 25%
- Some – 30 to 45%
- Mostly – > 50%

3.4 Groundwater Conditions

Groundwater measurements were taken after completion of the borings. Measurements obtained at borings advanced using rotary wash method may not reflect true groundwater conditions due to the timing of the measurement (shortly after boring completion) and drilling method involving introduction of water (rotary wash). Nevertheless, measurements obtained at the borings are between 1.5 and 6.5 ft below existing ground surface, at El. 157.8 to El. 160.9 NAVD88.

Two observations wells (RB-6 OW and RB-7 OW) were installed as part of RSE's supplemental subsurface investigation program. Both wells extend to a depth of 11' with 7' of screen. Ground surface at top of the well at RB-6 OW is at approximately El. 163.5 NAVD88 with measured groundwater at El. 160.5 on 19 April 2019 and El. 160.7 on 2 May 2019. At RB-7 OW, top of the wall is at approximately El. 164.4 with measured groundwater at El. 160.0 measured on 19 April 2019 on 2 May 2019. Additional groundwater readings are recommended in order to quantify seasonal fluctuations at the site.

3.5 Laboratory Test Results

Results of geotechnical laboratory tests performed by TerraSense are presented in Appendix C.

The four samples obtained from RB-1 RB-2, and RB-5 submitted for sieve analysis range from well-graded sand with silt (SW-SM), to poorly graded sand (SP), to silty sand (SM), and to sandy silt (ML).

4. FOUNDATION RECOMMENDATIONS

The design and construction for the proposed structure should be completed in accordance with the 9th edition of the Massachusetts Building Code. Specific design recommendations for the proposed foundation system are presented below.

4.1 Design Groundwater Level and Base Flood Elevation

Based on conditions encountered at the site, the design groundwater level for this project is recommended at El. 161.5 (NAVD88). Considering the presence of swamp and glacial lacustrine deposits, the design groundwater level likely reflects conditions of the perched water-table close to the grounds surface and not groundwater conditions of the lower aquifers (glacial outwash, till, and bedrock).

4.2 Recommended Engineering Properties for Soil

Recommended engineering properties for the fill, organics, glacial lacustrine, and glacial outwash strata at the site are summarized in Table 3. Engineering properties for the compacted structural fill, if used, are also included in Table 3.

The fill and organics are not suitable bearing strata therefore no recommended allowable bearing values are given in Table 3. Bottom of fill and organics varies between El. 160 and El. 149 with glacial lacustrine and/or glacial outwash below. Allowable net bearing pressures for footings bearing on glacial lacustrine and outwash below a depth of 4 ft are 1 TSF and 2.5 TSF, respectively for minimum footing width of 3 feet. For deeper footings, higher allowable net bearing pressure is likely; however, such an evaluation should be performed individually since the value depends on depth as well as footing location.

For compacted structural fill, meeting material specification and compaction requirement described in Section 5.1, the recommended soil properties are included in Table 3. The allowable net bearing pressure is expected to change and would depend on the material below the compacted structural fill and thickness of the compacted structural fill. Such an evaluation should be performed for individual cases.

4.3 Depth of Frost

All foundations bearing on soil shall be constructed at a minimum depth of 4’ feet below the finished ground surface for frost protection.

4.4 Recommended Foundation System and Anticipated Settlements

As stated in Section 4.2, the fill and organics are not suitable bearing strata. Suitable bearing strata at this site are the underlying glacial outwash and glacial lacustrine deposits located below the fill and organics. The subsurface investigation identified that the bottom of fill and organics strata extends below existing water table and varies between El. 160 and El. 149. Considering that the current ground surface varies between El. 165 and El. 162 and the proposed top of lowest slab is at El. 165.5, spread footings and slab-on-grade supported on ground improvement consisting of Aggregate Piers and/or Rigid Inclusions extended into the glacial lacustrine or glacial outwash is recommended to support the proposed building and a portion of the raised bus ramp. Installation of Aggregate Piers or Rigid Inclusion would minimize volume of excavation, backfill, and dewatering compared with construction of traditional footings with direct bearing on glacial outwash or glacial lacustrine or over-excavation of unsuitable material and replacement with compacted structural fill. For subsurface conditions encountered at the site and the anticipated building loads, Aggregate Piers and/or Rigid Inclusions are more cost-effective than pile foundation. General information regarding design, construction, and comparison of Aggregate Piers and Rigid Inclusions are included in Appendix D.

Ground Improvements for Building and Amphitheater

Ground Improvement techniques such as Aggregate Piers (columns filled with crushed stones[5]) and Rigid Inclusions (columns filled with grout) are generally proprietary and are provided by a design-build consultant. Aggregate Piers appears to be appropriate for building and bus ramp footprint within paved area where presence of peat is limited. In the vicinity of RB-1, northern portion of the building beyond paved parking lot, Rigid Inclusions may be needed due to the increased thickness of soft organics and increased presence of peat in that area. For northern area beyond the current pavement, over-excavation to El. 155 NAVD88 and replacement with compacted structural fill or ¾“ crushed stones 3/4 is recommended prior to ground improvement. The design-build consultant will provide detailed design calculations, sealed by a Professional Engineer licensed in the Commonwealth of Massachusetts, as well as implementing load testing program demonstration the performance of the Aggregate Pier/Rigid Inclusion elements. For the proposed building, the performance criteria for the Aggregate Piers/Rigid Inclusions are the following:

- Aggregate Piers/Rigid Inclusions should extend at least 1 ft into the glacial lacustrine or glacial outwash deposit;

[5] Grouted Aggregate Piers are not recommended for this project.

- Rigid Piers should be used at locations with presence of more than 3 feet of soft organics or highly loaded footing locations to control short-term and long-term settlements.
- Overall ground improvement, including load transfer platform, layout and spacing of Aggregate Piers/Rigid Inclusions, should provide allowable bearing of 2 TSF at footing locations and meeting settlement tolerance.
- Long-term total footing settlement is limited to 1-inch; Long-term differential settlement of adjacent footings should be less than ½-inch.
- Proposed lowest floor slab will be slab-on-grade on improved soil (Aggregate Piers or Rigid Inclusion). Ground improvement below the slab should provide allowable bearing of 450 psf with total and differential settlements limited to ½-inch and ¼-inch, respectively.
- Retaining wall and Amphitheater within 30 ft of the building should be on improved soil. Ground improvement below the raised bus ramp should provide allowable bearing of 1 TSF with total and differential settlements limited to ½-inch to ¼-inch, respectively.
- Sections of settlement-sensitive utilities with underlying organics should be supported by ground improvement. Based on current site layout, this would impact only the section of electric duct bank near the building. Ground Improvements for utility support should be designed to limit settlement to ½-inch.
- Modulus load test, loading to 150 percent of the maximum design stress, should be performed on at least one Aggregate Pier and one Rigid Inclusion, if used.

Elevations of the top of bearing strata, glacial lacustrine or glacial outwash, at boring locations are included in Table 2. Figure 16 shows the estimated top of glacial lacustrine or glacial outwash within the building and Amphitheater footprints.

Raised Grade for Building and Amphitheater

The proposed elevation of the finished slab and the Amphitheater south of the building will be raised above the existing grade. In order to minimize post-construction settlement, a surcharge program is recommended prior to final grading and placement of concrete slab or pavement. The surcharge program consists of placement of additional fill equal to 15% of the final loading (weight of new fill + DL + LL) and allow time for the underlying organics to consolidate. The estimated duration of the surcharge program is 2 to 3 months. Duration and

removal of the surcharge depends on the observed settlement rate. Minimum of 10 settlement plates (see Figure 17, locations to be specified) should be installed to monitor settlement rate during surcharge. The additional surcharge load can be removed after measured rate of settlement is negligible or small. Final grading and placement of concrete or pavement can proceed after the removal of surcharge load. Within the building footprint, magnitude of surcharge varies due to variations in existing grade. Slightly larger surcharge is expected on the western side due to lower existing grade. Over-excavation of organics containing peat and replacement with acceptable fill prior to surcharge is recommended for northern portion of the building beyond paved parking due to thickness and nature of organics encountered at RB-1. The surcharge is expected to reduce post-construction settlement to about ¼ to ½ inch over the life to the structure and most beneficial in areas with underlying organics.

Utilities

Proposed utilities are generally located outside of the estimated extent of the Organic Deposit (see Figure 15). For settlement sensitive utilities, surcharge, similar to those proposed for raised grade, can be placed to minimize post-construction settlement. For sections of settlement-sensitive utilities that are underlain by organics, ground improvements can be installed to limit settlement within allowable tolerance.

Athletic Fields and Parking Lot

Figure 15 shows that patches of organic deposit are present within the new parking lot to be constructed after building demolition. To limit post-construction settlement, it is recommended that the organics be over-excavated before backfilling the area to the final grade. If full removal of organic deposit cannot not be achieved, surcharge can be placed to limit post-construction settlement.

Figure 15 shows that organics, associated with previously filled brook, occupies the western half of the north athletic files. Presence of organics is limited under the southern athletic field. Surcharge is recommended at the northern field if the final grading is above the current grade. For the southern field, northwest corner of the field may require surcharge to control post-construction settlement if final grade exceeds current grade.

4.5 Seismic Design Considerations

In accordance with Chapter 20 of ASCE 7-10 “Minimum Design Loads for Buildings and Other Structures” and subsurface conditions encountered at the

boring locations, the site is categorized as Site Class D. The SPT N values, soil type, and the location of the water table in the vicinity suggest that bearing materials encountered at the boring location are not susceptible to liquefaction based on Figure 1806.4c of the Massachusetts Building Code.

4.6 Design Lateral Earth Pressures and Retaining Wall Design

Design lateral earth pressures for the at-rest and active cases corresponding to the various materials encountered at the site are summarized in Table 3. Drainage system should be installed behind the retaining wall and foundation wall to allow drainage through or around the wall and avoid built up of full and/or differential hydrostatic head behind the wall. Clean-outs, with recommended lateral spacing of 30 feet, should be provided to allow flushing of the retaining wall and foundation wall drainage systems. Continuous crushed stones with minimum cross sections 2-feet width and 1-foot depth extending minimum of 8-in beyond edge of footing can be use as substitute for perimeter drainage pipes adjacent to perimeter strip footings. Trees with potential height of more than 7 feet shall be planted beyond the zone of influence defined as horizontal distance from the back side of the wall equal to height above the exposed base of the wall plus 2 ft. If wall consists of geotextiles or geogrids, the back side of the soil-reinforced wall is defined as the extent of the reinforced soil (i.e. extent of the geotextile or geogrids).

5. CONSTRUCTION CONSIDERATIONS

The proposed project site is located within existing Fuller Middle School campus in Framingham, Massachusetts. Figure 6 is an aerial photograph of the site as well as the surrounding neighborhoods. The surrounding neighborhood is mostly residential, other schools, and state buildings. Prospective contractors for this project must evaluate potential construction and traffic issues associated with their anticipated construction means and methods based on their own knowledge, experience, as well as local regulations in the area. This section provides a brief summary of important aspects related to the proposed geotechnical construction activities.

5.1 Earthwork, Subgrade Preparation, and Dewatering

The site is located within the Fuller Middle School campus in Framingham, Massachusetts. Site is accessible through residential streets off Route 9 through the Town of Framingham. All activities at this site shall conform to project, local, and state ordinances governing constructions. The Contractor should note and be familiar with the required notification procedures, administrative orders, sedimentation and erosion control, disposal facilities requirements, traffic controls, and special conditions associated with this site.

This report focuses on geotechnical design issues associated with the proposed construction. Environmental issues are beyond the scope of this report and are not addressed in this report; however, the Contractor is reminded that chemical testing will be required for excavated material and soil spoils that are designated for offsite disposal as well as imported fill to be placed on site. No chemical testing was performed as part of this investigation.

The new foundations shall bear on Aggregate Piers and/or Rigid Inclusions extending minimum of 1 foot into glacial outwash or glacial lacustrine deposits with allowable bearing of 2 TSF at footing locations. Lower allowable bearings are specified for ground improvements below building slab and the Amphitheater. A design-build consultant should provide design calculation as well as field load test to verify the performance of the installed Aggregate Piers and Rigid Inclusions. Total and differential settlement at footing locations shall be limited to 1-inch and ½-inch, respectively. Total and differential settlement for the lowest level slab and the Amphitheater shall be limited to ½-inch and ¼-inch, respectively.

Surcharging should be placed for the full building footprint and Amphitheater to reduce post-construction settlement. Given changes in existing grade and final grade across the site, the magnitude of surcharge will vary across the site. Surcharge consists of placement of additional temporary fill equal to 15% of the

final increase in load to consolidate the underlying organic soils before the slab is poured and the roadway is paved. The surcharge is expected to reduce post-construction settlement for project elements with load bearing on the organics to about ¼ to ½-inch over the life to the structure. The anticipated time required for the surcharge to remain in place is approximately 2 to 3 months. Settlements will be monitored during the surcharge program using settlement plates (see Figure 17) in order to verify the actual duration required to achieve the desired degree of consolidation. The settlement plates should be installed prior to raising site grade and the placement of surcharge fill. Settlement, at minimum of 10 locations (TBD), should be monitored by survey and evaluated by the Geotechnical Engineer. Once incremental settlement has stopped, the surcharge can be removed and construction of slab, pavement, and walkway work can proceed. If surcharge is placed after the construction of the foundation wall and retaining wall, lateral loading on the retaining wall and foundation wall should be maintained below design lateral loads of the walls. Contractor may elect to (1) construct temporary reinforced earth berm with geogrids or geotextiles to maintain lateral loads below the design values; or alternatively (2) place additional surcharge on the other side of the wall so that differential lateral loads are within design limits of the walls.

Structural fill material, if used, shall consist of granular inert material that is hard, durable stone and coarse sand, free of excess moisture, frozen lumps, roots, sod, trash, metal, plastic, clay, and other deleterious materials and conforming to the following specifications:

Maximum particle size:

3 inches	100%
Sieve 1/2” (12.5 mm)	50 – 85% passing
Sieve #4 (4.75 mm)	40 – 75% passing
Sieve #50 (300 µm)	8 -28% passing
Material passing #200 sieve (75µm)	5% max.

Materials that break up when alternately frozen and thawed or wetted and dried should not be used. The material shall be placed and compacted in lift thickness not exceeding 8 inches. Material placed in all lifts shall be compacted to at least 95 percent of the maximum density as determined by ASTM 1557 using modified effort. For earthwork construction activities performed during freezing conditions, proper measures should be implemented to minimize penetration of frost in soil beneath foundations and slabs. Geogrids, Mirafi BXG 120 or similar, placed on 16” intervals are recommended below areas minimizing differential settlement is desired.

Remnants of abandoned underground structures, such as basement and foundation elements are not anticipated within the new building footprint but may be encountered during the construction of the foundation systems. Existing and abandoned buried utilities should be expected below the proposed building footprint as well as the Amphitheater. It is anticipated that removal of these obstructions, if necessary, can be accomplished using conventional heavy earth-moving equipment.

The proposed new foundation is expected to extend below the general groundwater level. Construction dewatering may be required during excavation or control of seepage, precipitation, and surface water inflow into the site. For those foundation construction activities to be performed in-the-dry, such as earthwork, construction dewatering should be accomplished by the Contractor using methods such as open pumping from sumps, temporary ditches and trenches, and general site grading. All discharge shall comply with the local and state regulations.

5.2 Impact on Adjacent Structures

Given the current building layout under consideration, extent of earthwork, and proximity of neighboring structures, the proposed construction activities may cause architectural/cosmetic damage to negligible impact on neighboring structures. Nevertheless, construction-related vibration should be limited and should be monitored, especially at Mass Bay Community College and residential properties to the west of the project site (85, 91, 99, 103, 105, 107, 109, and 111 Oaks Road and 34 and 37 Fraser Road), to quantify and control adverse impact on the adjacent buildings. Minimum of two vibration monitoring points are recommended with locations to be determined depending on construction activities. Noise and dust control shall be within City limits as well as limits defined by the Project.

Preconstruction survey is recommended for the Mass Bay Community College building and closest residential neighbor to the west. Preconstruction survey should also be performed at the existing Fuller School Building to verify structural integrity of the existing building prior to and during construction considering the building will be occupied during construction.

5.3 Field Monitoring During Construction

We recommend that RSE be retained and involved during foundation construction to provide the following services:

- Provide and review the final plans and specifications to verify that the geotechnical recommendations included in this report are incorporated as intended.

- Review contractor submittals related to foundation design, support of excavation design, and construction.

- Monitor earthwork, surcharge, and aggregate piers/rigid piers installation activities associated with the construction of foundation elements.

Our involvement during construction will allow us to (1) document the compliance of the construction with design recommendations, specifications, and building code, (2) identify changes in subsurface conditions different from those described in this report, i.e. prior to the start of the construction, and (3) provide timely design modifications in response to field conditions.

6. CLOSURE

The recommendations presented in this report are based on data obtained from the referenced geotechnical borings and may not capture the exact nature and extent of variations between the completed borings. If subsurface conditions uncovered during construction deviate significantly from the conditions described in this report, RSE should be notified and modifications or re-evaluations of the design recommendations may be necessary to reflect the actual field conditions.

This report has been prepared for the proposed Fuller Middle School in Framingham as described in Section 1.2. RSE should be informed of the final design and location of the foundation elements associated with the building (such as foundation loadings, slab loadings, column configurations, retaining wall design, finished floor elevation, and bus ramp geometry and location) prior to issuing the final bid and contract documents. This will allow us to review the final design, verify if the conclusions and recommendations contained in this report are still valid, and make design modifications, if necessary.

TABLES

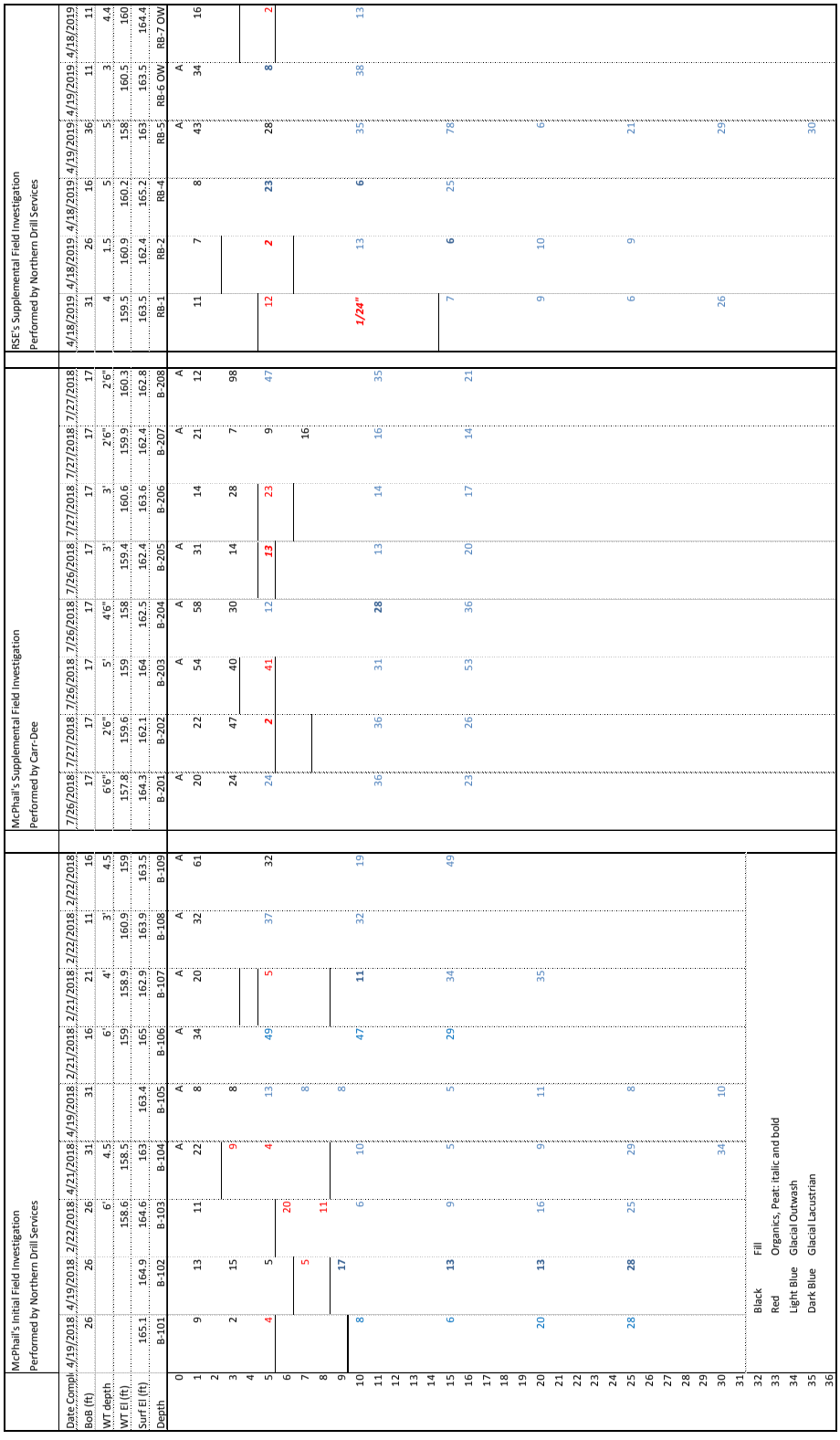


TABLE 1– Summary of N-values v. Depth From Previous and Current Geotechnical Subsurface Investigation

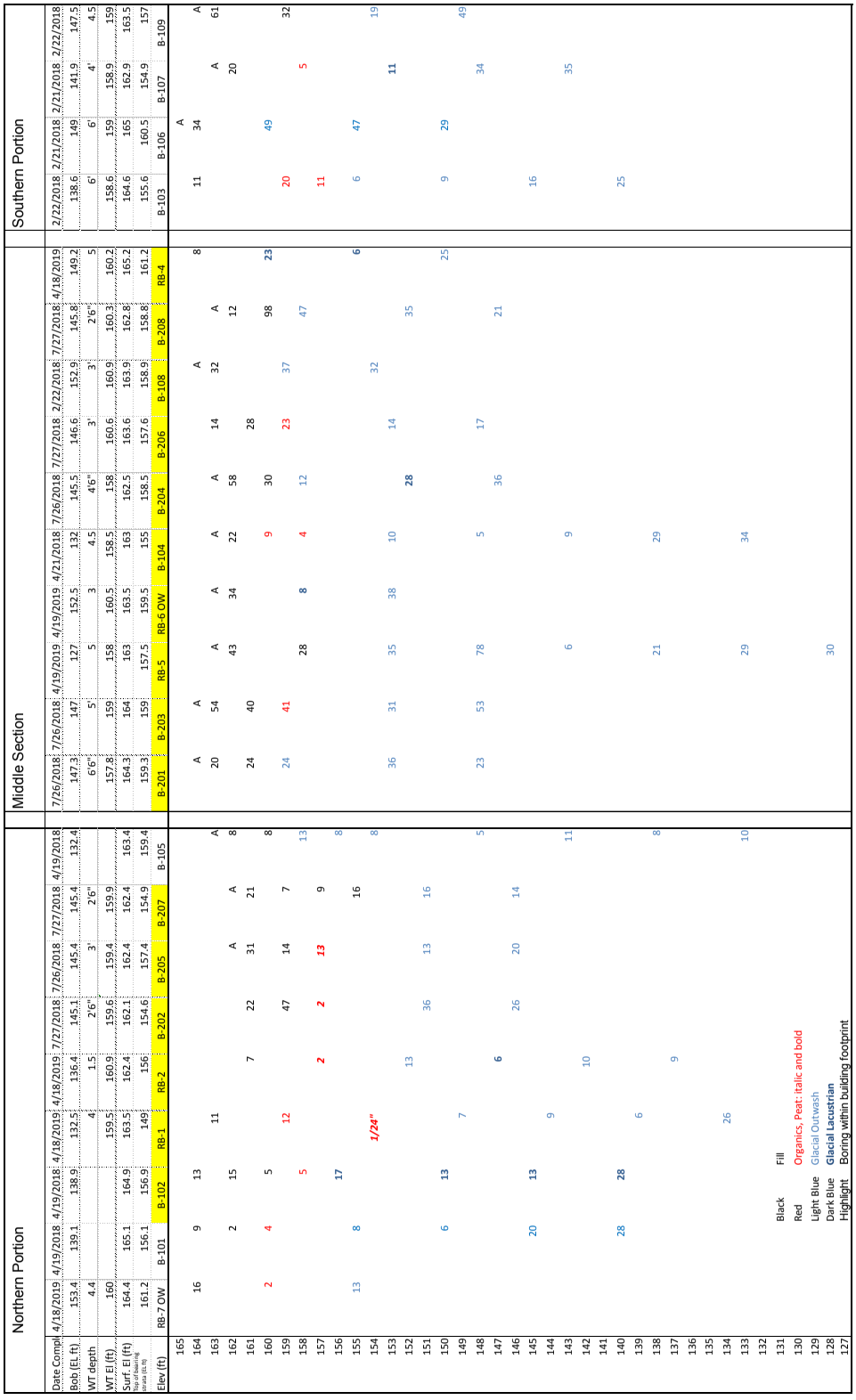


TABLE 2 – Summary of N-values v. Elevation From Previous and Current Geotechnical Subsurface Investigation Sorted by Location

Engineering Properties	**Existing Fill**	**Existing Organics**	**Glacial Lacustrine**	**Glacial Outwash**	**Compacted Structural fill or ¾" crushed stones**
Total Unit Weight (γ_t)	115 pcf	95 pcf	115 pcf	120 pcf	130 pcf
Passive Lateral Earth Pressure Coefficient (K_p)	3.0	---	3.0	3.4	3.5
At-rest Lateral Earth Pressure Coefficient (K_0)	0.5	0.5	0.5	0.46	0.44
Active Lateral Earth Pressure Coefficient (K_a)	0.33	---	0.33	0.3	0.28
Friction Angle (ϕ')	30º	---	30º	33º	34º
c (psf)	0	500 psf	0	0	0
Allowable Net Bearing (for footing widths between 3 and 6 feet)	---	---	1 TSF	2.5 TSF	--- #

Allowable bearing depends on underlying stratum.

TABLE 3 – Recommended Design Soil Engineering Properties for Foundation Design

FIGURES

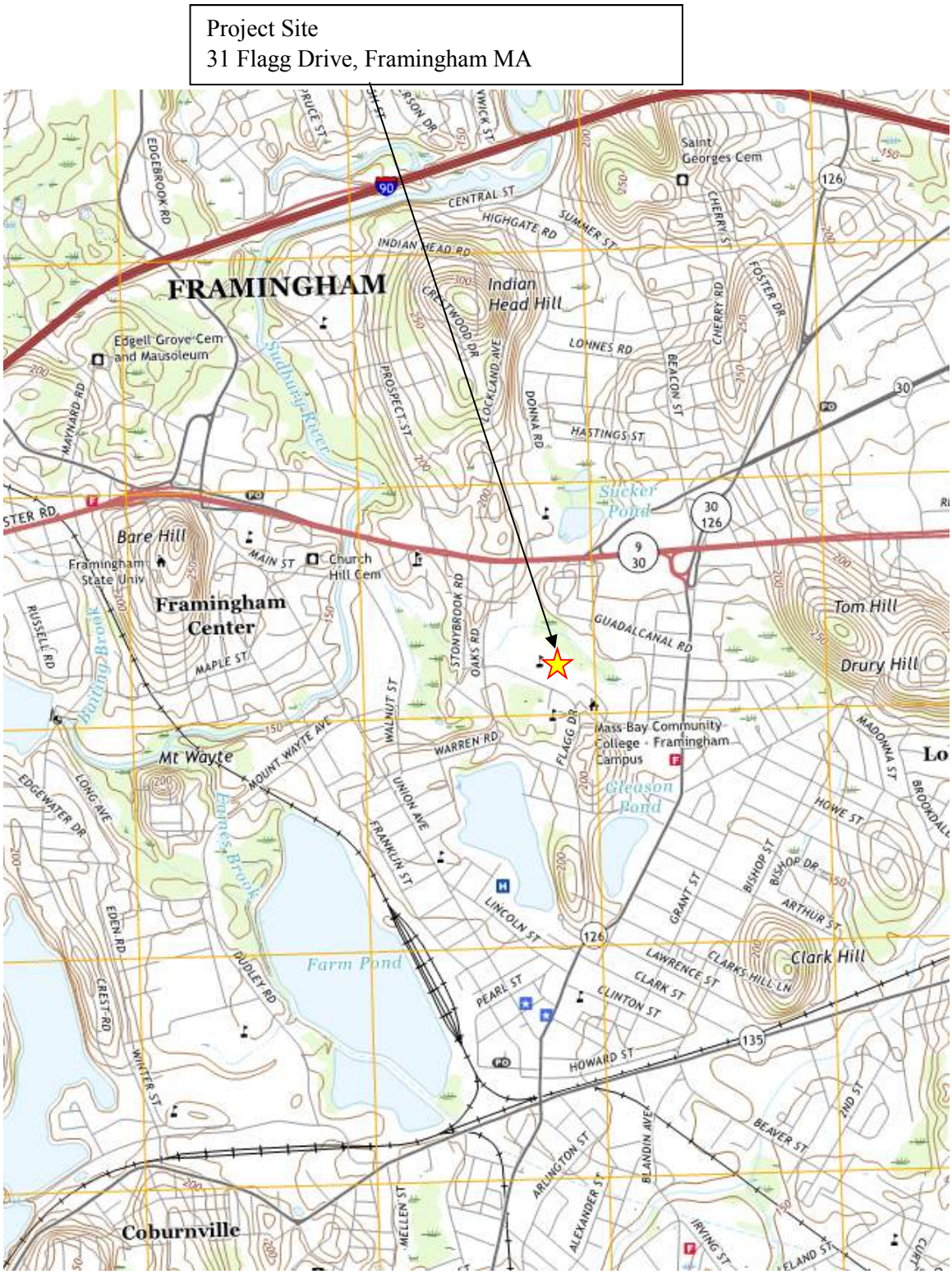


FIGURE 1 – Project Location Plan (from USGS Framingham Quadrangle, MA, 2018)

FIGURE 2 - USGS Framingham Sheet, MA, 1965

FIGURE 3 – USGS Framingham Sheet, MA, 1950

FIGURE 4 – USGS Framingham Sheet, MA, 1894

Property address: 31 Flagg Drive
ID: 102-82-8137-000
Book/Page: 8601-279
Land Acreage: 18.96 Acres

Building Type: School
Year Built: 1959
Bld Finished Area: 201238 SF
Basement Area: 0

FIGURE 5 -Town of Framingham, MA Assessor's Map
[https://framinghamma.mapgeo.io/datasets/properties/102-82-8137-000]

FIGURE 6 – Aerial Photograph of the Project Site (from www.bing.com)

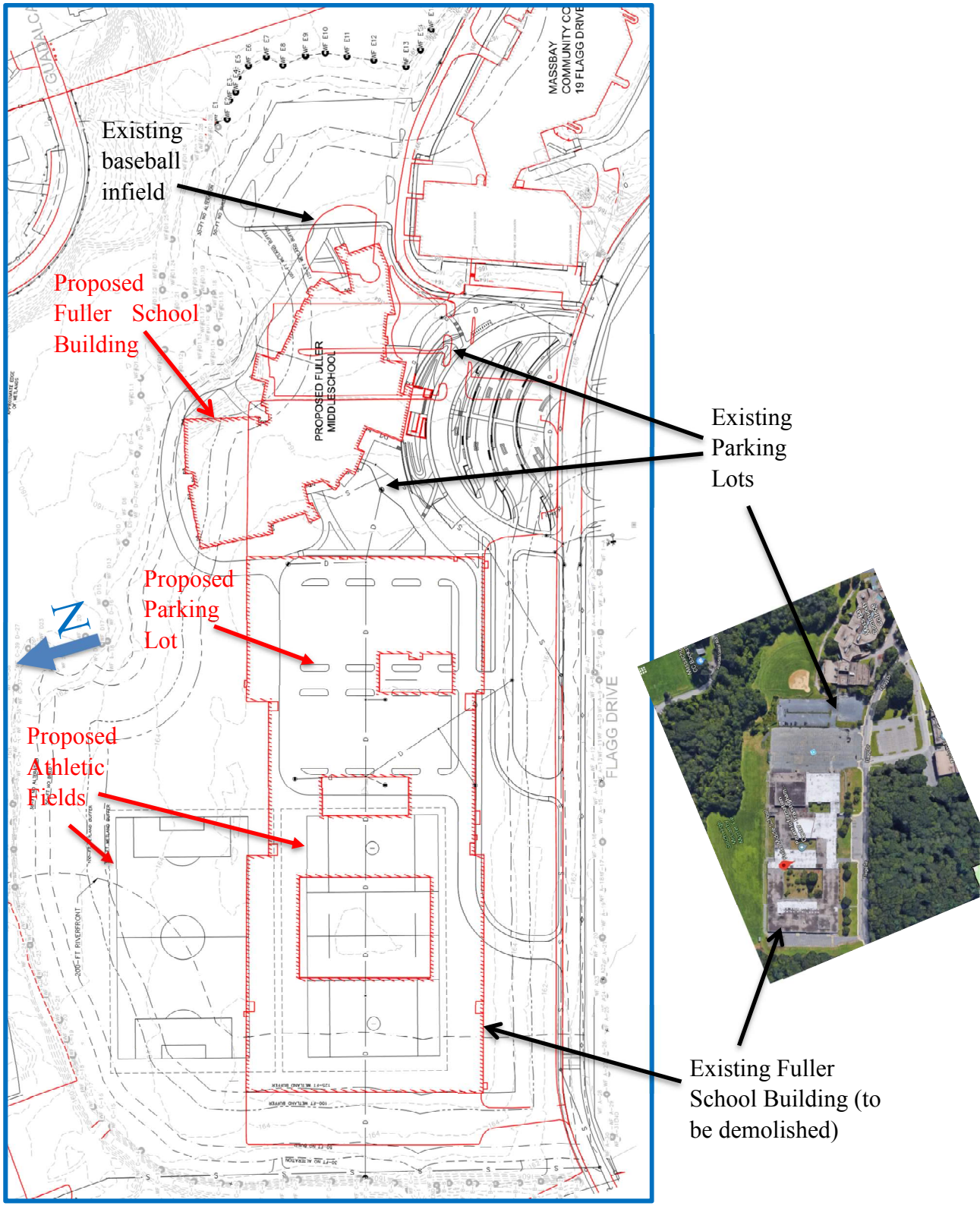
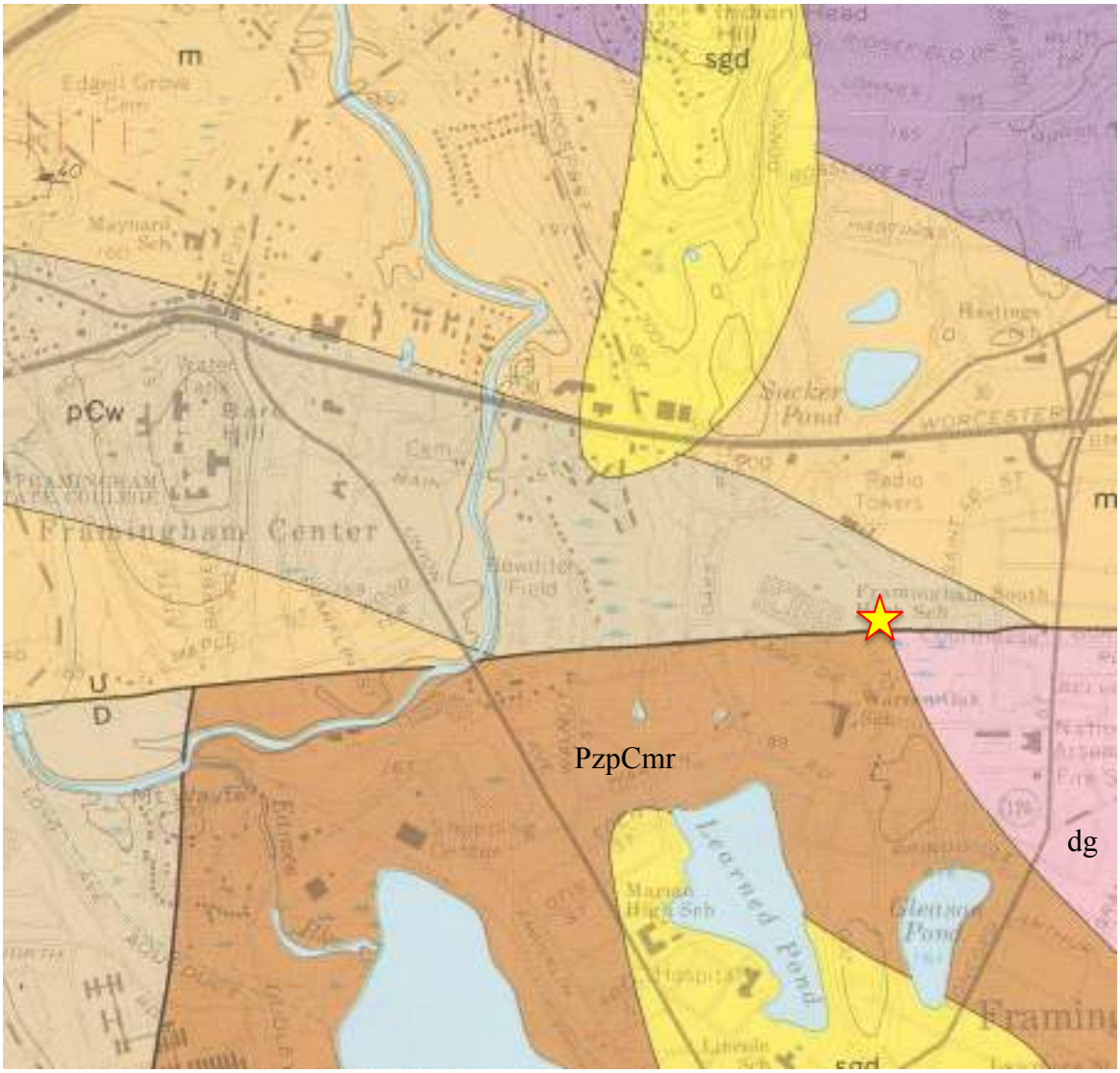


FIGURE 7 - Location of the Proposed Building



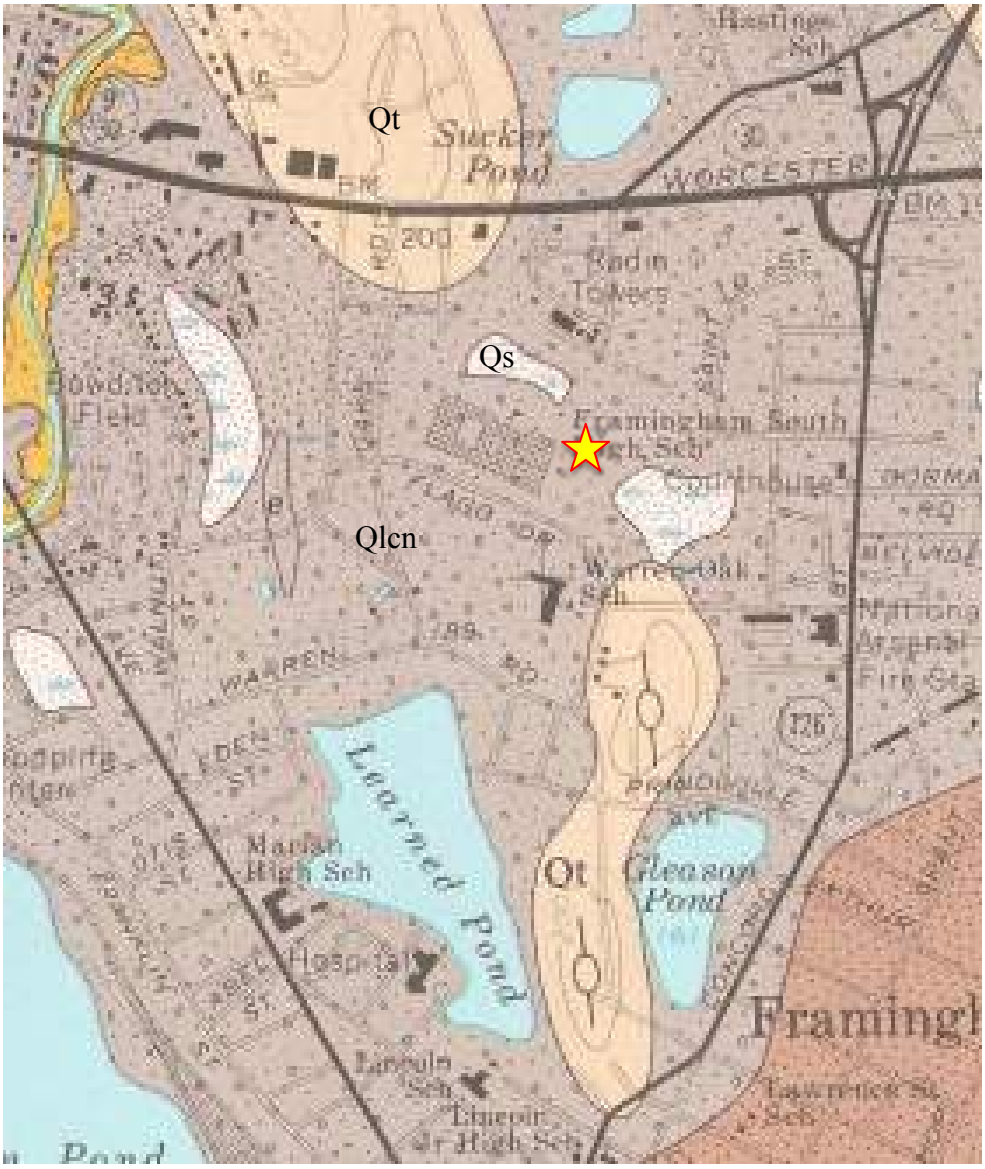
m *Milford Granite*: pinkish-gray, light-pinkish-gray to medium gray, fine- to coarse-grained rock ranging from graite to granodiorite.

dg *Dedham Granodiorite*: light-gray to pinkish-gray fine to coarse-grained plutonic rock that is mostly granodiorite but ranges from granite to quartz diorite.

PzpCmr *Mixed rocks*.

pCw Westboro Quartzite: light to medium- to dark-gray locally yellowish-gray quartzite that is mostly fine grained.

FIGURE 8 – Bedrock Geologic Map of Framingham, Massachusetts [Arthur E. Nelson, 1975, USGS GQ-1274]

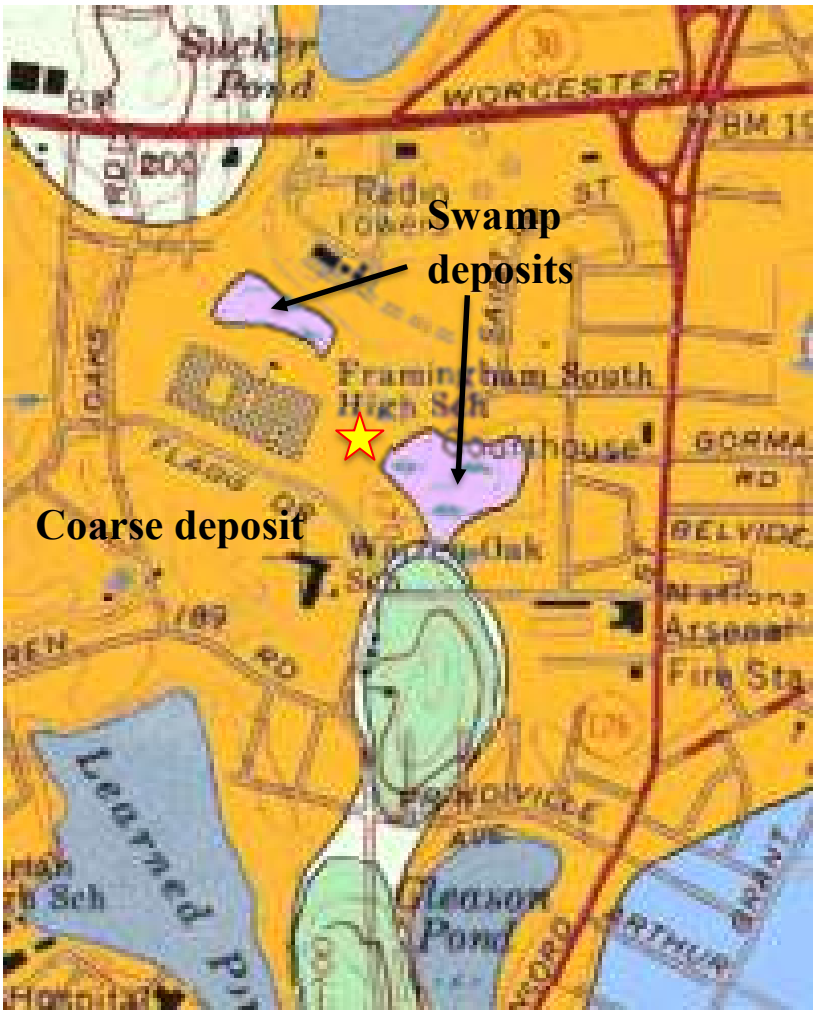


Qlcn *Deposits of Lake Charles*, East Natick stage: glacial-lake and glacial-stream deposits consist of mixtures of gravel, sand, and silt in ice-channel fillings, kame terraces, kames, make deltas, and some outwash.

Qt *Till*: light-gray to greenish-gray non-stratified and poorly sorted heterogeneous mixture of boulders, cobbles, pebbles, sand, silt, and clay-sized materials. Texture ranges from loose and sandy to compact.

Qs *Swamp Deposit*: Brownish-black muck, peat, silt, and sand present in poorly drained areas.

FIGURE 9 - Surficial Geologic Map of the Framingham Quadrangle [Arthur E. Nelson, 1974, map GQ-1176]



Glacial Stratified Deposit

Coarse deposits consist of *gravel deposits*, *sand and gravel deposits*, and *sand deposits*, not differentiated in this report. *Gravel deposits* are composed of at least 50 percent gravel-size clasts; cobbles and boulders predominate; minor amounts of sand occur within gravel beds, and sand comprises a few separate layers. Gravel layers generally are poorly sorted, and bedding commonly is distorted and faulted due to postdepositional collapse related to melting of ice. *Sand and gravel deposits* occur as mixtures of gravel and sand within individual layers and as layers of sand alternating with layers of gravel. Sand and gravel layers generally range between 25 and 50 percent gravel particles and between 50 and 75 percent sand particles. Layers are well sorted to poorly sorted; bedding may be distorted and faulted due to postdepositional collapse. *Sand deposits* are composed mainly of very coarse to fine sand, commonly in well-sorted layers. Coarser layers may contain up to 25 percent gravel particles, generally granules and pebbles; finer layers may contain some very fine sand, silt, and clay

Postglacial Deposits

Swamp deposits—Organic muck and peat that contain minor amounts of sand, silt, and clay, are stratified and poorly sorted, and occur in swamps and freshwater marshes, in kettle depressions, or in poorly drained areas. Unit is shown only where deposits are estimated to be at least 3 ft thick; most deposits are less than 10 ft thick. Swamp deposits overlie glacial deposits or bedrock. They locally overlie glacial till even where they occur within thin glacial meltwater deposits

FIGURE 10 - Surficial Geologic Map of the Framingham Quadrangle [Scientific Investigations Map 3402, Quadrangle 98, 2018]

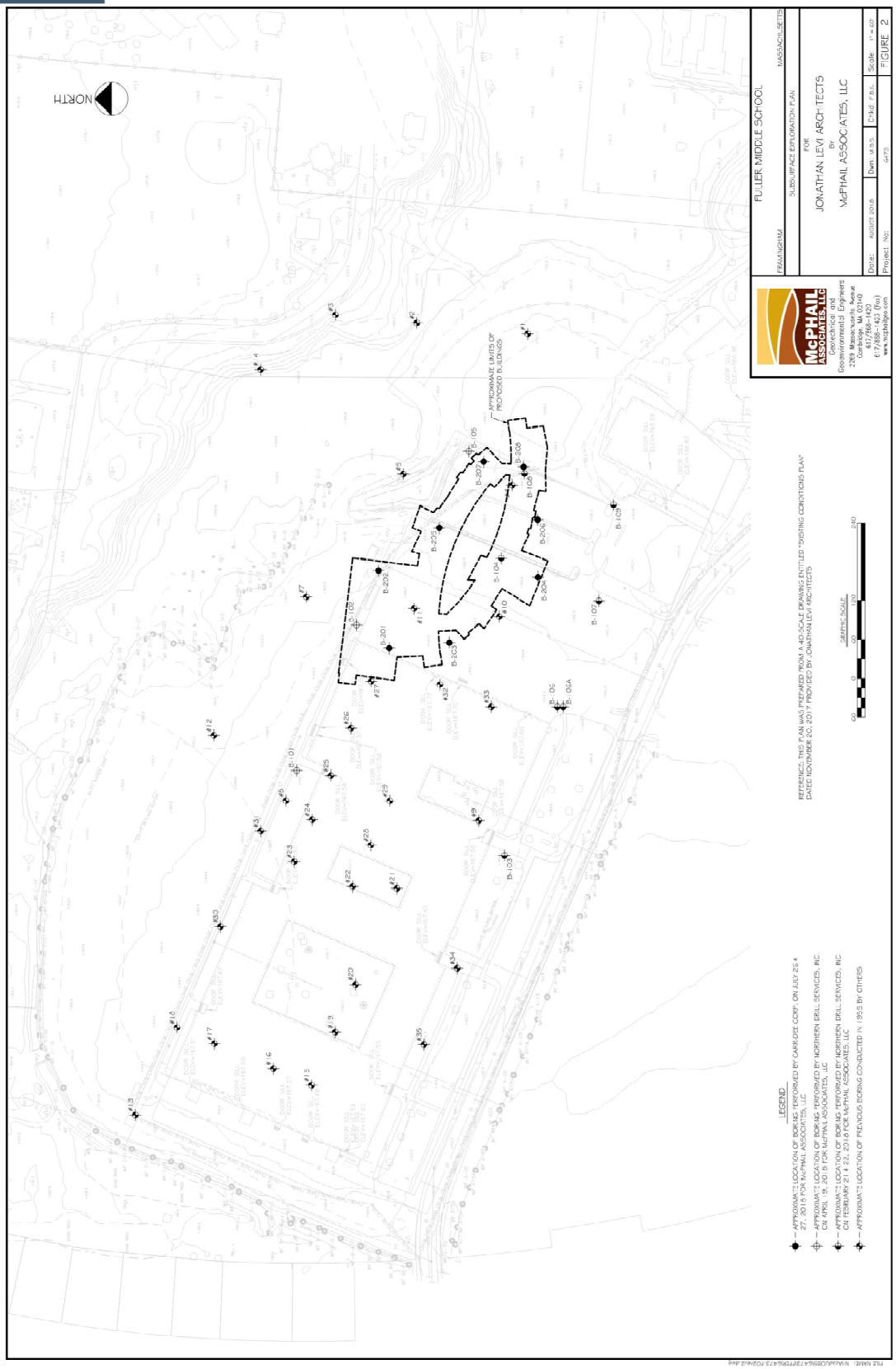


FIGURE 11 – Boring Locations from Previous 1955 and 2018 Subsurface Investigations (see McPhail, 10 September 2018)

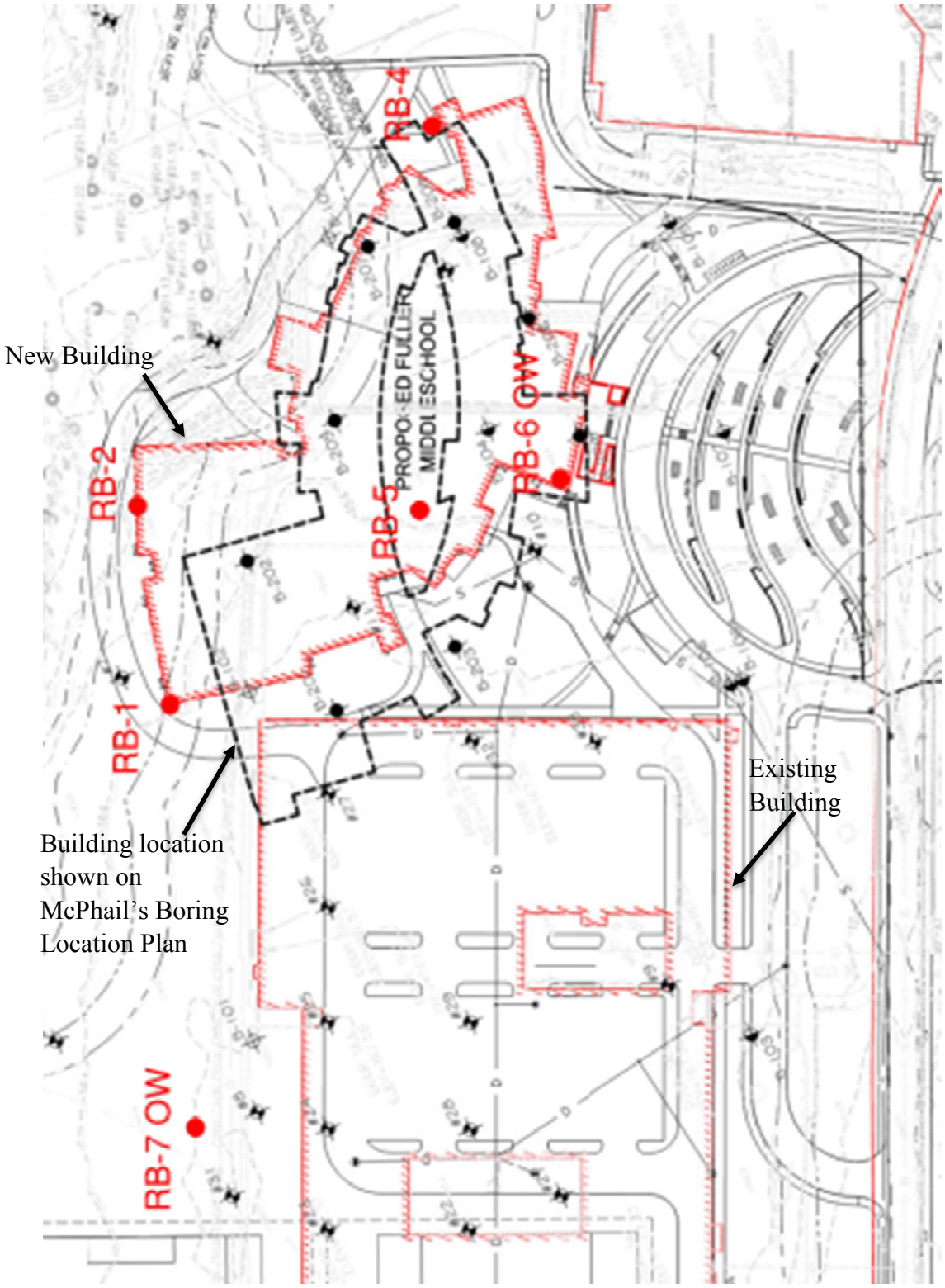


FIGURE 12 – Approximate Supplemental Boring Locations at Fuller Middle School, Framingham, MA (Field Program: 18 – 19 April 2019)

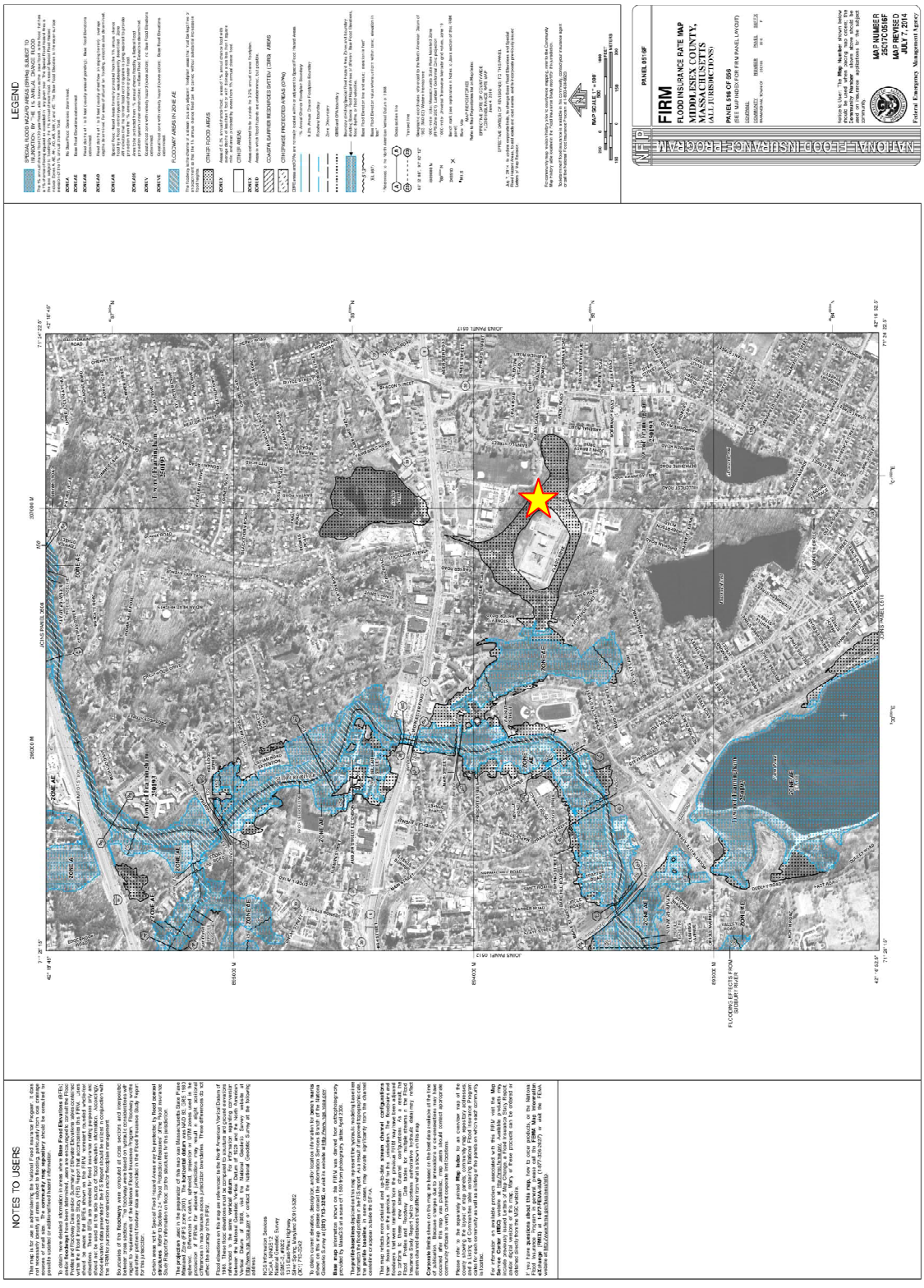


FIGURE 13 - Flood Insurance Rate Map (July 7, 2014, Map Numbers 25017C0516F)

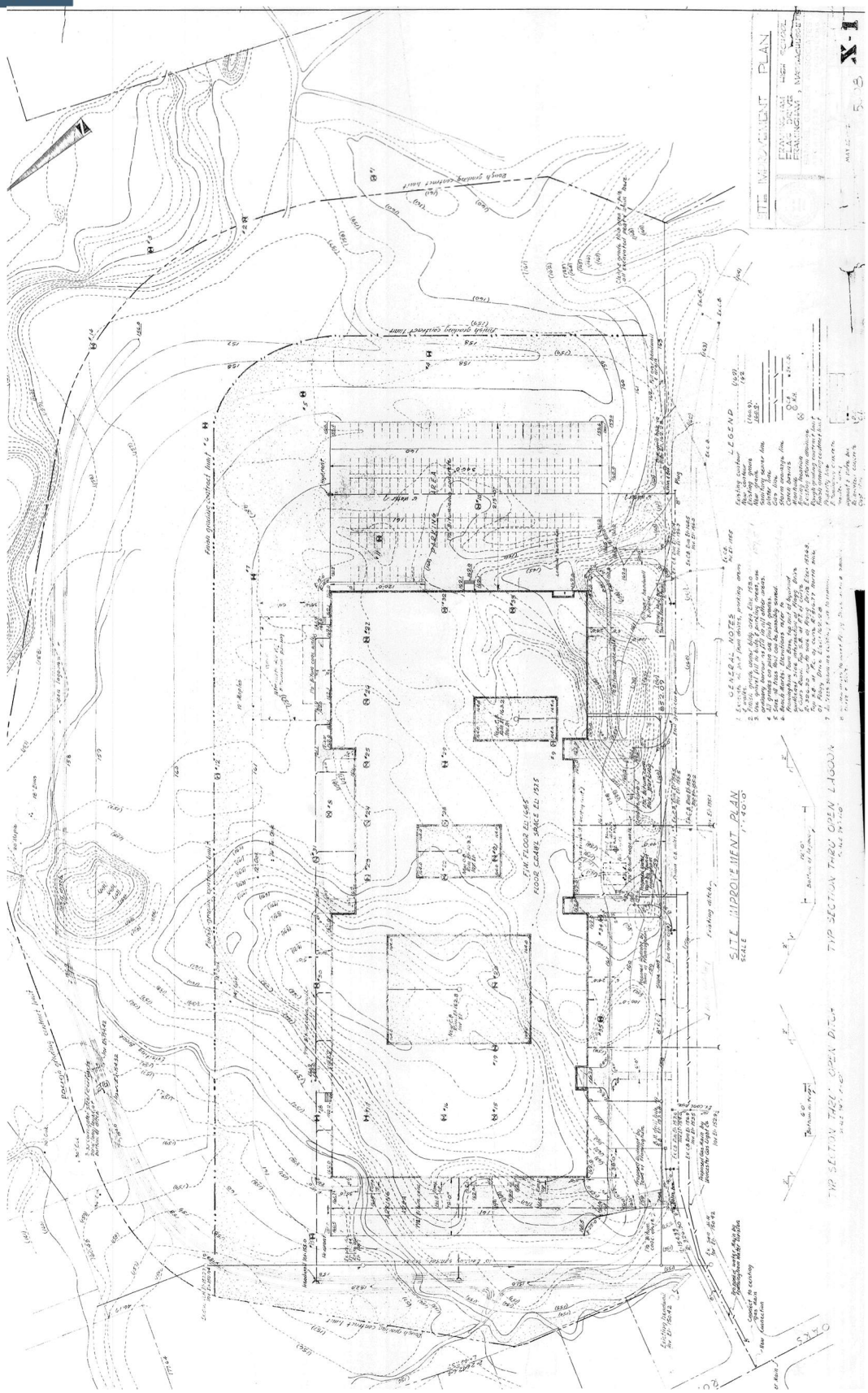


FIGURE 14 – Site Plan showing 1956 Existing and Proposed Site Grading

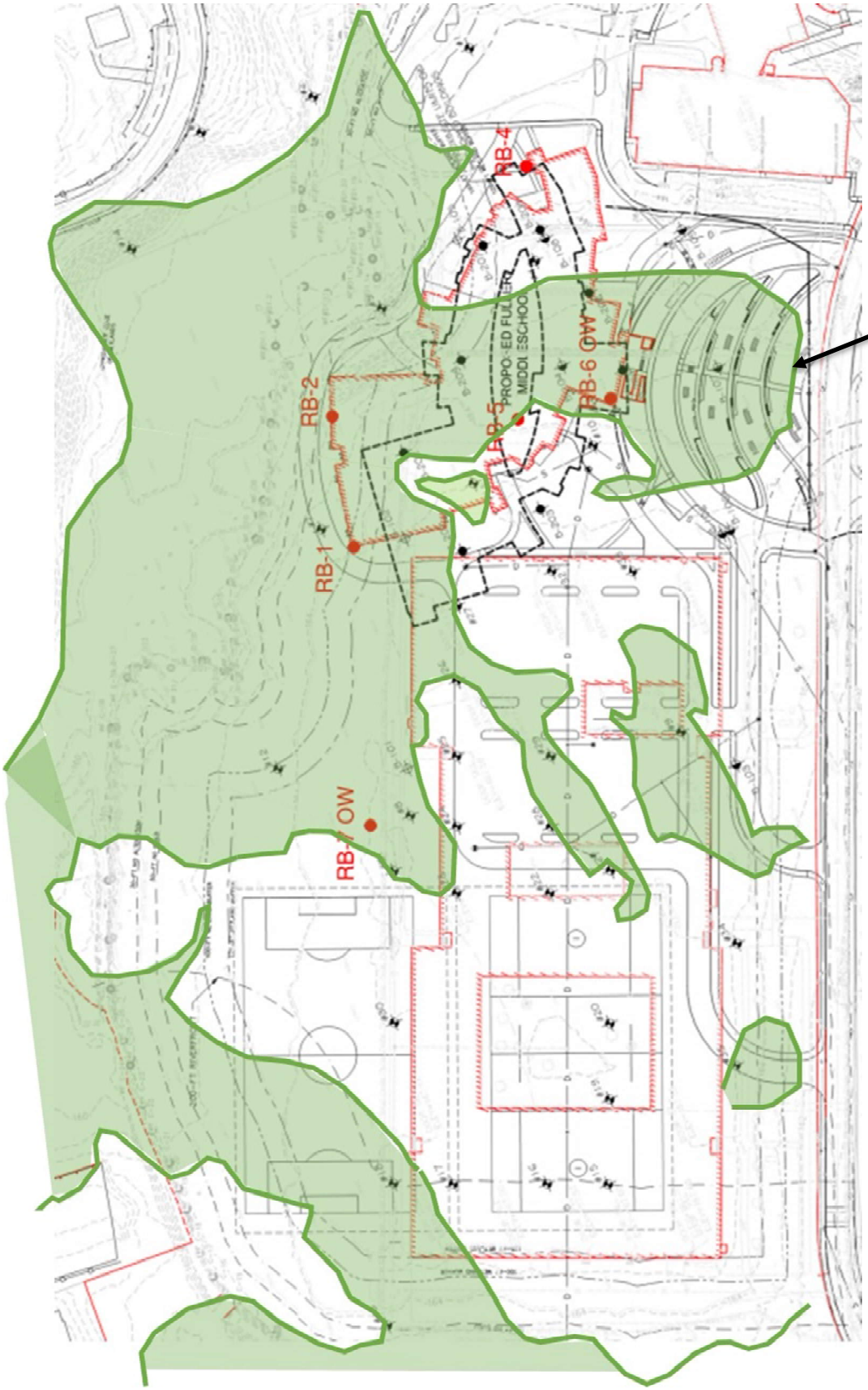


FIGURE 15 – Estimated Extent of Organic Deposits at Original Grade below El. 161.25 (NAVD 88)

(xxx) Elevation of top of glacial lacustrine or glacial outwash in NAVD88

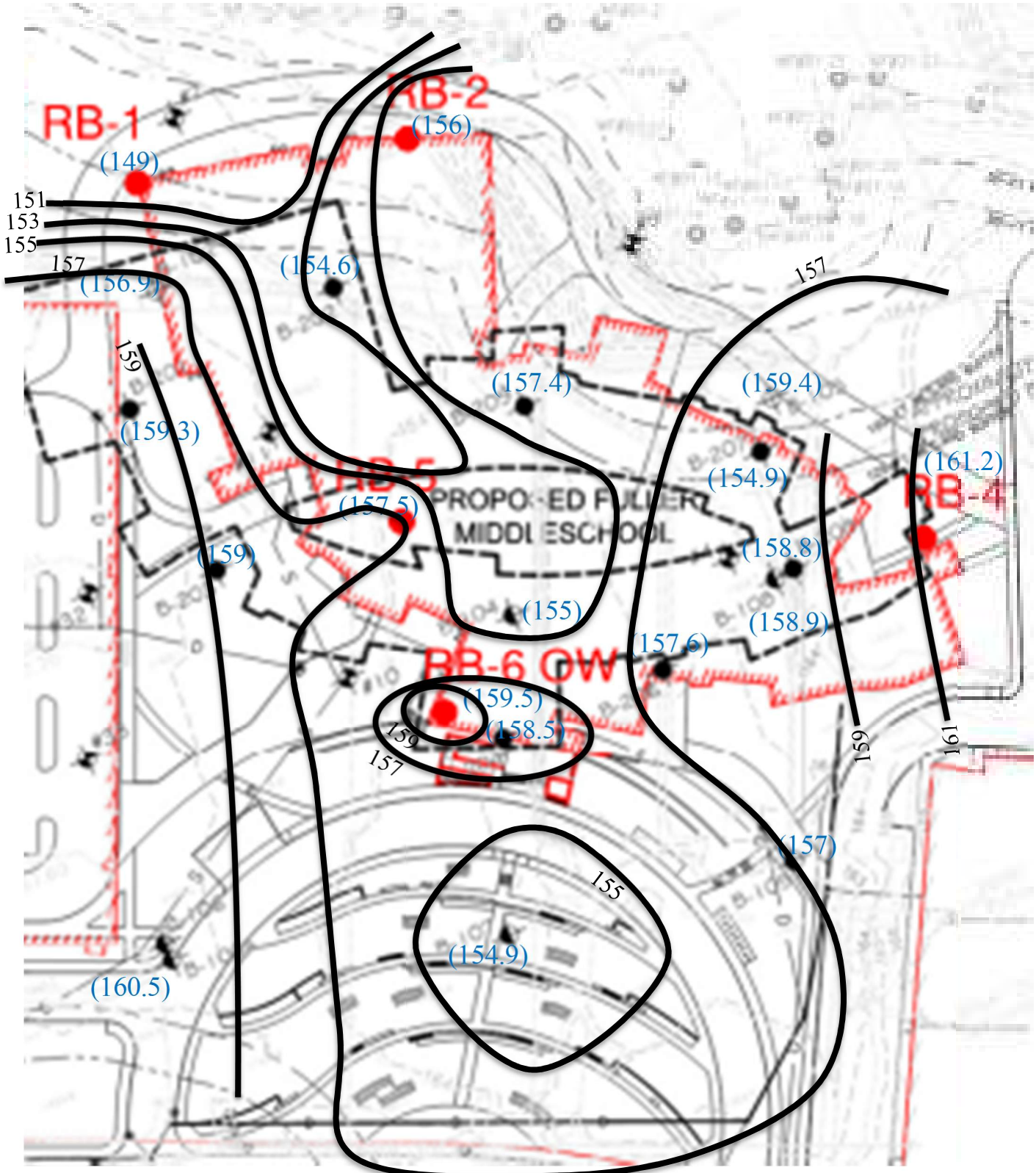
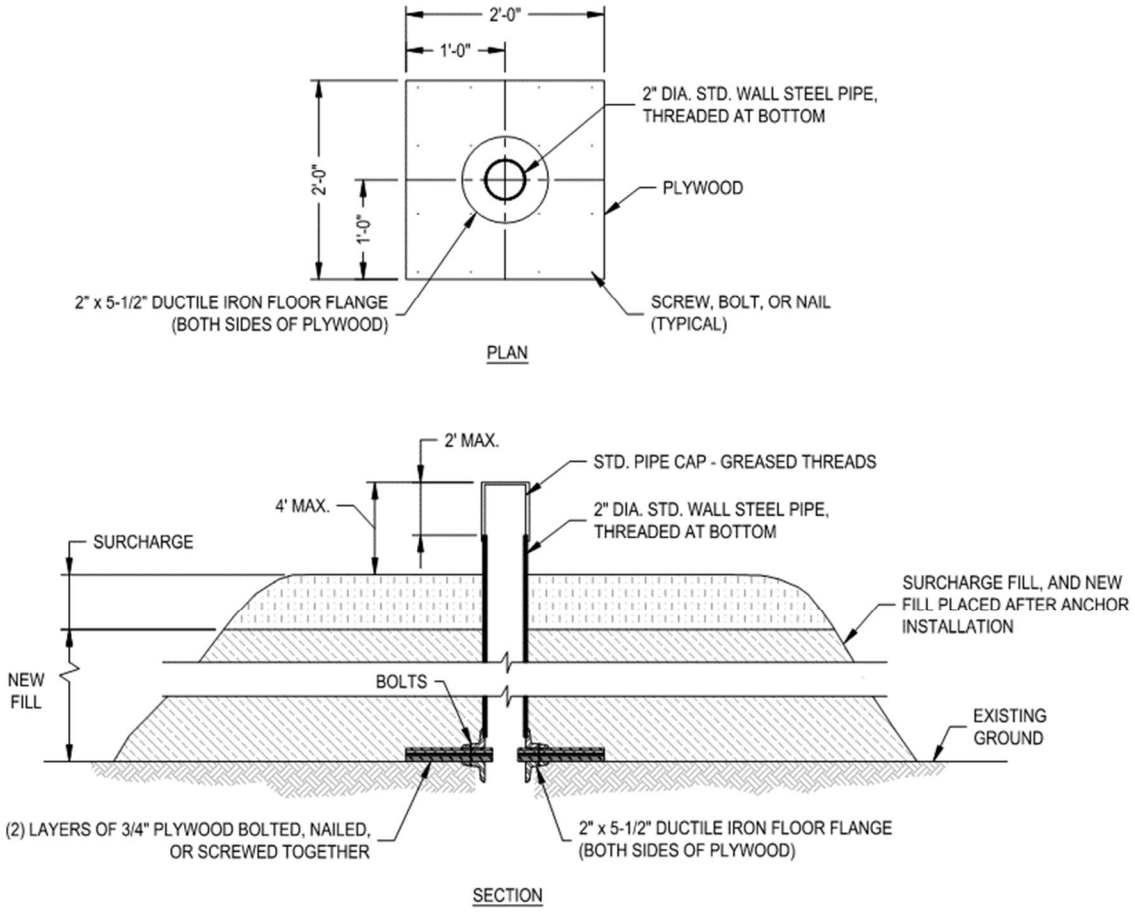


FIGURE 16 – Estimated Elevation at Top of Native Glacial Lacustrine or Glacial Outwash



Note: Weight of surcharge = 0.15(weight of new fill + DL + LL)

FIGURE 17 – Settlement Plate Detail

Appendix A

Previous Borings and Laboratory Tests

FINAL FOUNDATION ENGINEERING REPORT

FULLER MIDDLE SCHOOL

FRAMINGHAM, MASSACHUSETTS

SEPTEMBER 10, 2018

Prepared For:

Jonathan Levi Architects
266 Beacon Street
Boston, MA 02116

2269 Massachusetts Avenue
Cambridge, MA 02140
www.mcphailgeo.com
(617) 868-1420

PROJECT NO. 6473.2.02

September 10, 2018

Jonathan Levi Architects
266 Beacon Street
Boston, MA 02116

Attention: Mr. Philip Gray

Reference: Fuller Middle School; Framingham, Massachusetts
Final Foundation Engineering Report

Ladies and Gentlemen:

This report documents the results of our subsurface exploration program and final foundation design study for the proposed redevelopment of the Fuller Middle School (FMS) located in Framingham, Massachusetts.

This report was prepared in accordance with our proposal dated May 25, 2018, and the subsequent authorization of Jonathan Levi Architects (JLA). These services are subject to the limitations contained in **Appendix A**.

Purpose and Scope

The purpose of the subsurface exploration programs and final foundation design study are to assess the subsurface soil and groundwater conditions at the site as they relate to foundation design and construction and, based on this information, to provide safe and economic foundation design recommendations for the proposed building.

Foundation design includes foundation support of the proposed building and its lowest level slabs, treatment of the lowest level slabs in consideration of groundwater, lateral earth pressures on foundation walls, and seismic design considerations in accordance with the provisions of the Ninth Edition of the Massachusetts State Building Code (Code). Foundation construction considerations are also presented herein.

Available Information

Information provided to McPhail Associates, LLC (McPhail) by JLA included a 40-scale drawing entitled "Existing Condition Plan" dated November 20, 2017 prepared for JLA and a schematic untitled and undated drawing prepared by (JLA) and provided to McPhail via email on July 18, 2018, which indicates an approximate location of the proposed building. Also, a drawing entitled "Approximate and Potential Stockpile Areas" dated November 20, 2017 was provided to us via email on July 21, 2018.

Further, information previously provided to McPhail by JLA included a set of architectural and structural drawings for the existing FMS prepared by Samuel Glaser Associates (SGA) dated May 25, 1956. McPhail was also provided the logs of thirty-four (34) borings

performed during the original school design in 1956. Two plans were included in the set of plans prepared by SGA: a sheet entitled "Existing Topography Map" dated May 25, 1956 and a sheet entitled "Site Improvement Plan – Boring Location Plan" dated May 25, 1956. Elevations as noted on the boring location plan are in feet and referenced to the Framingham Town Base (FTB). A conversion of 3.3 feet from FTB to the NAVD88 (FTB + 3.3 feet = NAVD88) was utilized for the preparation of this report.

Existing and Proposed Conditions

The subject site fronts onto Flagg Drive to the south and is bounded by the Mass Bay Community College to the east, residential properties to the west and a wooded area to the north. Currently, the existing one-story, brick Fuller Middle School building occupies the central portion of the site, which was built in the late 1950's. The site is occupied by a paved surface parking lot, as well as grassed and landscape areas. Existing ground surface across the site varies from about Elevation +160.5 to Elevation +166.

The proposed development involves the demolition of the existing school and the construction of a new school building to the east of the existing school. Based on the information provided to us, the proposed school consists of a 2 to 3-story structure that will occupy a footprint of approximately 55,900 square feet. The proposed building will generally be located within an existing bituminous concrete parking area to the east of the existing school where the existing grade slopes downward from north to south from about Elevation +164 to Elevation +165.2. The lowest level slab of the proposed building will be located at about Elevation +165.5. Except for the area of the proposed auditorium (floor slab at Elevation +163.5), it is understood that the proposed building will not contain any below grade space. In addition, it is understood that a retaining wall and an access ramp will be constructed south of the proposed school. The construction of the ramp will require the placement of upwards to approximately 11 feet of fill.

Elevations cited herein are in feet and are referenced to the North American Vertical Datum of 1988 (NAVD88).

Subsurface Explorations

Two (2) phases of subsurface explorations consisting of a total of eighteen (18) borings were completed at the site for foundation design purposes under contract to McPhail. Approximate plan locations of the borings are as indicated on the enclosed Subsurface Exploration Plan, **Figure 2**.

A preliminary subsurface exploration program consisting of ten (10) borings was conducted at the site on February 21, 22 and April 19, 2018 by Northern Drill Services, Inc. under contract to McPhail. The borings were performed utilizing track or truck-mounted drilling equipment. Borings B-101 through B-109 were terminated at depths ranging from 8 to 31

feet below existing ground surface. Boring logs prepared by McPhail from the initial exploration program are contained in **Appendix B**.

A supplemental subsurface exploration program was conducted as part of our final foundation engineering services on July 26 and 27, 2018 consisting of eight (8) borings, B-201 through B-208. The borings were performed by Carr-Dee Corp. under contract to McPhail. Boring logs from the final exploration phase are contained in **Appendix C**.

The borings were performed utilizing NW casing. Standard 2-inch O.D. split-spoon samples and standard penetration tests (SPT) were obtained continuously or at 5-foot intervals of depth, in general accordance with the standard procedures described in ASTM D1586.

The most recent borings were performed within the existing parking lot south and east of the existing building. Borings B-201 through B-208 were each terminated at a depth of 17 feet below ground surface.

The borings were observed by representatives of McPhail who performed field layout, prepared field logs, obtained and visually classified soil samples, monitored groundwater conditions in the open boreholes, and determined the required boring depths based upon the actual subsurface conditions encountered.

Field locations of the borings were determined by taping from existing site features indicated on the existing conditions plan provided to us. The existing ground surface elevation at each boring location was determined by a level survey performed by our field staff utilizing vertical control information indicated on the plan.

Laboratory Testing

At the completion of the subsurface exploration program, soil samples were returned to our laboratory for more detailed classification, analysis, and testing. The laboratory testing consisted of sieve analyses to determine the grain size distribution and confirm the visual classifications of the fill material, lacustrine deposit and the glacial outwash deposit. Laboratory test procedures were in general accordance with applicable ASTM Standards. Results of the gradation testing appear on **Figure 4**, **Figure 5**, **Figure 6 and Figure 7** following the text of this report.

Previous Subsurface Information

As part of the original construction, thirty-four (34) boring logs were performed within or near the footprint of the existing school building, in the area of the existing parking lot and in the field northeast of the existing building. The boring logs indicate that directly below the former ground surface the explorations encountered either soft peat/organic soil or loamy sand deposits. The peat/organic soil was encountered within thirteen (13) of the previous borings and it was observed to extend to depths from about 1.7 to 6.6 feet below

ground surface. The loamy sand deposit was observed to extend to depths from about 0.5 to 4 feet below ground surface. Below the soft peat/organic soil and loamy sand deposits, the borings encountered a loose to very dense sand and gravel deposit with occasional boulders. Groundwater was encountered in the borings at a depth of 0 to 8 feet below ground surface. The boring logs and location plan are attached as **Appendix D**. Approximate plan locations of the borings are also indicated on the enclosed Subsurface Exploration Plan, **Figure 2**.

Recent Subsurface Conditions

A detailed description of the subsurface conditions encountered within the recent borings are documented on the boring logs contained in **Appendix B** and **Appendix C**. Based on these explorations, the following is a description of the generalized subsurface conditions encountered across the site from ground surface downward.

Fill material of about 2.2- to 7.5-foot in thickness was encountered in the borings at ground surface or below the surface treatments, which consisted of a 3-inch thickness of asphalt or a 6-inch thickness of topsoil. The fill material was observed to generally range from a very loose to dense gray to brown sand and gravel with trace silt to a sand with some gravel and silt. Grain size distributions of selected samples of the fill material are shown on **Figures 4 and 5**.

Due to obstructions within the fill deposit, boring B-106 was terminated at a depth of 4.5 feet below the existing ground surface. Therefore, boring B-106A was drilled adjacent to the abandoned boring B-106 and standard sampling commenced at a depth of 4 feet below the existing ground surface.

Underlying the fill deposit, nine (9) borings B-101, B-102, B-103, B-104, B-107, B-202, B-203, B-205, and B-206 encountered an alluvial/organic silt deposit and/or peat, which ranged in consistency from a very loose to compact, dark brown to fine to medium sand with trace to some organic silt and peat fibers to a peaty sand trace gravel. Generally, the alluvial/organic silt deposit and/or peat, where encountered, ranged from about 2 to 5.5 feet in thickness.

Below the fill and/or alluvial/organic silt deposits, a natural lacustrine deposit was encountered within borings B-102 and B-107 at a depth of 8 feet below ground surface corresponding to Elevation +156.9 and Elevation +154.9, respectively. The lacustrine deposit was observed to vary from a compact, light gray, silt with trace sand to silty sand with trace gravel and clay. A typical grain size distribution of the lacustrine deposit is presented on **Figure 6**.

Below the fill, alluvial/organic silt, peat and lacustrine deposits, a natural glacial outwash deposit was encountered at depths ranging from 4 to 9 feet below ground surface corresponding to Elevation +159.4 to Elevation +155.6. The glacial outwash was observed to vary from a compact to very dense, brown to gray, sand with trace silt to a sand and

gravel with some silt. Grain size distributions of samples of the glacial outwash deposit are presented on **Figure 7**. A contour plan indicating the elevation of the top of natural soil deposits (glacial outwash, and lacustrine deposits) across the site is presented on the enclosed **Figure 3**.

At the time of the 2018 borings, groundwater levels where measured within the completed boreholes performed within the project site. The groundwater levels were observed to vary from about 2.5 to approximately 6.5 feet below the existing ground surface corresponding to about Elevation +159.6 to Elevation +157.8. It is anticipated that future groundwater levels across the site may vary from those reported herein due to factors such as normal seasonal changes, periods of heavy precipitation, and alterations of existing drainage patterns or may become perched on the relatively impervious organic deposit.

Final Foundation Design Recommendations

Based upon the results of subsurface exploration programs described above, the ground surface across the project site is underlain by fill and alluvial/organic deposits which extend to depths ranging from approximately 4 to 9 feet below the existing ground surface and are underlain by successive natural glacial lacustrine and glacial outwash deposits. The existing fill and alluvial/organic deposits as they exist are not considered to be suitable for direct foundation support. Therefore, foundation support for the proposed building is recommended to be provided by spread footing foundations in conjunction with slab-on-grade construction supported on the existing fill soil that has been improved with a ground improvement technique. Ground improvement methods such as Aggregate Piers (APs) deriving their support within the lacustrine or glacial outwash deposits would allow for the utilization of conventional spread footing construction without requiring over excavation and replacement, temporary earth support, extensive construction dewatering and significant soil disposal from the site.

Ground Improvement

In general, an AP cavity is created by either augering open-hole or driving an approximately 12 to 16-inch closed-end diameter casing to the surface of the lacustrine or glacial outwash deposit. Aggregate is then introduced either through a top-feed or bottom-feed system and the subsequent dynamic compaction of aggregate layers introduced into the cavity. The use of a closed-ended temporary casing with bottom-feed capability eliminates spoils as all penetrated soils are displaced laterally. After creating the AP cavity to the design depth, aggregate is placed inside the void. The aggregate is compacted into layers of about 1-foot in thickness and the process is repeated to the top of the cavity, forming the AP. The compaction densifies the aggregate and increases the lateral stress in the soil matrix beneath the proposed buildings.

Additionally, the aggregate may be grouted to increase the stiffness of the AP in very loose granular deposits or in organic materials. Potential for larger settlements is reduced by

improving the unsuitable soils to a stiffer composite soil matrix with the installation of the AP.

Since ground improvement techniques are provided by a design-build consultant, detailed design calculations should be submitted to the Architect for review prior to the beginning of construction. A detailed explanation of the design parameters for capacity and settlement calculations should be included in the design submittal. The design submittal should also include a testing program to demonstrate the design capacity of the aggregate pier elements is being achieved. All calculations and drawings should be prepared and sealed by a Professional Engineer licensed in the Commonwealth of Massachusetts and retained by the Contractor who is to perform the work.

The following general criteria should be utilized in the design of aggregate piers:

1. Aggregate piers should extend at least to the surface of the lacustrine or glacial outwash deposit;
2. The maximum allowable bearing pressure supported on a reinforced ground surface which extends to the lacustrine or glacial outwash deposit should be equal to or less than 2 tons per square-foot (TSF);
3. Estimated long-term settlement for footings should be less than 1-inch;
4. Estimated long-term differential settlement of adjacent footings should be less than 1/2-inch; and
5. A modulus load test should be performed on at least one aggregate pier to 150 percent of the maximum design stress.

Where AP elements are installed through organic materials, it is typical that the AP be grouted to increase the stiffness of the foundation unit. Therefore, it is anticipated that a grouted AP would be required for this project due to the presence of organic deposit.

It is understood that the proposed finished grades will roughly coincide with the existing grades as part of the proposed construction. In the event that existing grades are raised to establish the proposed finished site grades, long-term settlement of the existing organic deposit is anticipated. Therefore, it is recommended that site grades either remain at the existing levels or be raised as little as possible to minimize the amount of future settlement of the organic deposit.

Lowest Level Slab

The proposed floor slab at Elevation +165.5 should be designed as a conventional slab-on-grade underlain by a polyethylene vapor barrier spread over a minimum 9-inch thickness of off-site gravel fill containing less than 8 percent by weight passing the No. 200 sieve. It is recommended that slab-on-grade to be constructed on the AP improved soils.

Based on information provided to us, it is understood that the proposed lowest level slab at Elevation +165.5 of the proposed building will be located at or slightly above the proposed exterior finished grades, therefore, perimeter and underslab drainage are not considered

necessary. It is recommended that the proposed finished grades be sloped away from the proposed buildings to promote drainage away from the structure.

Retaining Wall(s)

As indicated above, a retaining wall will be constructed south of the proposed school building to support soil for a new access ramp. The proposed retaining wall footings and the access ramp are recommended to be constructed on the AP improved soils.

In addition, it is recommended that drainage be provided along the retained soil side of the proposed retaining wall. The drainage should consist of a foundation drain pipe embedded within a minimum 6-inch thickness of ¾-inch crushed stone which is surrounded by filter fabric and backfilled with a free draining gravel to within 18 inches of final grade. Alternatively, a prefabricated drainage product such as Miradrain 6000 should be installed directly along the exterior of the wall that that should be tied directly into the crushed stone envelope surrounding the foundation drain. The upper 18 inches of backfill should be relatively impervious ordinary fill with the finished grade pitched away from the wall to minimize surface water infiltration.

If the proposed final site grades require filling to establish the required access ramp subgrade elevation in consideration with the AP supported access ramp, settlement of the site areas should be monitored by means of settlement platforms installed at several locations across the proposed ramp area. In addition, it is recommended that the APs utilized for support of the ramp and settlement platforms be installed prior to the backfilling to the proposed access ramp grade elevations. Following installation of the APs for support of the ramp, the settlement platforms should be monitored daily during construction of the working pad, and bi-weekly thereafter. The settlement platform monitoring data would be used to determine when the ramp construction can begin which typically occurs when settlement has either stopped or when the rate of settlement is very small. Typically, the settlement monitoring program could take between about 1 to 3 months, depending upon such factors as the thickness of the compressible soils, the distance to free draining soils, the consolidation parameters of the compressible soils and the height of the soil surcharge, etc.

General Foundation Recommendations

Recommended minimum footing widths for continuous and isolated spread footings are 30 and 36 inches, respectively. Perimeter foundations and interior foundations located adjacent to unheated areas should be provided with a minimum 4-foot thickness of soil cover as frost protection. Interior footings below heated areas should be located such that the top of the foundation concrete is at least 6 inches below the underside of the lowest level slab. All foundations should be located such that they bear below a theoretical line drawn upward and outward at 2 to 1 (horizontal to vertical) from the bottom exterior edge of all existing adjacent footings, structures and utilities. All foundations should be designed in accordance with the provisions of the Ninth Edition of the Code.

All localized depressions in the lowest level slab (such as elevator pits, etc.) should be provided with properly tied continuous waterstops in all construction joints and cementitious waterproofing to protect against groundwater intrusion. Furthermore, the perimeter below-grade foundation walls should receive a trowelled-on bitumastic damproofing.

Below-grade foundation walls receiving lateral support at the top and bottom (i.e. restrained walls) should be designed for a lateral earth pressure corresponding to an equivalent fluid density of 60 pounds per cubic-foot. Similarly, drained cantilevered retaining walls, (i.e. receiving no lateral support at the top) should be designed for a lateral earth pressure corresponding to an equivalent fluid density of 40 pounds per cubic-foot. To these values must be added the pressures attributable to earthquake forces per Section 1610.2 of the Code.

Lateral forces can be considered to be transmitted from the structure to the soil by passive pressure against the foundation walls utilizing an equivalent fluid density of 120 pounds per cubic-foot providing that the walls are designed to resist these pressures. Lateral force can also be considered to be transmitted from the structure to the soil by friction on the base of footings using a coefficient of 0.35, to which a safety factor of 1.5 should be applied.

Seismic Design Considerations

For the purposes of determining parameters for structural seismic design, this site is considered to be a Site Class D as defined in Chapter 20 of American Society of Civil Engineers (ASCE) Standard 7-10 "Minimum Design Loads for Buildings and Other Structures". Further, the bearing stratum on the proposed site is not considered to be subject to liquefaction during an earthquake based on the criterion of Section 1806.4 of the Code.

Foundation Construction Considerations

The primary foundation construction considerations that are anticipated to have an impact on the design of the structure include removal of potential obstructions to AP installation, impact AP installation on surrounding structures, the preparation of the foundation bearing surfaces, construction dewatering, and off-site disposal of excess excavated material.

Removal of obstructions to AP installation should be performed on an as-needed basis. Excavations to remove the obstructions should be backfilled with ordinary fill after all oversized material has been removed. The fill should be replaced in maximum 2-foot lifts and tamped with the backhoe bucket to facilitate future AP installation. The below-grade obstructions should be removed in their entirety wherever they interfere with the new construction, however, they may remain in-place under the proposed building provided that they are in excess of 18 inches below the lowest level slab and do not interfere with the foundation or utility installation.

The installation of the aggregate piers will likely result in some ground vibrations and noise which may be disruptive to the Mass Bay Community College building occupants and could potentially cause cosmetic damage to existing structures. Therefore, it is recommended that ground vibration monitoring be performed with the use of seismographs during the installation of the aggregate piers.

To minimize disturbance of the AP-improved soil bearing surfaces, it is recommended that the final excavation to expose the surface of the bearing stratum at footing locations be performed utilizing an excavator that has a smooth-edged "toothless" bucket. Further, it is recommended that bearing surfaces be immediately covered with a minimum of 3-inch thickness of 3/4-inch crushed stone to minimize disturbance of the subgrade during subsequent forming operations.

It is anticipated that portions the excavated fill material may be re-used on-site as ordinary fill provided it is primarily granular excavated during non-freezing conditions in a relatively dry condition, is maintained in a dry condition, and can be properly compacted. Protection of all materials from increases in moisture content is considered to be the responsibility of the Contractor. Prior to reusing the fill material on-site as ordinary fill, it will be necessary to cull out all material in excess of 4 inches in largest dimension.

It is recommended that the placement and compaction of the on-site materials be completed during relatively dry and non-freezing conditions. Stockpiled excavated material designated for reuse on-site should be covered at all times with 6-mil polyethylene for protection from precipitation and also as a dust mitigation measure. If, due to any of the above conditions, the excavated material becomes unsuitable for reuse, it should be removed from the site and an off-site gravel fill used.

It is anticipated that dewatering, if required, by means of strategically located sumps and trenches should suffice during foundation construction operations. In addition, trapped surface water may accumulate within localized depressions in the ground surface across the site after periods of heavy precipitation and will most likely necessitate localized sumping. It is recommended that all pumped groundwater be discharged on-site. If pumped groundwater cannot be discharged on-site, it would be necessary to dispose of pumped groundwater into a nearby storm drain or combined sewer which may require the need for a temporary groundwater discharge permit.

Should excess excavated soil generated from the proposed construction require off-site disposal, current Department of Environmental Protection (DEP) policies and regulations for off-site reuse of excess excavated soil require environmental characterization of the excavated soil prior to its off-site reuse.

Final Comments

Under the terms of our contract, McPhail will provide design assistance to the design team during the final design phase of this project. The purpose of this involvement would be to

review the structural foundation drawings and foundation notes for conformance with the recommendations presented herein and to prepare the earthwork and specialty foundation specification sections for inclusion into the Contract Documents for construction.

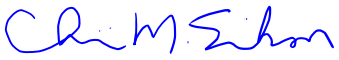
It is recommended that McPhail Associates, LLC be retained during the construction period to review ground-improvement and earthwork-related submittals; observe installation of aggregate piers; observe pre-excavation, observe final preparation of the foundation bearing surfaces; and to monitor placement and compaction of fill materials in accordance with the provisions of the Code and the provisions of the Contract Documents. Our involvement during the construction phase of the work should minimize costly delays due to unanticipated field problems since our field engineer would be under the direct supervision of our project manager who was responsible for the subsurface exploration program and foundation and site design recommendations documented herein.

We trust that the above is sufficient for your present requirements. Should you have any questions concerning the recommendations presented herein, please do not hesitate to call us.

Very truly yours,

McPHAIL ASSOCIATES, LLC

Fatima Babic-Konjic, P.E.



Chris M. Erikson, P.E.

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FBK/cme

FIGURE 1

McPHAIL ASSOCIATES, LLC
Geotechnical and
Geoenvironmental Engineers
2269 Massachusetts Avenue
Cambridge, MA 02140
617/868-1420
617/868-1423 (Fax)
www.mcphailgeo.com

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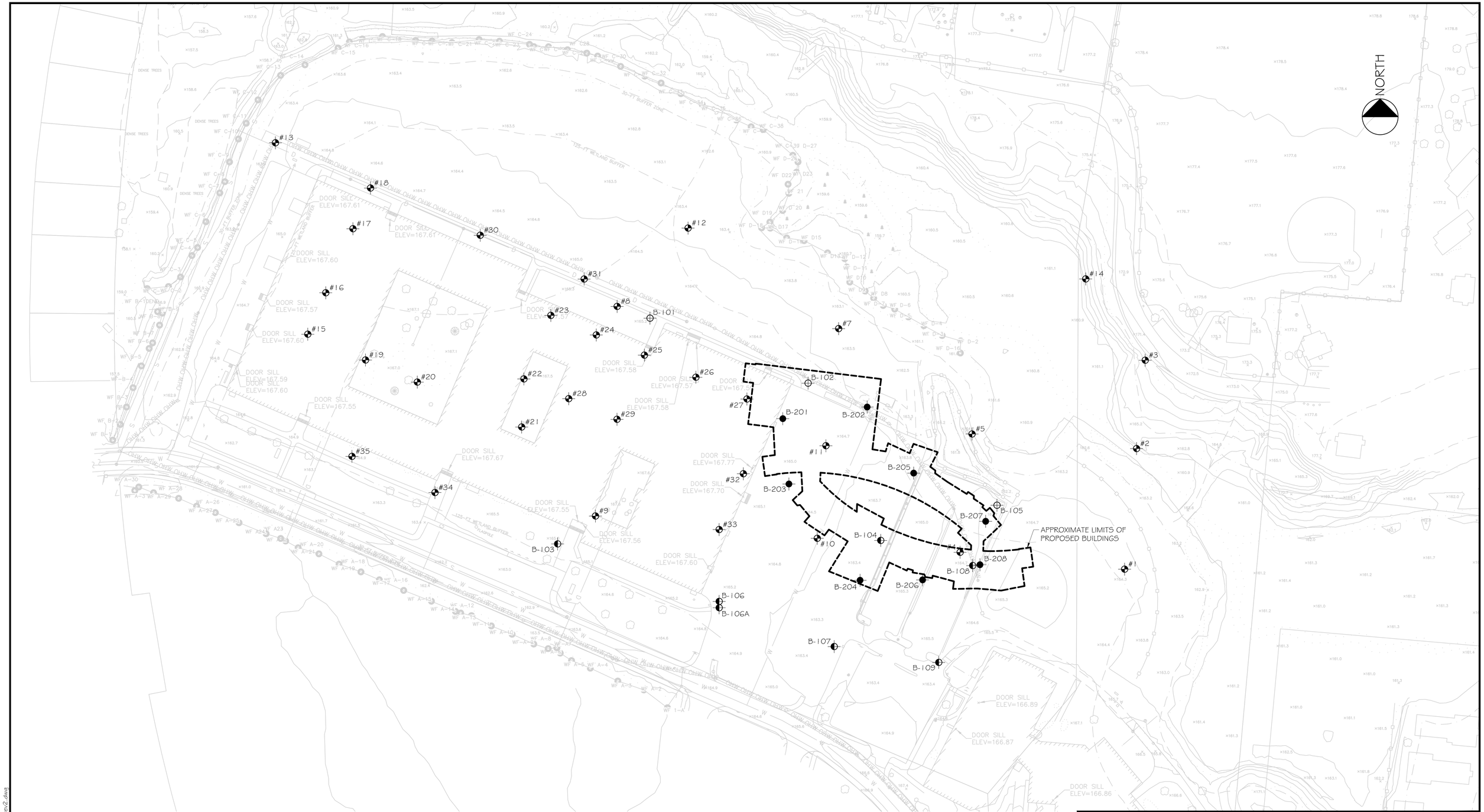
SCALE 1:25,000

PROJECT LOCATION PLAN

FULLER MIDDLE SCHOOL

FRAMINGHAM MASSACHUSETTS



LEGEND

- ⊕ — APPROXIMATE LOCATION OF BORING PERFORMED BY CARR-DEE CORP. ON JULY 26 & 27, 2018 FOR McPHAIL ASSOCIATES, LLC
- ⊕ — APPROXIMATE LOCATION OF BORING PERFORMED BY NORTHERN DRILL SERVICES, INC. ON APRIL 19, 2018 FOR McPHAIL ASSOCIATES, LLC
- ⊕ — APPROXIMATE LOCATION OF BORING PERFORMED BY NORTHERN DRILL SERVICES, INC. ON FEBRUARY 21 & 22, 2018 FOR McPHAIL ASSOCIATES, LLC
- ⊕ — APPROXIMATE LOCATION OF PREVIOUS BORING CONDUCTED IN 1955 BY OTHERS

REFERENCE: THIS PLAN WAS PREPARED FROM A 40-SCALE DRAWING ENTITLED "EXISTING CONDITIONS PLAN" DATED NOVEMBER 20, 2017 PROVIDED BY JONATHAN LEVI ARCHITECTS

GRAPHIC SCALE

60 0 60 120 240

McPHAIL ASSOCIATES, LLC
Geotechnical and Geoenvironmental Engineers
2269 Massachusetts Avenue
Cambridge, MA 02140
617/868-1420
617/868-1423 (Fax)
www.mcphailgeo.com

FULLER MIDDLE SCHOOL

FRAMINGHAM MASSACHUSETTS

SUBSURFACE EXPLORATION PLAN

FOR

JONATHAN LEVI ARCHITECTS

BY

McPHAIL ASSOCIATES, LLC

Date: AUGUST 2018	Dwn: M.B.S.	Chkd: F.B.K.	Scale: 1" = 60'
Project No: 6473			FIGURE 2

FILE NAME: N:\Cad\2018\6473\FIER\6473_F02rev2.dwg

LEGEND

- — APPROXIMATE LOCATION OF BORING PERFORMED BY CARR-DEE CORP. ON JULY 26 & 27, 2018 FOR McPHAIL ASSOCIATES, LLC
- — APPROXIMATE LOCATION OF PREVIOUS BORING CONDUCTED IN 1955 BY OTHERS
- — APPROXIMATE LOCATION OF BORING PERFORMED BY NORTHERN DRILL SERVICES, INC. ON APRIL 19, 2018 FOR McPHAIL ASSOCIATES, LLC
- — APPROXIMATE LOCATION OF BORING PERFORMED BY NORTHERN DRILL SERVICES, INC. ON FEBRUARY 21 & 22, 2018 FOR McPHAIL ASSOCIATES, LLC
- +160 — CONTOUR ELEVATION OF TOP OF NATURAL SOIL (REFER TO NOTES 1 AND 2)
- (+153.8) — ELEVATION OF TOP OF NATURAL SOIL ENCOUNTERED AT EXPLORATION LOCATION

NOTES:
1. CONTOURS PRESENTED ARE BASED ON LINEAR INTERPOLATION BETWEEN EXPLORATIONS. THE ACTUAL FIELD CONDITIONS MAY VARY FROM THE INDICATED CONTOURS.
2. NATURAL SOIL FOR THE PURPOSE OF THIS FIGURE INCLUDE: GLACIAL OUTWASH AND LACUSTRINE DEPOSIT.

REFERENCE: THIS PLAN WAS PREPARED FROM A 40-SCALE DRAWING ENTITLED "EXISTING CONDITIONS PLAN" DATED NOVEMBER 20, 2017 PROVIDED BY JONATHAN LEVI ARCHITECTS

GRAPHIC SCALE

60 0 60 120 240

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Cambridge, MA 02140
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www.mcphailgeo.com

FULLER MIDDLE SCHOOL

FRAMINGHAM MASSACHUSETTS

TOP OF NATURAL SOIL CONTOUR PLAN

FOR

JONATHAN LEVI ARCHITECTS

BY

McPHAIL ASSOCIATES, LLC

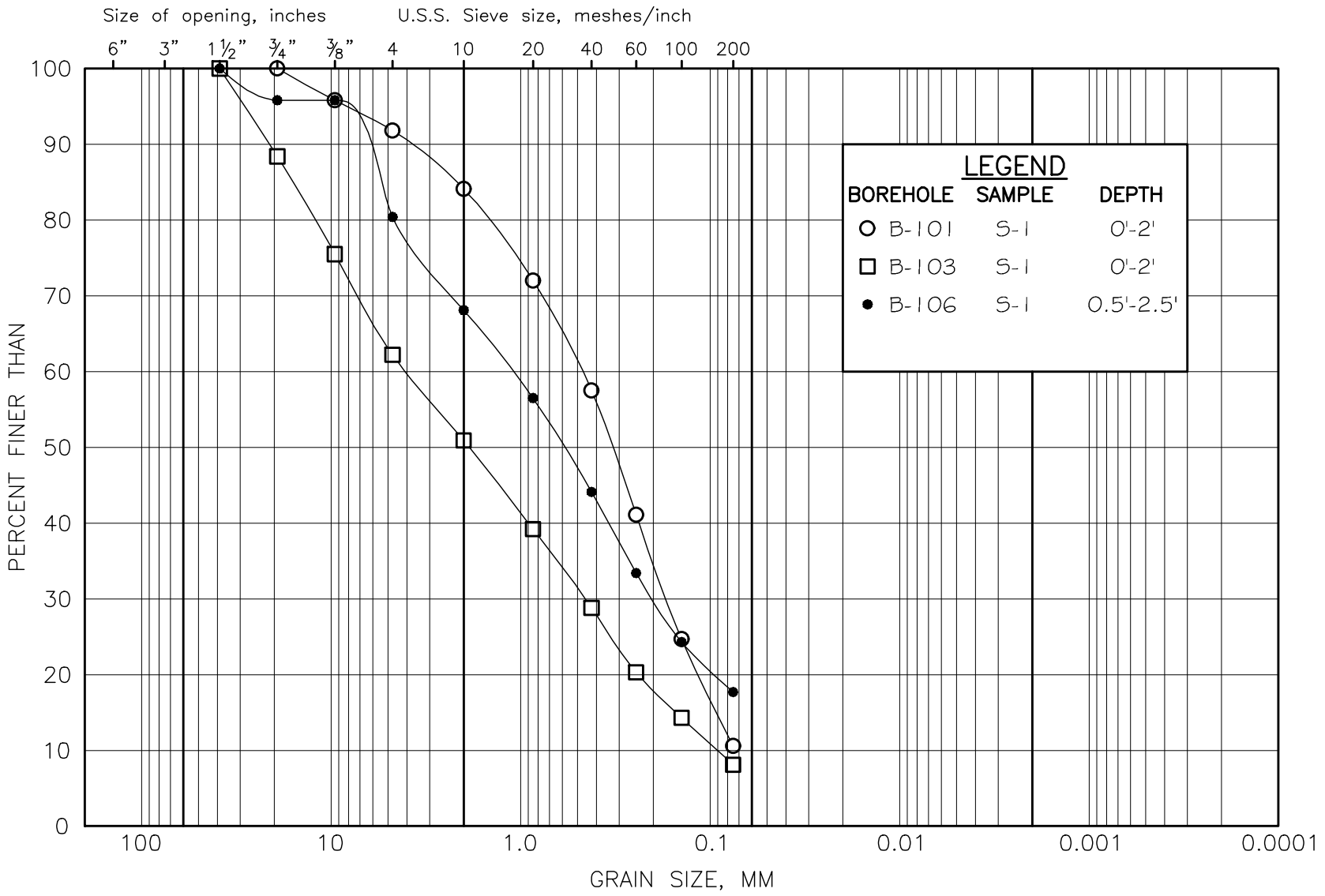
Date: SEPTEMBER 2018	Dwn: I.J.M.	Chkd: F.B.K.	Scale: 1" = 60'
Project No: 6473			FIGURE 3

FILE NAME: N:\Acad\JOBS\6473\FFER\6473-F03_Contour.dwg

FILE NAME: N:\Acad\JOBS\6473\FFER\6473-F04_Sieve.dwg

PROJECT No. 6473

M.I.T. GRAIN SIZE SCALE



COBBLE SIZE	GRAVEL SIZE			SAND SIZE			FINE GRAINED	
	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE

McPHAIL ASSOCIATES, LLC

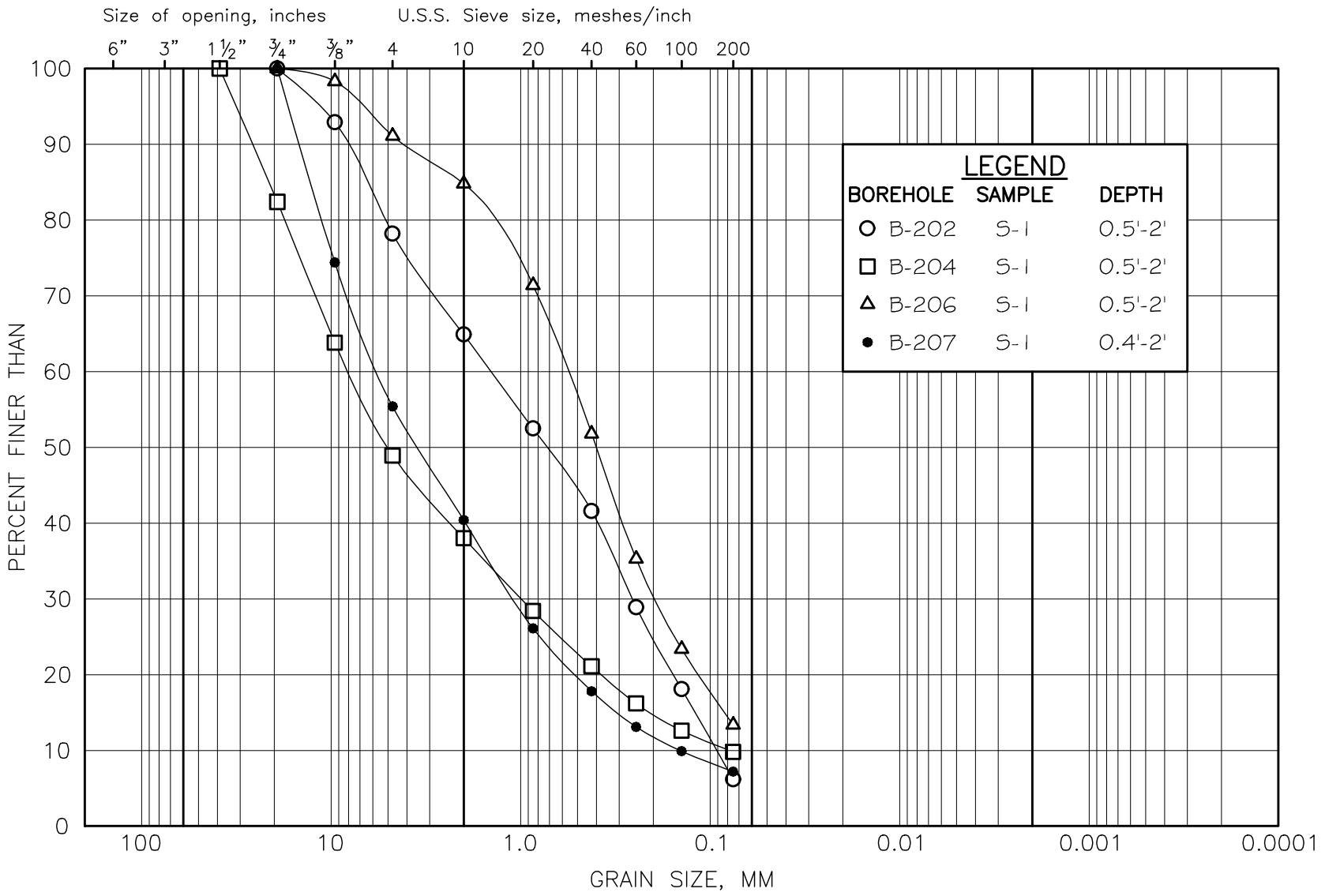
GRAIN SIZE DISTRIBUTION
FILL

FIGURE 4

FILE NAME: N:\Acad\JOBS\6473\FFER\6473-F05_Sieve.dwg

PROJECT No. 6473

M.I.T. GRAIN SIZE SCALE



COBBLE SIZE	GRAVEL SIZE			SAND SIZE			FINE GRAINED	
	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE

McPHAIL ASSOCIATES, LLC

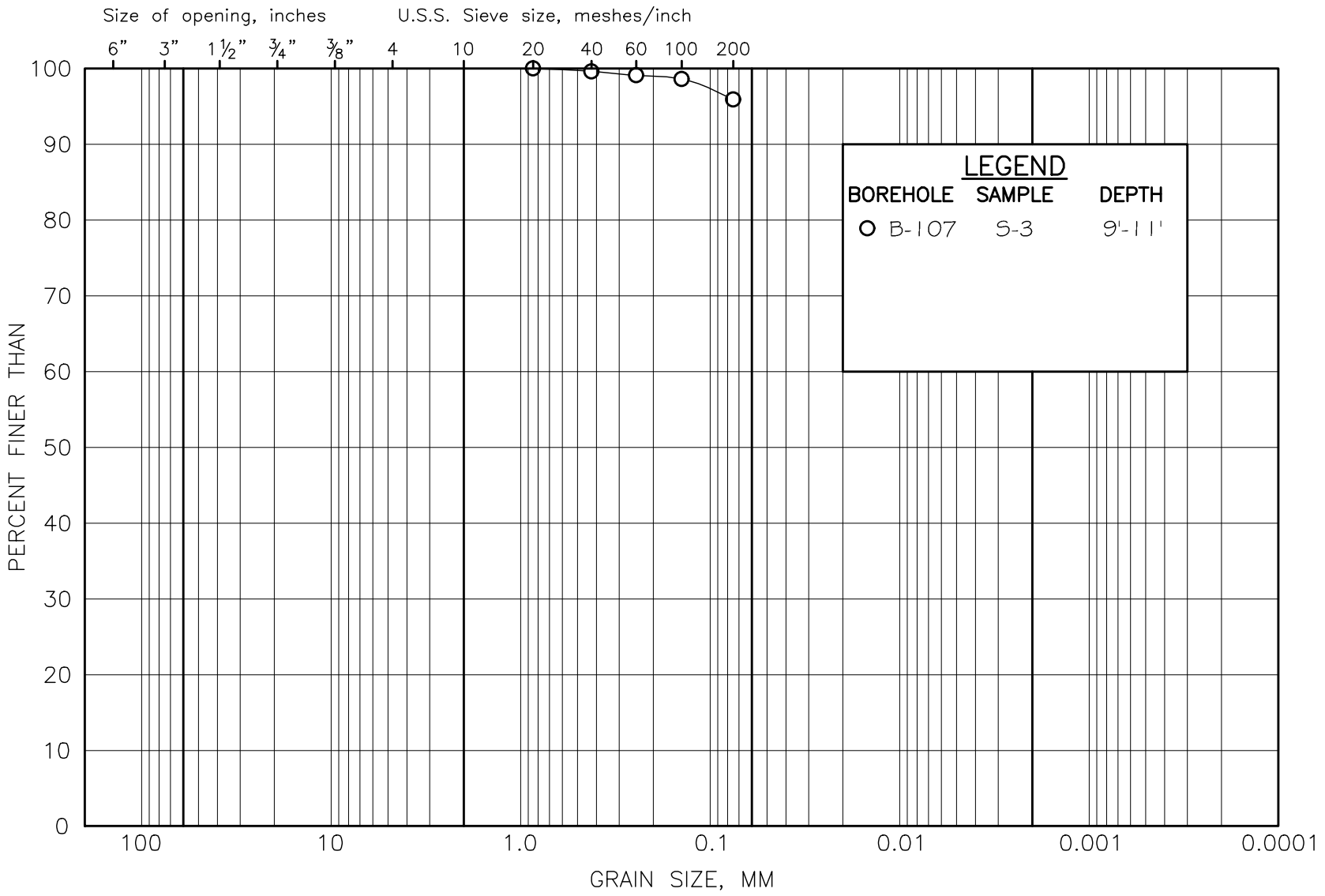
GRAIN SIZE DISTRIBUTION
FILL

FIGURE 5

FILE NAME: N:\Acad\JOBS\6473\FFER\6473-F06_Sieve.dwg

PROJECT No. 6473

M.I.T. GRAIN SIZE SCALE



COBBLE SIZE	GRAVEL SIZE			SAND SIZE			FINE GRAINED	
	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE

McPHAIL ASSOCIATES, LLC

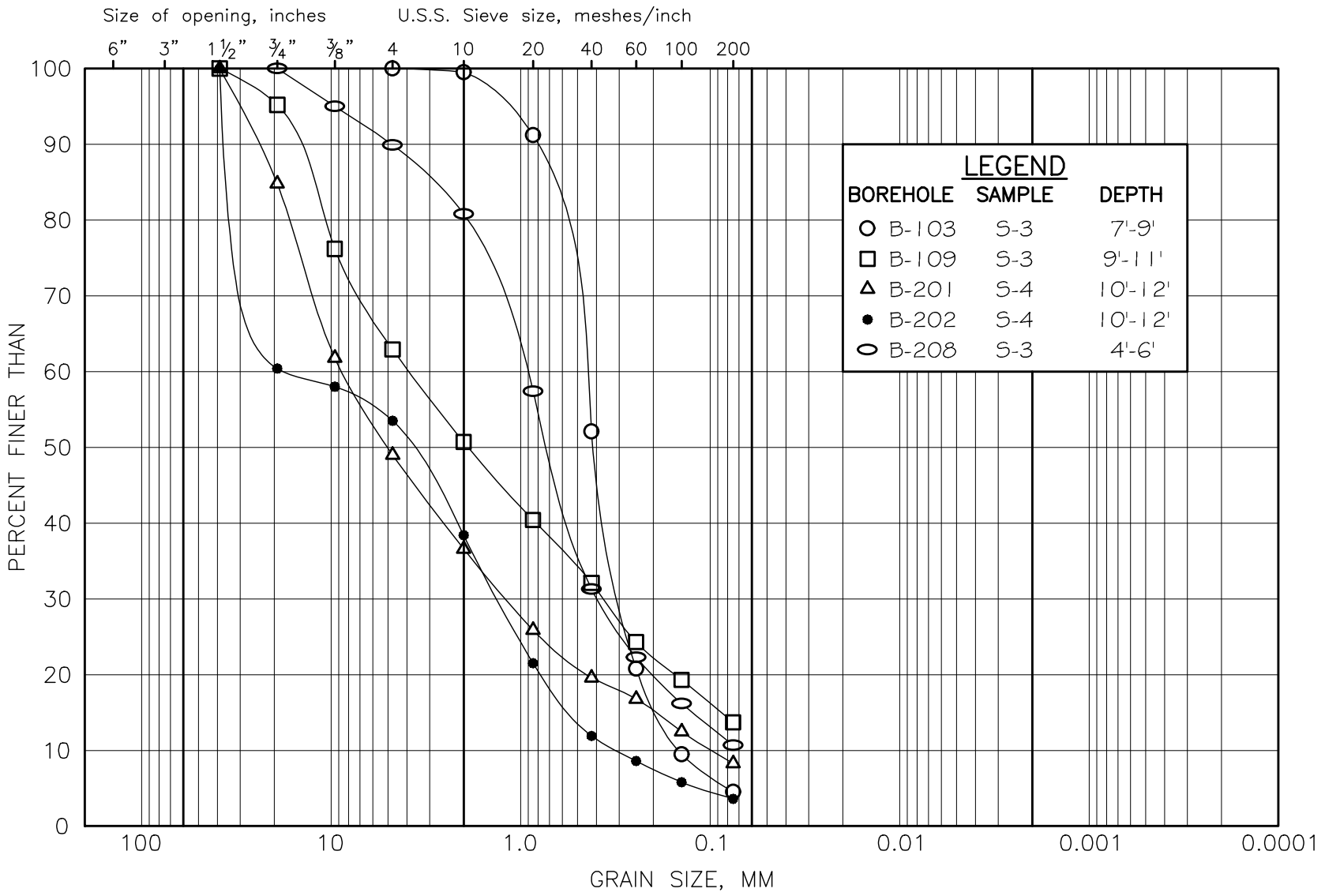
GRAIN SIZE DISTRIBUTION
LACUSTRINE

FIGURE 6

FILE NAME: N:\Acad\JOBS\6473\FFER\6473-F07_Sieve.dwg

PROJECT No. 6473

M.I.T. GRAIN SIZE SCALE



COBBLE SIZE	GRAVEL SIZE			SAND SIZE			FINE GRAINED	
	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE

McPHAIL ASSOCIATES, LLC

GRAIN SIZE DISTRIBUTION
GLACIAL OUTWASH

FIGURE 7

APPENDIX A:

LIMITATIONS

LIMITATIONS

This report has been prepared on behalf of and for the exclusive use of Jonathan Levi Architects for specific application to the proposed new construction to be located on the campus of the Fuller Middle School in Framingham, Massachusetts in accordance with generally accepted soil and geotechnical engineering practices. No other warranty, expressed or implied, is made.

In the event that any changes in nature or design of the proposed construction are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by McPhail Associates, LLC.

The analyses and recommendations presented in this report are based upon the data obtained from the subsurface explorations performed at the approximate locations indicated on the enclosed plan. If variations in the nature and extent of subsurface conditions between the widely spaced explorations become evident during the course of construction, it will be necessary for a re-evaluation of the recommendations of this report to be made after performing on-site observations during the construction period and noting the characteristics of any variations.

APPENDIX B:

BORING LOGS B-101 THROUGH B-109
PREPARED BY MCPHAIL

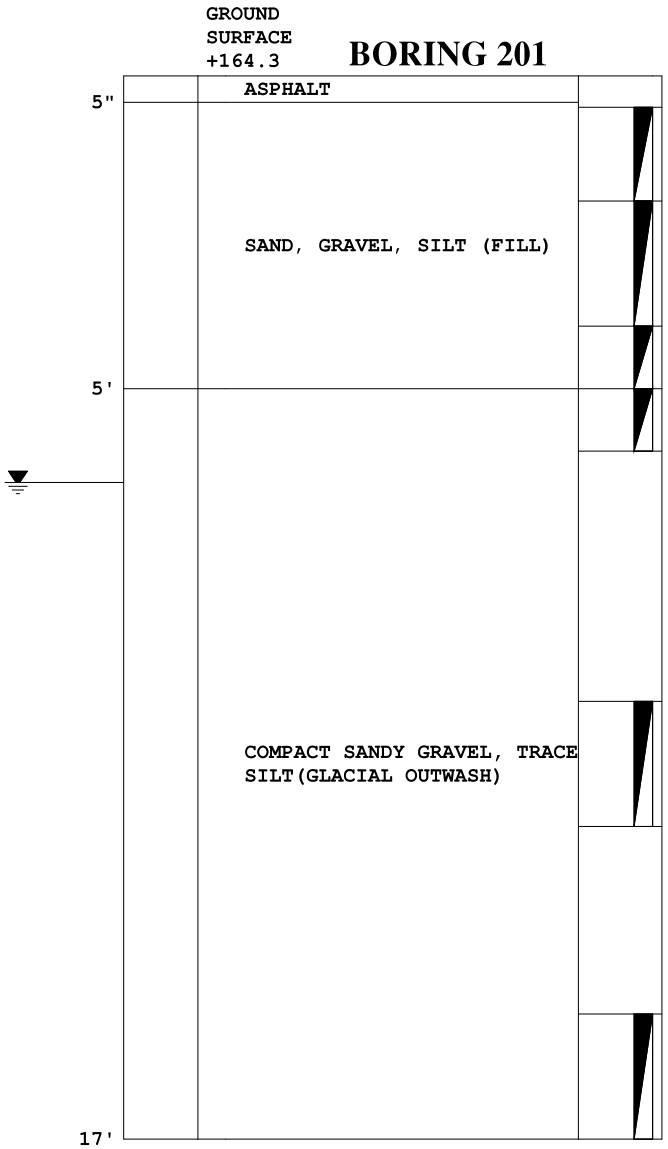
CARR-DEE CORP.

37 LINDEN STREET MEDFORD, MA 02155-0001 Telephone (781) 391-4500

To: MCPHAIL ASSOC., LLC, 2269 MASS. AVE., CAMBRIDGE, MA Date: 7-30-2018 Job No.: 2018-146

Location: FULLER MIDDLE SCHOOL, 31 FLAGG DRIVE, FRAMINGHAM, MA Scale: 1 in.= 3 ft.

BORING 201



WATER LEVEL 6'6"
SIZE OF CASING: NW, LENGTH: 15'0"
DRILLER: G. SMITH, INSPECTOR: J. CRONIN
DATE STARTED & COMPLETED: 7-26-2018

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

CARR-DEE CORP.

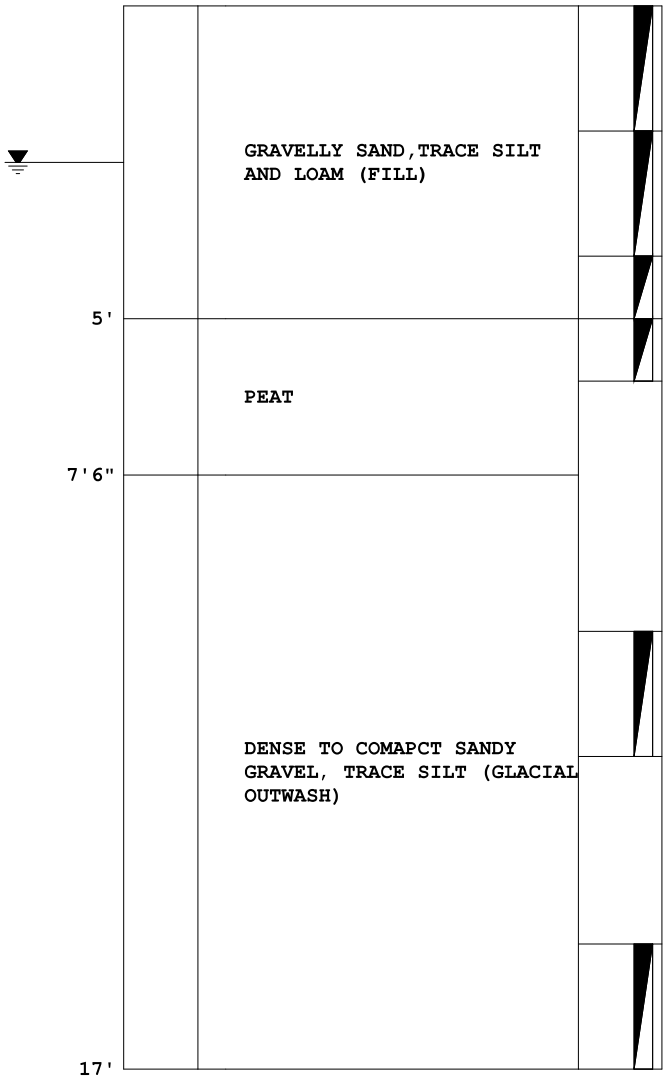
37 LINDEN STREET MEDFORD, MA 02155-0001 Telephone (781) 391-4500

To: MCPHAIL ASSOC., LLC, 2269 MASS. AVE., CAMBRIDGE, MA Date: 7-30-2018 Job No.: 2018-146

Location: FULLER MIDDLE SCHOOL, 31 FLAGG DRIVE, FRAMINGHAM, MA Scale: 1 in.= 3 ft.

GROUND SURFACE +162.1

BORING 202



S#1, 0' to 2'
(7-5-17-31)
RECOVERED 14 in.

S#2, 2' to 4'
(33-26-21-6)
RECOVERED 4 in.

S#3, 4' to 5'
(3-1)
RECOVERED 12 in.

S#3A, 5' to 6'
(1-1)
RECOVERED 12 in.

S#4, 10' to 12'
(12-21-15-14)
RECOVERED 12 in.

S#5, 15' to 17'
(23-14-12-14)
RECOVERED 5 in.

WATER LEVEL 2'6"
SIZE OF CASING: NW, LENGTH: 15'0"
DRILLER: G. SMITH, INSPECTOR: J. CRONIN
DATE STARTED & COMPLETED: 7-27-2018

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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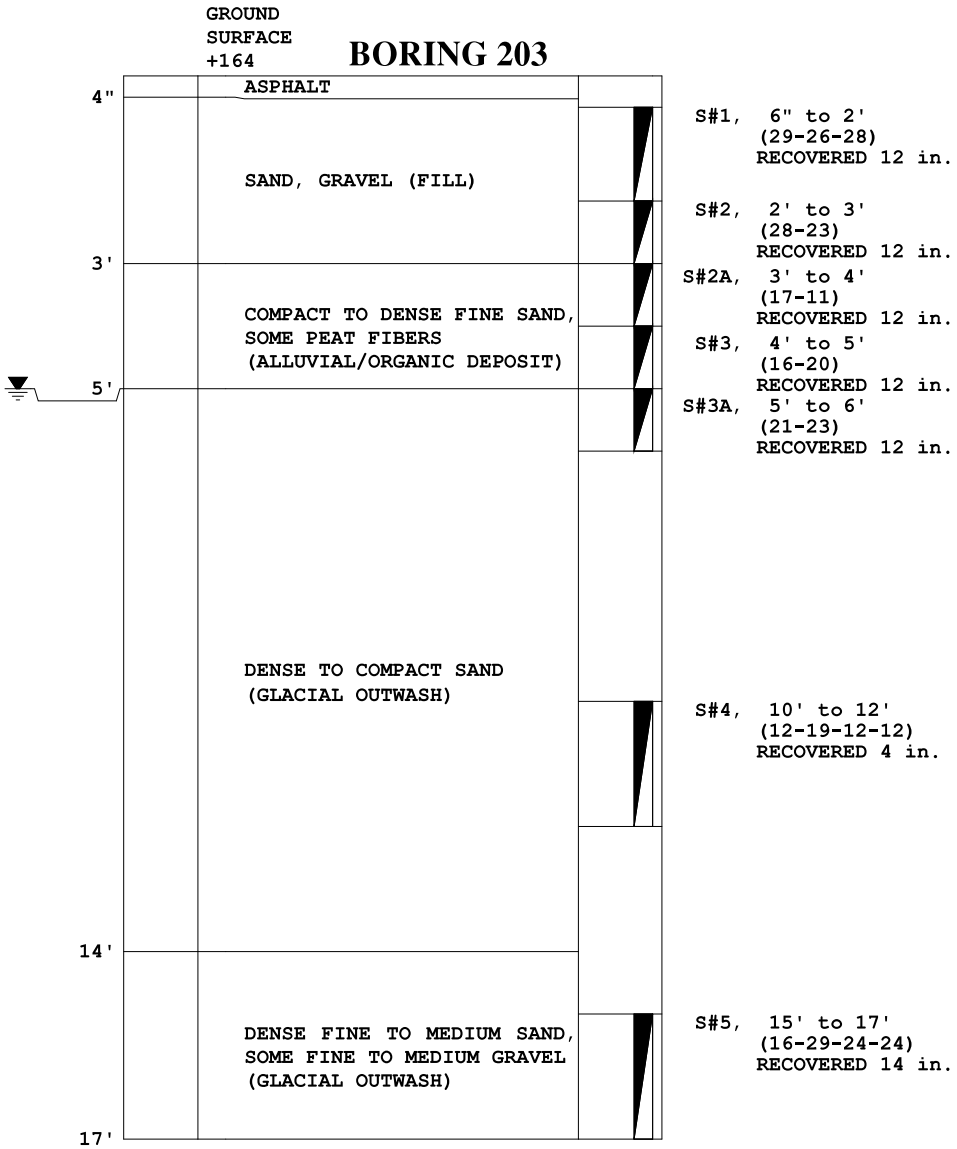
To: MCPHAIL ASSOC., LLC, 2269 MASS. AVE., CAMBRIDGE, MA Date: 7-30-2018 Job No.: 2018-146

Location: FULLER MIDDLE SCHOOL, 31 FLAGG DRIVE, FRAMINGHAM, MA Scale: 1 in.= 3 ft.



WATER LEVEL 5'
SIZE OF CASING: NW, LENGTH: 15'0"
DRILLER: G. SMITH, INSPECTOR: J. CRONIN
DATE STARTED & COMPLETED: 7-26-2018

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

CARR-DEE CORP.

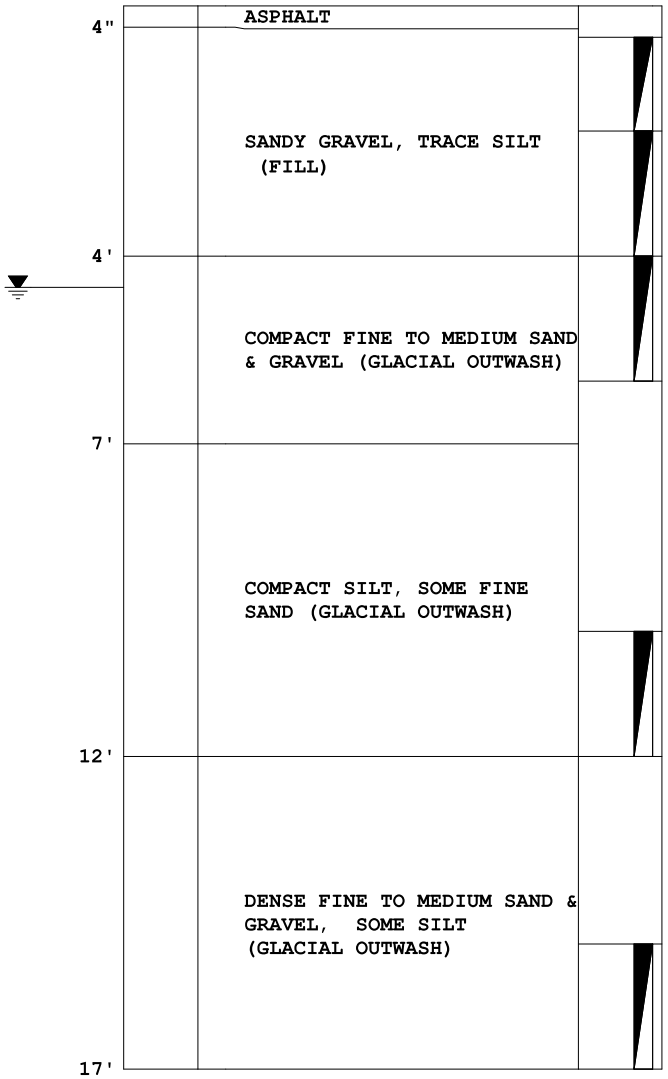
37 LINDEN STREET MEDFORD, MA 02155-0001 Telephone (781) 391-4500

To: MCPHAIL ASSOC., LLC, 2269 MASS. AVE., CAMBRIDGE, MA Date: 7-30-2018 Job No.: 2018-146

Location: FULLER MIDDLE SCHOOL, 31 FLAGG DRIVE, FRAMINGHAM, MA Scale: 1 in.= 3 ft.

BORING 204

GROUND SURFACE +162.5



S#1, 6" to 2'
(33-25-33)
RECOVERED 7 in.

S#2, 2' to 4'
(21-17-13-8)
RECOVERED 14 in.

S#3, 4' to 6'
(9-6-6-5)
RECOVERED 12 in.

S#4, 10' to 12'
(4-9-19-25)
RECOVERED 10 in.

S#5, 15' to 17'
(19-20-16-13)
RECOVERED 6 in.

WATER LEVEL 4'6"
SIZE OF CASING: NW, LENGTH: 15'0"
DRILLER: G. SMITH, INSPECTOR: J. CRONIN
DATE STARTED & COMPLETED: 7-26-2018

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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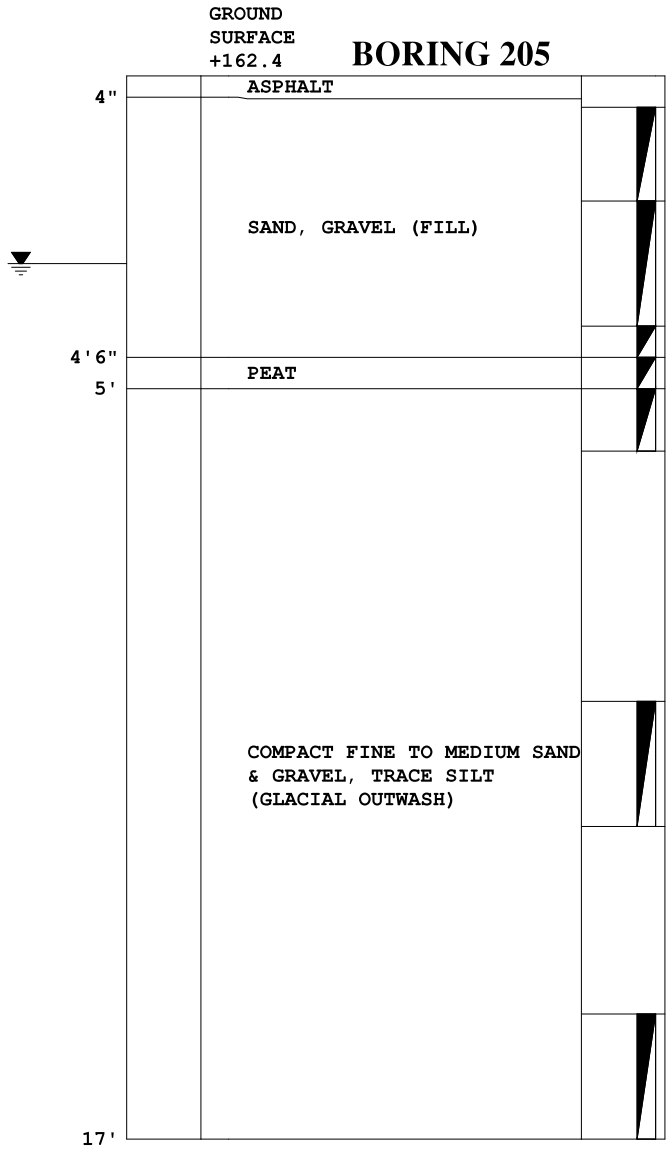
37 LINDEN STREET MEDFORD, MA 02155-0001 Telephone (781) 391-4500

To: MCPHAIL ASSOC., LLC, 2269 MASS. AVE., CAMBRIDGE, MA Date: 7-30-2018 Job No.: 2018-146

Location: FULLER MIDDLE SCHOOL, 31 FLAGG DRIVE, FRAMINGHAM, MA Scale: 1 in.= 3 ft.

BORING 205



WATER LEVEL 3'
SIZE OF CASING: NW, LENGTH: 15'0"
DRILLER: G. SMITH, INSPECTOR: J. CRONIN
DATE STARTED & COMPLETED: 7-26-2018

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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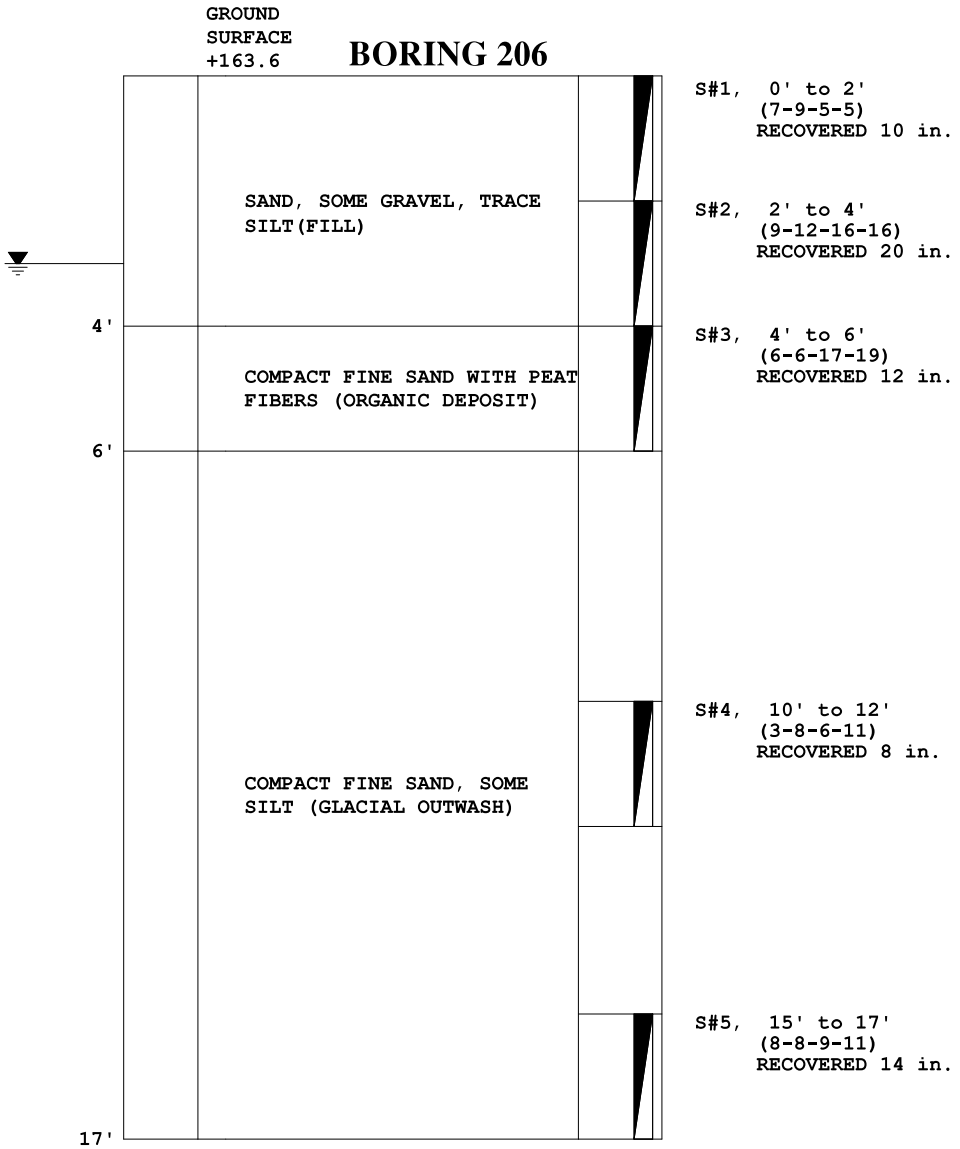
To: MCPHAIL ASSOC., LLC, 2269 MASS. AVE., CAMBRIDGE, MA Date: 7-30-2018 Job No.: 2018-146

Location: FULLER MIDDLE SCHOOL, 31 FLAGG DRIVE, FRAMINGHAM, MA Scale: 1 in.= 3 ft.



WATER LEVEL 3'
SIZE OF CASING: NW, LENGTH: 15'0"
DRILLER: G. SMITH, INSPECTOR: J. CRONIN
DATE STARTED & COMPLETED: 7-27-2018

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

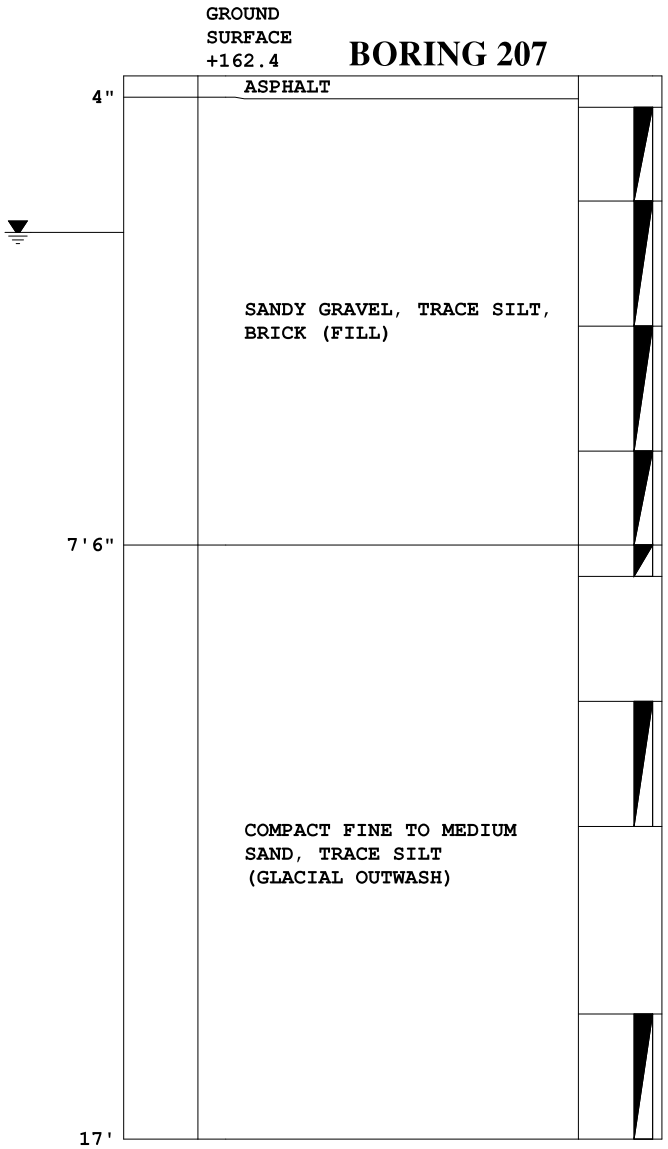
CARR-DEE CORP.

37 LINDEN STREET MEDFORD, MA 02155-0001 Telephone (781) 391-4500

To: MCPHAIL ASSOC., LLC, 2269 MASS. AVE., CAMBRIDGE, MA Date: 7-30-2018 Job No.: 2018-146

Location: FULLER MIDDLE SCHOOL, 31 FLAGG DRIVE, FRAMINGHAM, MA Scale: 1 in.= 3 ft.

BORING 207



S#1, 6" to 2'
(21-15-6)
RECOVERED 10 in.

S#2, 2' to 4'
(4-4-3-3)
RECOVERED 12 in.

S#3, 4' to 6'
(4-3-6-5)
RECOVERED 2 in.

S#4, 6' to 7'6"
(2-7-9)
RECOVERED 10 in.

S#4A, 7'6" to 8'
(9)
RECOVERED 1 in.

S#5, 10' to 12'
(3-5-11-9)
RECOVERED 10 in.

S#6, 15' to 17'
(8-6-8-11)
RECOVERED 10 in.

WATER LEVEL 2'6"
SIZE OF CASING: NW, LENGTH: 15'0"
DRILLER: G. SMITH, INSPECTOR: J. CRONIN
DATE STARTED & COMPLETED: 7-27-2018

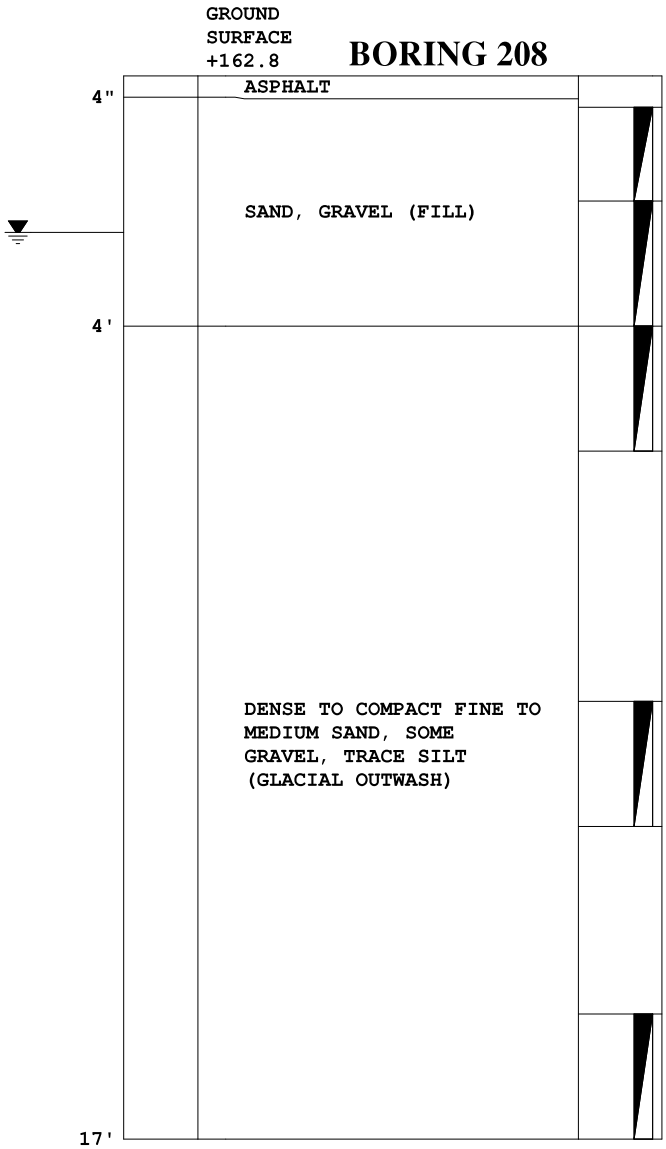
All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

CARR-DEE CORP.

37 LINDEN STREET MEDFORD, MA 02155-0001 Telephone (781) 391-4500

To: MCPHAIL ASSOC., LLC, 2269 MASS. AVE., CAMBRIDGE, MA Date: 7-30-2018 Job No.: 2018-146

Location: FULLER MIDDLE SCHOOL, 31 FLAGG DRIVE, FRAMINGHAM, MA Scale: 1 in.= 3 ft.



S#1, 6" to 2'
(7-5-7)
RECOVERED 4 in.

S#2, 2' to 4'
(7-66-32-22)
RECOVERED 16 in.

S#3, 4' to 6'
(14-19-28-22)
RECOVERED 16 in.

S#4, 10' to 12'
(19-18-17-23)
RECOVERED 8 in.

S#5, 15' to 17'
(14-12-9-19)
RECOVERED 10 in.

WATER LEVEL 2'6"
SIZE OF CASING: NW, LENGTH: 15'0"
DRILLER: G. SMITH, INSPECTOR: J. CRONIN
DATE STARTED & COMPLETED: 7-27-2018

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

APPENDIX C:

BORING LOGS B-201 THROUGH B-208
PREPARED BY CARR-DEE

Project:	Fuller Middle School	**Job #:**	6473
Location:	31 Flagg Drive	**Date Started:**	4-19-18
City/State:	Framingham, MA	**Date Finished:**	4-19-18

Boring No.

B-101

Contractor: Northern Drill Service, Inc.
Driller/Helper: Z. Nada/J. Stevens
Logged By/Reviewed By: C. Connors
Surface Elevation (ft): 165.1

Casing Type/Depth (ft): 4"
Casing Hammer (lbs)/Drop (in): 140lb/30"
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/30"

Groundwater Observations

Date	Depth	Elev.	Notes

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample: TVOC (ppm)	Sample: N-Value / RQD	Sample: No.	Sample: Pen./Rec. (in)	Sample: Depth (ft)	Sample: Blows/6" / Min/ft	Sample Description and Boring Notes
			0.5 / 164.6	TOPSOIL							
1	164				0.0	9	S1	24/14	0.0-2.0	2 4 5 6	Loose, light borwn to brown, SILTY SAND, some gravel. (Fill)
2	163										
3	162			FILL	0.0	2	S2	24/16	2.0-4.0	2 1 1 1	Very loose, brown to yellow/brown, SILTY SAND, trace gravel. (Fill)
4	161				0.0	4	S3	12/6	4.0-5.0	2 2	Very loose to loose, yellow/brown, SAND, some silt, trace gravel. (Fill)
			5.0 / 160.1								
5	160				0.1	4	S3A	12/6	5.0-6.0	2 6	Very loose to loose, dark brown, fine to medium grain, SAND, trace to some organic silt and peat fibers. (Alluvial Organic Silt Deposit)
6	159										
7	158			ALLUVIAL ORGANIC SILT DEPOSIT							
8	157										
			9.0 / 156.1								
9	156										
10	155				0.0	8	S4	24/8	9.0-11.0	3 4 4 5	Loose, light brown to gray, medium to coarse grain, SAND, trace silt and gravel. (Glacial Outwash)
11	154										
12	153										
13	152										
14	151										
15	150				0.0	6	S5	24/6	14.0-16.0	2 3 3 4	Loose, light brown to brown, medium to coarse grain, SAND, trace silt and gravel. (Glacial Outwash)
16	149			GLACIAL OUTWASH							
17	148										
18	147										
19	146										
20	145					20	S6	24/4	19.0-21.0	9 11 9 7	Compact, light brown to gray, SANDY GRAVEL, trace silt. (Glacial Outwash)
21	144										
22	143										

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Total Volatile Organic Compounds (TVOC) measured w/ PID Model:
TVOC Background: ppm
Weather:
Temperature:

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Fuller Middle School	**Job #:**	6473
Location:	31 Flagg Drive	**Date Started:**	4-19-18
City/State:	Framingham, MA	**Date Finished:**	4-19-18

Boring No.

B-101

Contractor: Northern Drill Service, Inc.
Driller/Helper: Z. Nada/J. Stevens
Logged By/Reviewed By: C. Connors
Surface Elevation (ft): 165.1

Casing Type/Depth (ft): 4"
Casing Hammer (lbs)/Drop (in): 140lb/30"
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/30"

Groundwater Observations

Date	Depth	Elev.	Notes

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample TVOC (ppm)	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
24	141										
25	140			GLACIAL OUTWASH		28	S7	24/8	24.0-26.0	14 16 12 9	Compact, gray, well graded mixture of SILT, SAND and GRAVEL, trace clay. (Glacial Outwash)
26	139		26.0 / 139.1	Bottom of borehole 26 feet below ground surface.							
27	138										
28	137										
29	136										
30	135										
31	134										
32	133										
33	132										
34	131										
35	130										
36	129										
37	128										
38	127										
39	126										
40	125										
41	124										
42	123										
43	122										
44	121										
45	120										

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Total Volatile Organic Compounds (TVOC) measured w/ PID Model:
TVOC Background: ppm
Weather:
Temperature:

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Fuller Middle School	**Job #:**	6473
Location:	31 Flagg Drive	**Date Started:**	4-19-18
City/State:	Framingham, MA	**Date Finished:**	4-19-18

Boring No.

B-102

Contractor: Northern Drill Service, Inc.
Driller/Helper: Z. Nada/J. Stevens
Logged By/Reviewed By: C. Connors
Surface Elevation (ft): 164.9

Casing Type/Depth (ft): 4"
Casing Hammer (lbs)/Drop (in): 140lb/30"
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/30"

Groundwater Observations

Date	Depth	Elev.	Notes

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample: TVOC (ppm)	Sample: N-Value / RQD	Sample: No.	Sample: Pen./Rec. (in)	Sample: Depth (ft)	Sample: Blows/6" / Min/ft	Sample Description and Boring Notes
1	164		0.5 / 164.4	TOPSOIL	0.1	13	S1	24/20	0.0-2.0	2 6 7 10	Compact, brown to yellow/brown, SILTY SAND, trace gravel. (Fill)
2	163										
3	162			FILL	0.1	15	S2	24/18	2.0-4.0	8 8 7 5	Compact, yellow/brown to orange/brown, SILTY SAND, trace gravel. (Fill)
4	161										
5	160				0.0	5	S3	24/16	4.0-6.0	2 2 3 4	Compact, yellow/brown to orange/brown, SILTY SAND, trace gravel. (Fill)
6	159		6.0 / 158.9								
7	158			ALLUVIAL ORGANIC SILT DEPOSIT		5	S4	24/16	6.0-8.0	4 2 3 4	Loose, dark gray to gray, medium to coarse grain, SAND, trace to some organic silt. (Alluvial Organic Silt Deposit)
8	157		8.0 / 156.9								
9	156				0.0	17	S5	24/12	8.0-10.0	4 9 8 8	Compact, light gray to gray, medium to coarse grain, SILTY SAND. (Lacustrine)
10	155										
11	154										
12	153										
13	152										
14	151										
15	150			LACUSTRINE	0.1	13	S6	24/14	14.0-16.0	6 8 5 9	Compact, light brown, fine grain, SILTY SAND, trace clay and gravel. (Lacustrine)
16	149										
17	148										
18	147										
19	146										
20	145				0.0	13	S7	24/18	19.0-21.0	5 7 6 10	Compact, light brown, fine grain, SILTY SAND, trace clay and gravel. (Lacustrine)
21	144										
22	143										

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Total Volatile Organic Compounds (TVOC) measured w/ PID Model:
TVOC Background: ppm
Weather:
Temperature:

McPHAIL ASSOCIATES, LLC
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CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Fuller Middle School	**Job #:**	6473
Location:	31 Flagg Drive	**Date Started:**	4-19-18
City/State:	Framingham, MA	**Date Finished:**	4-19-18

Boring No.

B-102

Contractor: Northern Drill Service, Inc.
Driller/Helper: Z. Nada/J. Stevens
Logged By/Reviewed By: C. Connors
Surface Elevation (ft): 164.9

Casing Type/Depth (ft): 4"
Casing Hammer (lbs)/Drop (in): 140lb/30"
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/30"

Groundwater Observations

Date	Depth	Elev.	Notes

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample TVOC (ppm)	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
24	141										
25	140			LACUSTRINE	0.0	28	S8	24/10	24.0-26.0	8 8 20 13	Compact, light brown, fine grain, SILTY SAND, trace gravel. (Lacustrine)
26	139		26.0 / 138.9	Bottom of borehole 26 feet below ground surface.							
27	138										
28	137										
29	136										
30	135										
31	134										
32	133										
33	132										
34	131										
35	130										
36	129										
37	128										
38	127										
39	126										
40	125										
41	124										
42	123										
43	122										
44	121										
45	120										

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Total Volatile Organic Compounds (TVOC) measured w/ PID Model:
TVOC Background: ppm
Weather:
Temperature:

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Fuller Middle School	**Job #:**	6473
Location:	31 Flagg Drive	**Date Started:**	2-22-18
City/State:	Framingham, MA	**Date Finished:**	2-22-18

Boring No.

B-103

Contractor: Northern Drill Service, Inc.
Driller/Helper: Z. Nada/J. Stevens
Logged By/Reviewed By: T. Cormican
Surface Elevation (ft): 164.6

Casing Type/Depth (ft): 4"
Casing Hammer (lbs)/Drop (in): 140lb/30"
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/30"

Groundwater Observations

Date	Depth	Elev.	Notes
2-22-18	6	158.6	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample: TVOC (ppm)	Sample: N-Value / RQD	Sample: No.	Sample: Pen./Rec. (in)	Sample: Depth (ft)	Sample: Blows/6" / Min/ft	Sample Description and Boring Notes
1	164		0.5 / 164.1	TOPSOIL		11	S1	24/16	0.0-2.0	3 3 8 10	Compact, brown to yellow/brown, SAND and GRAVEL, some silt. (Fill)
2	163										
3	162			FILL							
4	161										
5	160		5.0 / 159.6								
6	159			ALLUVIAL ORGANIC SILT DEPOSIT		20	S2	24/14	5.0-7.0	5 10 10 9	Compact, dark brown, PEATY SAND, trace gravel. (Alluvial Organic Silt Deposit)
7	158										
8	157					11	S3	24/18	7.0-9.0	8 5 6 5	Compact, dark brown, fine to medium grain, SAND, trace to some organic silt, to gray, fine to medium grain, SAND, trace silt. (Alluvial Organic Silt Deposit)
9	156		9.0 / 155.6								
10	155			GLACIAL OUTWASH		6	S4	24/14	9.0-11.0	2 3 3 6	Loose, gray, fine to medium grain, SAND, trace silt and gravel. (Glacial Outwash)
11	154										
12	153										
13	152										
14	151					9	S5	24/12	14.0-16.0	14 6 3 4	Loose, gray, SAND and GRAVEL, trace silt. (Glacial Outwash)
15	150										
16	149										
17	148										
18	147										
19	146					16	S6	24/8	19.0-21.0	10 10 6 6	Compact, orange/brown, SAND and GRAVEL, trace silt, to light brown, SILTY SAND. (Glacial Outwash)
20	145										
21	144										
22	143										
	142										

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Total Volatile Organic Compounds (TVOC) measured w/ PID Model:
TVOC Background: ppm
Weather:
Temperature:

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Fuller Middle School	**Job #:**	6473
Location:	31 Flagg Drive	**Date Started:**	2-22-18
City/State:	Framingham, MA	**Date Finished:**	2-22-18

Boring No.

B-103

Contractor: Northern Drill Service, Inc.
Driller/Helper: Z. Nada/J. Stevens
Logged By/Reviewed By: T. Cormican
Surface Elevation (ft): 164.6

Casing Type/Depth (ft): 4"
Casing Hammer (lbs)/Drop (in): 140lb/30"
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/30"

Groundwater Observations

Date	Depth	Elev.	Notes
2-22-18	6	158.6	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample TVOC (ppm)	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
24	141										
				GLACIAL OUTWASH		25	S7	6/5	24.0-24.5	4	Loose to compact, yellow/brown, fine to medium grain, SAND, trace silt and gravel. (Glacial Outwash)
25	140									10	
						25	S7A	18/16	24.5-26.0	15	Compact, gray/brown, stratified, fine grain, SANDY SILT, to fine grain, SAND, trace silt. (Glacial Outwash)
26	139		26.0 / 138.6							19	
27	138			Bottom of borehole 26 feet below ground surface.							
28	137										
29	136										
30	135										
31	134										
32	133										
33	132										
34	131										
35	130										
36	129										
37	128										
38	127										
39	126										
40	125										
41	124										
42	123										
43	122										
44	121										
45	120										
	119										

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Total Volatile Organic Compounds (TVOC) measured w/ PID Model:
TVOC Background: ppm
Weather:
Temperature:

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2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Fuller Middle School	**Job #:**	6473
Location:	31 Flagg Drive	**Date Started:**	2-21-18
City/State:	Framingham, MA	**Date Finished:**	2-21-18

Boring No.

B-104

Contractor: Northern Drill Service, Inc.
Driller/Helper: Z. Nada/J. Stevens
Logged By/Reviewed By: T. Cormican
Surface Elevation (ft): 163.0

Casing Type/Depth (ft): 4"
Casing Hammer (lbs)/Drop (in): 140lb/30"
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/30"

Groundwater Observations

Date	Depth	Elev.	Notes
2-21-18	4.5	158.5	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample: TVOC (ppm)	Sample: N-Value / RQD	Sample: No.	Sample: Pen./Rec. (in)	Sample: Depth (ft)	Sample: Blows/6" / Min/ft	Sample Description and Boring Notes
			0.3 / 162.7	ASPHALT							
1	162			FILL		22	S1	18/10	0.5-2.0	8 11 11	Compact, brown, GRAVELLY SAND, trace silt. (Fill)
2	161		2.5 / 160.5			9	S2	6/6	2.0-2.5	11	Compact, brown SAND, some gravel, trace silt. (Fill)
3	160			ALLUVIAL ORGANIC SILT DEPOSIT		9	S2A	18/8	2.5-4.0	5 4 5	Loose, light gray, stratified, SAND, w/ seams of dark brown organic silt. (Alluvial Organic Silt Deposit)
4	159										
5	158					4	S3	24/12	4.0-6.0	3 2 2 4	Very loose to loose, gray, fine to medium grain, SAND, trace silt, w/ pockets of organic silt. (Alluvial Organic Silt Deposit)
6	157										
7	156										
8	155		8.0 / 155.0								
9	154			GLACIAL OUTWASH							
10	153					10	S4	24/16	9.0-11.0	3 4 6 6	Loose to compact, stratified, light gray to brown, fine to medium grain, SAND, trace silt. (Glacial Outwash)
11	152										
12	151										
13	150										
14	149										
15	148					5	S5	24/16	14.0-16.0	2 2 3 4	Loose, brown, fine to medium grain, SAND, trace silt. (Glacial Outwash)
16	147										
17	146										
18	145										
19	144										
20	143					9	S6	24/12	19.0-21.0	2 4 5 5	Loose, brown, fine to medium grain, SAND, trace silt, to SAND and GRAVEL. (Glacial Outwash)
21	142										
22	141										

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Total Volatile Organic Compounds (TVOC) measured w/ PID Model:
TVOC Background: ppm
Weather:
Temperature:

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Fuller Middle School	**Job #:**	6473
Location:	31 Flagg Drive	**Date Started:**	2-21-18
City/State:	Framingham, MA	**Date Finished:**	2-21-18

Boring No.

B-104

Contractor: Northern Drill Service, Inc.
Driller/Helper: Z. Nada/J. Stevens
Logged By/Reviewed By: T. Cormican
Surface Elevation (ft): 163.0

Casing Type/Depth (ft): 4"
Casing Hammer (lbs)/Drop (in): 140lb/30"
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/30"

Groundwater Observations

Date	Depth	Elev.	Notes
2-21-18	4.5	158.5	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample TVOC (ppm)	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
24	139										
25	138					29	S7	24/12	24.0-26.0	12 12 17 16	Compact, gray/brown to orange/brown, SAND and GRAVEL, some silt. (Glacial Outwash)
26	137										
27	136			GLACIAL OUTWASH							
28	135										
29	134										
30	133					34	S8	24/8	29.0-31.0	8 19 15 12	Dense, gray/brown, SAND and GRAVEL, to light gray/brown, SILTY SAND and GRAVEL. (Glacial Outwash)
31	132		31.0 / 132.0								
32	131			Bottom of borehole 31 feet below ground surface.							
33	130										
34	129										
35	128										
36	127										
37	126										
38	125										
39	124										
40	123										
41	122										
42	121										
43	120										
44	119										
45	118										

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Total Volatile Organic Compounds (TVOC) measured w/ PID Model:
TVOC Background: ppm
Weather:
Temperature:

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project: Fuller Middle School
Location: 31 Flagg Drive
City/State: Framingham, MA

Job #: 6473
Date Started: 4-19-18
Date Finished: 4-19-18

Boring No. B-105

Contractor: Northern Drill Service, Inc.
Driller/Helper: Z. Nada/J. Stevens
Logged By/Reviewed By: C. Connors
Surface Elevation (ft): 163.4

Casing Type/Depth (ft): 4"
Casing Hammer (lbs)/Drop (in): 140lb/30"
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/30"

Groundwater Observations

Date	Depth	Elev.	Notes

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample: TVOC (ppm)	Sample: N-Value / RQD	Sample: No.	Sample: Pen./Rec. (in)	Sample: Depth (ft)	Sample: Blows/6" / Min/ft	Sample Description and Boring Notes
	163		0.5 / 162.9	ASPHALT							
1	162			FILL	0.1	8	S1	18/6	0.5-2.0	3 4 4	Loose, dark gray to dark brown, well graded mixture of SILT, SAND and GRAVEL, w/ asphalt. (Fill)
2	161				0.2	8	S2	24/12	2.0-4.0	3 6 2 9	Loose, dark gray, SAND and GRAVEL, tarce silt. (Fill)
3	160		4.0 / 159.4								
4	159			GLACIAL OUTWASH	0.1	13	S3	24/12	4.0-6.0	4 6 7 6	Compact, gray to brown, coarse grain, SAND, trace silt and gravel. (Glacial Outwash)
5	158										
6	157				0.1	8	S4	24/16	6.0-8.0	6 4 4 7	Loose, gray, coarse grain, SAND, trace silt and gravel. (Glacial Outwash)
7	156										
8	155				0.1	8	S5	24/6	8.0-10.0	3 4 4 5	Loose, light brown to orange/brown, cparse grain, SAND, trace silt and gravel. (Glacial Outwash)
9	154										
10	153										
11	152										
12	151										
13	150										
14	149				0.1	5	S6	24/3	14.0-16.0	2 2 3 6	Loose, light brown to orange/brown, coarse grain, SAND, trace silt and gravel. (Glacial Outwash)
15	148										
16	147										
17	146										
18	145										
19	144				0.0	11	S7	24/10	19.0-21.0	3 4 7 10	Compact, light brown, coarse grain, GRAVELY SAND, trace silt. (Glacial Outwash)
20	143										
21	142										
22	141										

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Total Volatile Organic Compounds (TVOC) measured w/ PID Model:
TVOC Background: ppm
Weather:
Temperature:

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CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Fuller Middle School	**Job #:**	6473
Location:	31 Flagg Drive	**Date Started:**	4-19-18
City/State:	Framingham, MA	**Date Finished:**	4-19-18

Boring No.

B-105

Contractor: Northern Drill Service, Inc.
Driller/Helper: Z. Nada/J. Stevens
Logged By/Reviewed By: C. Connors
Surface Elevation (ft): 163.4

Casing Type/Depth (ft): 4"
Casing Hammer (lbs)/Drop (in): 140lb/30"
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/30"

Groundwater Observations

Date	Depth	Elev.	Notes

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample TVOC (ppm)	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
24	140										
25	139				0.0	8	S8	24/6	24.0-26.0	8 4 4 5	Loose, light brown, fine to medium grain, SILTY SAND. (Glacial Outwash)
26	138										
27	137			GLACIAL OUTWASH							
28	136										
29	135										
30	134					10	S9	24/6	29.0-31.0	7 6 4 8	Loose to compact, brown to dark brown, coarse grain, SAND and GRAVEL, trace silt. (Glacial Outwash)
31	133		31.0 / 132.4								
32	132			Bottom of borehole 31 feet below ground surface.							
33	131										
34	130										
35	129										
36	128										
37	127										
38	126										
39	125										
40	124										
41	123										
42	122										
43	121										
44	120										
45	119										
	118										

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Total Volatile Organic Compounds (TVOC) measured w/ PID Model:
TVOC Background: ppm
Weather:
Temperature:

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Fuller Middle School	**Job #:**	6473
Location:	31 Flagg Drive	**Date Started:**	2-21-18
City/State:	Framingham, MA	**Date Finished:**	2-21-18

Boring No.

B-106

Contractor: Northern Drill Service, Inc.
Driller/Helper: Z. Nada/J. Stevens
Logged By/Reviewed By: T. Cormican
Surface Elevation (ft): 165.0

Casing Type/Depth (ft): 4"
Casing Hammer (lbs)/Drop (in): 140lb/30"
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/30"

Groundwater Observations

Date	Depth	Elev.	Notes
2-21-18	6	159.0	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample TVOC (ppm)	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
			0.3 / 164.7	ASPHALT							
1	164			FILL		34	S1	24/16	0.5-2.5	31 16 18 38	Dense, gray/brown, SAND and GRAVEL, some silt. (Fill) Drilled through cobbles from 5 to 8 feet below ground surface and casing refusal at 8 feet below ground surface. Moved borehole 4 feet to the south.
2	163										
3	162										
4	161		4.5 / 160.5								
5	160			GLACIAL OUTWASH							
6	159										
7	158										
8	157		8.0 / 157.0	Bottom of borehole 8 feet below ground surface.							
9	156										
10	155										
11	154										
12	153										
13	152										
14	151										
15	150										
16	149										
17	148										
18	147										
19	146										
20	145										
21	144										
22	143										

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Total Volatile Organic Compounds (TVOC) measured w/ PID Model:
TVOC Background: ppm
Weather:
Temperature:

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Fuller Middle School	**Job #:**	6473
Location:	31 Flagg Drive	**Date Started:**	2-21-18
City/State:	Framingham, MA	**Date Finished:**	2-22-18

Boring No.

B-106A

Contractor: Northern Drill Service, Inc.
Driller/Helper: Z. Nada/J. Stevens
Logged By/Reviewed By: T. Cormican
Surface Elevation (ft): 165.0

Casing Type/Depth (ft): 4"
Casing Hammer (lbs)/Drop (in): 140lb/30"
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/30"

Groundwater Observations

Date	Depth	Elev.	Notes
2-22-18	6	159.0	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample: TVOC (ppm)	Sample: N-Value / RQD	Sample: No.	Sample: Pen./Rec. (in)	Sample: Depth (ft)	Sample: Blows/6" / Min/ft	Sample Description and Boring Notes
1	164		0.3 / 164.7	ASPHALT							
2	163			FILL							
3	162										
4	161		4.5 / 160.5			49	S2	6/4	4.0-4.5	6	Loose to compact, gray/brown, SAND and GRAVEL, some silt. (Fill)
5	160			GLACIAL OUTWASH		49	S2A	18/6	4.5-6.0	15 34 28	Dense, yellow/brown to orange/brown, SAND and GRAVEL, trace silt. (Glacial Outwash)
6	159										
7	158										
8	157										
9	156										
10	155					47	S3	24/12	9.0-11.0	22 25 22 12	Dense, light gray, SILTY SAND and GRAVEL, to brown, SAND and GRAVEL, trace to some silt. (Glacial Outwash)
11	154										
12	153										
13	152										
14	151										
15	150					29	s4	24/16	14.0-16.0	12 19 10 8	Compact, brown, SAND and GRAVEL, trace to some silt. (Glacial Outwash)
16	149		16.0 / 149.0	Bottom of borehole 16 feet below ground surface.							
17	148										
18	147										
19	146										
20	145										
21	144										
22	143										

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Total Volatile Organic Compounds (TVOC) measured w/ PID Model:
TVOC Background: ppm
Weather:
Temperature:

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Fuller Middle School	**Job #:**	6473
Location:	31 Flagg Drive	**Date Started:**	2-21-18
City/State:	Framingham, MA	**Date Finished:**	2-21-18

Boring No. B-107

Contractor: Northern Drill Service, Inc.
Driller/Helper: Z. Nada/J. Stevens
Logged By/Reviewed By: T. Cormican
Surface Elevation (ft): 162.9

Casing Type/Depth (ft): 4"
Casing Hammer (lbs)/Drop (in): 140lb/30"
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/30"

Groundwater Observations

Date	Depth	Elev.	Notes
2-21-18	4	158.9	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample: TVOC (ppm)	Sample: N-Value / RQD	Sample: No.	Sample: Pen./Rec. (in)	Sample: Depth (ft)	Sample: Blows/6" / Min/ft	Sample Description and Boring Notes
			0.3 / 162.6	ASPHALT							
1	162					20	S1	24/12	0.5-2.5	26 11 9 12	Compact, brown, GRAVELLY SAND, trace silt. (Fill)
2	161			FILL							
3	160										
4	159		4.0 / 158.9								
5	158					5	S2	24/14	4.0-6.0	2 2 3 5	Loose, interbedded, gray, SAND and brown to dark brown, ORGANIC SILT, some peat. (Alluvial Organic Silt Deposit)
6	157			ALLUVIAL ORGANIC SILT DEPOSIT							
7	156										
8	155		8.0 / 154.9								
9	154										
10	153					11	S3	24/16	9.0-11.0	5 6 5 6	Compact, light gray, fine grain, SANDY SILT, to fine grain SILTY SAND. (Lacustrine Deposit)
11	152			LACUSTRINE DEPOSIT							
12	151										
13	150										
14	149		14.5 / 148.4			34	S4	6/6	14.0-14.5	8	Loose to compact, light gray, fine grain, SAND, trace silt, to brown, fine to medium grain, SAND, trace silt. (Lacustrine Deposit)
15	148					34	S4A	18/14	14.5-16.0	18 16 7	Dense, gray/brown to orange/brown, SAND and GRAVEL, trace silt. (Glacial Outwash)
16	147										
17	146										
18	145			GLACIAL OUTWASH							
19	144										
20	143					35	S5	24/12	19.0-21.0	11 19 16 15	Dense, gray/brown, SAND and GRAVEL, trace silt. (Glacial Outwash)
21	142		21.0 / 141.9								
22	141			Bottom of borehole 21 feet below ground surface.							

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Total Volatile Organic Compounds (TVOC) measured w/ PID Model:
TVOC Background: ppm
Weather:
Temperature:

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CAMBRIDGE, MA 02140
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Project:	Fuller Middle School	**Job #:**	6473
Location:	31 Flagg Drive	**Date Started:**	2-22-18
City/State:	Framingham, MA	**Date Finished:**	2-22-18

Boring No. B-108

Contractor: Northern Drill Service, Inc.
Driller/Helper: Z. Nada/J. Stevens
Logged By/Reviewed By: T. Cormican
Surface Elevation (ft): 163.9

Casing Type/Depth (ft): 4"
Casing Hammer (lbs)/Drop (in): 140lb/30"
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/30"

Groundwater Observations

Date	Depth	Elev.	Notes
2-22-18	3	160.9	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample TVOC (ppm)	Sample N-Value / RQD	Sample No.	Sample Pen./Rec. (in)	Sample Depth (ft)	Sample Blows/6" / Min/ft	Sample Description and Boring Notes
			0.3 / 163.6	ASPHALT							
1	163			FILL		32	S1	24/15	0.5-2.5	14 11 21 19	Dense, dark gray/black, SILTY SAND and GRAVEL. (Fill)
2	162										
3	161										
4	160					37	S2	12/8	4.0-5.0	13 19	Dense, dark gray/brown, SILTY SAND and GRAVEL. (Fill)
5	159		5.0 / 158.9								
6	158			GLACIAL OUTWASH		37	S2A	12/8	5.0-6.0	18 16	Dense, light gray, fine to medium grain, SAND, trace silt. (Glacial Outwash)
7	157										
8	156										
9	155										
10	154					32	S3	24/13	9.0-11.0	15 17 15 18	Dense, brown, SAND and GRAVEL, trace silt. (Glacial Outwash)
11	153		11.0 / 152.9								
12	152			Bottom of borehole 11 feet below ground surface.							
13	151										
14	150										
15	149										
16	148										
17	147										
18	146										
19	145										
20	144										
21	143										
22	142										

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Total Volatile Organic Compounds (TVOC) measured w/ PID Model:
TVOC Background: ppm
Weather:
Temperature:

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	Fuller Middle School	**Job #:**	6473
Location:	31 Flagg Drive	**Date Started:**	2-22-18
City/State:	Framingham, MA	**Date Finished:**	2-22-18

Boring No. B-109

Contractor: Northern Drill Service, Inc.
Driller/Helper: Z. Nada/J. Stevens
Logged By/Reviewed By: T. Cormican
Surface Elevation (ft): 163.5

Casing Type/Depth (ft): 4"
Casing Hammer (lbs)/Drop (in): 140lb/30"
Sampler Size/Type: 24" Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/30"

Groundwater Observations

Date	Depth	Elev.	Notes
2-22-18	4.5	159.0	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample: TVOC (ppm)	Sample: N-Value / RQD	Sample: No.	Sample: Pen./Rec. (in)	Sample: Depth (ft)	Sample: Blows/6" / Min/ft	Sample Description and Boring Notes
0	163		0.1 / 163.4	ASPHALT							
1	162					61	S1	24/13	0.0-2.0	10 18 43 29	Very dense, dark brown, SILTY SAND and CRUSHED CONCRETE. (Fill)
2	161										
3	160			FILL							
4	159										
5	158					32	S2	24/8	4.0-6.0	13 15 17 14	Dense, gray/brown, SAND and GRAVEL, trace silt. (Fill)
6	157		6.5 / 157.0								
7	156										
8	155										
9	154					19	S3	24/14	9.0-11.0	8 9 10 19	Compact, brown to gray/brown, SAND and GRAVEL, trace silt. (Glacial Outwash)
10	153										
11	152			GLACIAL OUTWASH							
12	151										
13	150										
14	149					49	S4	24/10	14.0-16.0	12 17 32 27	Dense, gray/brown, SAND and GRAVEL, trace to some silt. (Glacial Outwash)
15	148		16.0 / 147.5								
16	147			Bottom of borehole 16 feet below ground surface.							
17	146										
18	145										
19	144										
20	143										
21	142										
22	141										

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:

Total Volatile Organic Compounds (TVOC) measured w/ PID Model:
TVOC Background: ppm
Weather:
Temperature:

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APPENDIX D:

1956 BORING LOCATION PLANS AND LOGS


SECTION THRU CULVERT IN OPEN DITCH
SCALE 1/2" = 1'-0"
Finish grade
Ordinary gravel borrow
30" Corrugated steel pipe
15"
Bottom of ditch
12" Compacted gravel
Open ditch
PLAN
ELEVATION
SECTION
DETAIL OF CONCRETE HEADWALL
SCALE: 1/4" = 1'-0"
1 1/2" Bit. conc. splash apron
1 1/2" Bitum. conc. walk
VA-1 Granite curb
1 1/2" Bitum. conc. drive
8" Compacted gravel
10" Compacted gravel
TYP. SECTION THRU CURB, BITUM. CONC. WALK & DRIVE
SCALE 1/2" = 1'-0"
Rough grading contract limit
Finish grading contract limit
3-30" Corrugated steel culverts 20'-0" long laid at bottom of ditch
Inv. El. 154.42
Inv. El. 154.32
Existing Brook
Open ditch
Open lagoon
20" Maple
18" Elms
40' Pines
30" Oak
36" Oak
12" Oak
14" Oak
16" Tw. Oak
12" Maples
Alternate for 1 1/2" Bituminous paving
1 1/2" Bitum. conc. walk
Headwall Inv. 155.0
Hydrant
PARKING AREA
1 1/2" Bitum. conc.
Ramp up
10' Existing sanitary sewer
Ex. San. M.H. El. 151.27 Inv. El. 152.94
New C.B. Rim El. 162.8 Inv. El.
New C.B. Rim El. 163.2 Inv. El.
FIN. FLOOR EL. 164.5
FLOOR CRAWL SPACE EL. 157.5
PARKING AREA
1 1/2" Bituminous concrete
6" Water
Loading platform
Proposed Hydrant by Town of Framingham
Proposed water main by Town of Framingham
Fuel tanks see details
Flag pole
Granite curb
1 1/2" Bitum. conc. Bus Parking
Fill over headwall & drain
Proposed Hyd. by Town of Framingham
B.M. drill hole in S.B. El. 157.68
B.M. drill hole in S.B. El. 162.28
Valve & Box
Plug
End gran. curb
Remove C.B. inlet
Ex. C.B. Rim El. 158.5 Inv. El. 155.5
Ex. C.B. Rim El. 158.3 Inv. El. 155.2
Ex. C.B. Rim El. 160.4 Inv. El. 156.3
Ex. C.B. Rim El. 160.5 Inv. El. 156.0
Ex. C.B. Rim El. 157.0 Inv. El. 154.0
Ex. C.B. Rim El. 156.9 Inv. El. 153.5
Inv. El. 152.9
12" Ex. conc. pipe
Existing ditch
Inv. El. 155.1
Ex. C.B. Inv. El. 155.5
852.09
Existing headwall Inv. El. 150.42
Ex. San. M.H. Inv. El. 150.42
L: 154.33
R: 326.30
Proposed Gas Main by Worcester Gas Light Co.
Proposed water Main by Framingham Water Division
Connect to existing gas main
New Connection
Existing water Main
OAKS ROAD
Clear & grade this area & pile all excavated peat & loam here.
SITE IMPROVEMENT PLAN
SCALE 1" = 40'-0"
6'-0" Bottom of ditch
TYP. SECTION THRU OPEN DITCH
SCALE 1/4" = 1'-0"
12'-0" Bottom of lagoon
TYP. SECTION THRU OPEN LAGOON
SCALE 1/4" = 1'-0"
GENERAL NOTES
1. Excavate all peat from drives, parking areas & walks.
2. Finish grade under bldg. area Elev. 158.0
3. Use gravel fill in bldg. & parking areas, use ordinary borrow as fill in all other areas.
4. All grades on plan are finish grades.
5. Save all trees that can be possibly saved.
6. Bench Marks: Elevations refer to Framingham Town Base, top nut of hydrant southeast side intersection of Flagg Drive & Oaks Road. Top S.B. at P.T. of curve R=326.30 north side of Flagg Drive Elev.= 157.68. Top S.B. at P.C. of curve R=516.77 north side of Flagg Drive Elev.= 162.28
7. All trees shown are existing & are to remain.
8. All new drives to meet Flagg Drive with a smooth curve & slope.
LEGEND
Existing contour (162)
New contour 162
Existing grade (160.9)
New grade 160.9
Sanitary sewer line
Water line
Gas line
Storm drainage line
Catch basins ○ C.B. ▪ Ex. C.B.
Manhole ⊙ M.H.
Boring location
Existing storm drainage
Rough grading contract limit
Finish grading contract limit
Property line
Bituminous concrete
Seeded area
Hydrant & valve box
Reinforced concrete R.C.
Cast iron C.I.
Vitreous clay V.C.
SITE IMPROVEMENT PLAN
FRAMINGHAM HIGH SCHOOL
FLAG DRIVE
FRAMINGHAM, MASSACHUSETTS
SAMUEL GLASER ASSOCIATES
ARCHITECTS ENGINEERS
5808
X-1

BORING SCHEDULE

TEST BORING REPORT JAN. 21, '55

(1) ELEV. 160.0±

LOOSE FINE SAND & TRACE OF MICA.	10	0.5' WATER	3.0'
LOOSE FINE SAND.	6		5.0'
LOOSE FINE SAND, SILT, GRAVEL & TRACE OF MICA.	8		10.0'
FIRM MEDIUM SAND, GRAVEL & TRACE OF MICA	12		20.0'
			24.0'

(2) ELEV. 157.0±

SOFT PEAT.	2		5.0' WATER
FINE, SILTY SAND (POSSIBLY SILT).	16		15.3'
HARD FINE YELLOW SAND & TRACE OF MICA.			21.5'

(3) ELEV. 157.0±

SOFT PEAT	4	1.0' WATER 1.0'	
LOOSE VERY FINE SAND & TRACE OF INORGANIC SILT.	10		10.0'
FIRM VERY FINE SAND & SOME INORGANIC SILT.	11		20.0'
	11		25.0'

(4) ELEV. 159.0±

LOOSE, MEDIUM DIRTY SAND.	5	5.6' WATER 7.5'	2.0'
LOOSE MEDIUM SAND & FINE GRAVEL.	9		
HARD FINE SAND & GRAVEL.	22		17.7'
			24.2'

(5) ELEV. 157.0±

VERY SOFT ORGANIC SILT.	1	0.0' WATER	
LOOSE FINE SAND & LITTLE MICA.	4		5.0'
FIRM FINE SAND & TRACE OF MICA.	12		10.0'
FINE SAND, LITTLE GRAVEL & TRACE OF MICA.	12		16.0'
			21.3'

(7) ELEV. 157.0±

VERY SOFT ORGANIC SILT.	6	+1.0 WATER	6.6'
SOFT ORGANIC SILT (FINE SILT).	6		10.3'
LOOSE FINE SAND & TRACE OF MICA.	7		16.0'
FIRM FINE SAND, GRAVEL & LITTLE MICA.	12		25.6'
HARD MEDIUM SAND, GRAVEL & TRACE OF MICA.	18		34.0'

(8) ELEV. 158.0±

VERY LOOSE SILTY SAND.	1	0.0' WATER	6.6'
LOOSE FINE SAND & TRACE OF MICA.	7		10.0'
LOOSE FINE SAND & LITTLE FINE GRAVEL.	7		15.0'
LOOSE MEDIUM SAND & GRAVEL.	7		23.0'

(9) ELEV. 158.0±

SOFT ORGANIC SILT.	4.3'	0.0' WATER	
LOOSE MEDIUM SAND, GRAVEL & BOULDERS.	8		8.0'
HARD MEDIUM SAND, GRAVEL & BOULDERS.	18		26.0'

(10) ELEV. 160.0±

LOAMY SAND	4		
HARD FINE SAND & GRAVEL.	25		11.0' WATER 11.3'
FIRM MEDIUM TO COARSE SAND & GRAVEL.	12		18.0'
FIRM MEDIUM TO COARSE SAND & GRAVEL.	12		24.6'

(11) ELEV. 158.0±

SOFT ORGANIC SILT, LOOSE FINE DIRTY SAND (POSSIBLY FILL)	8	1.0' WATER 1.7'	5.8'
FIRM MEDIUM SAND & GRAVEL, TRACE OF MICA.	12		15.0'
FIRM FINE SAND, GRAVEL & SOME ORGANIC SILT.	18		21.8'

(12) ELEV. 158.0±

VERY SOFT ORGANIC SILT.	0	0.0' WATER	2.5'
LOOSE FINE SAND & TRACE OF MICA.	6		7.8'
LOOSE FINE SAND & TRACE OF MICA.	6		12.0'
HARD FINE SAND & GRAVEL.	19		21.0'

(13) ELEV. 157.0±

LOAMY SAND.	1	3.0' WATER	
FIRM FINE SAND.	7		11.0'
HARD FINE SAND & GRAVEL.	18		20.0'

(14) ELEV. 157.0±

SOFT ORGANIC SILT.	6	0.0' WATER	3.0'
LOOSE FINE SAND, LITTLE FINE GRAVEL & TRACE OF MICA.	6		10.0'
LOOSE FINE SAND, LITTLE FINE GRAVEL & TRACE OF MICA.	6		19.5'

TEST BORING REPORT SEPT. 23, 1955

(15) ELEV. 168.0±

LOAMY SAND & GRAVEL.	8		4.0'
LOOSE FINE SAND.	8		8.0'
LOOSE MEDIUM SAND & GRAVEL.	6		12.0' WATER 14.5'
HARD COARSE SAND, GRAVEL & BOULDERS.	28		20.5'
HARD FINE SAND, GRAVEL, TRACE CLAY	21		24.5'
CEMENTED SAND, GRAVEL			28.0'

RENT CAUSES ⊕ NO SAMPLE

(16) ELEV. 168.0±

LOOSE FINE SAND & LITTLE GRAVEL.	5		1.0'
LOOSE MEDIUM SAND & GRAVEL.	7		8.0'
LOOSE COARSE SAND & GRAVEL.	3		11.5' WATER 16.5'
HARD COARSE SAND, GRAVEL & BOULDERS.	17		20.0'
VERY COMPACT MEDIUM SAND, GRAVEL & BOULDERS	85		26.5'
VERY COMPACT FINE SAND & GRAVEL	67		32.0'
VERY COMPACT FINE SAND, GRAVEL	140		35.5'
REFUSAL			36.2'

(17) ELEV. 161.0±

LOAMY SAND	3		2.0'
LOOSE FINE SAND.	3		4.5' WATER 7.5'
LOOSE FINE SAND.	6		12.5'
FIRM COARSE SAND & GRAVEL.	11		16.1'
VERY DENSE FINE SAND & GRAVEL.	5		18.5'
FIRM FINE SAND, GRAVEL	16		21.5'
LOOSE FINE SAND, LITTLE CLAY	10		24.5'
COMPACT FINE SAND, LITTLE CLAY, VERY COMPACT FINE SAND & GRAVEL	52		27.0'
	78		29.5'

(18) ELEV. 156.0±

SOFT PEAT	2	0.5' WATER 2.0'	
LOOSE FINE SAND.	8		6.0'
LOOSE FINE SAND.	6		11.0'
LOOSE COARSE SAND & GRAVEL & SOME BOULDERS	9		15.5'
** COMPACT FINE SAND, GRAVEL	8		17.0'
** COMPACT FINE SAND, GRAVEL & TRACE OF CLAY	39		20.0'

** COMPACT FINE SAND, GRAVEL & TRACE OF CLAY

(19) ELEV. 170.0±

LOAMY SAND & GRAVEL.	7		4.0'
LOOSE FINE SAND & LITTLE GRAVEL.	12		9.0'
FIRM MEDIUM SAND, GRAVEL & LITTLE CLAY	12	13.5' WATER	18.0'
HARD COARSE SAND & GRAVEL.	25		22.5'
LOOSE FINE SAND, GRAVEL & LITTLE CLAY	9		30.5'
HARD FINE SAND, CLAY, GRAVEL & TRACE OF CLAY	21		
VERY COMPACT FINE SAND & GRAVEL	67		37.5'
REFUSAL			

(20) ELEV. 165.0±

LOAMY SAND & GRAVEL.	8		3.5'
FIRM FINE SAND & GRAVEL.	13		9.5' WATER 11.0'
HARD COARSE SAND, GRAVEL & BOULDERS.	21		14.0'
FIRM, COARSE SAND, GRAVEL & BOULDERS.	13		18.0'
HARD COARSE SAND & GRAVEL	21		26.0'
VERY COMPACT FINE SAND & GRAVEL	72		28.5'
			35.0'

(21) ELEV. 169.0±

LOAMY SAND & GRAVEL.	4		4.0'
LOOSE FINE SAND & GRAVEL.	5		7.5' WATER 9.0'
FIRM MEDIUM SAND & GRAVEL.	13		14.5'
HARD COARSE & SAND & GRAVEL	21		21.0'

NOTE: 1. WATER LEVELS INDICATED ARE THOSE OBSERVED AT THE COMPLETION OF EACH BORING, OR AS NOTED, AND DO NOT NECESSARILY REPRESENT PERMANENT GROUND WATER LEVELS.
2. FIGURES IN RIGHT HAND COLUMN INDICATE NUMBER OF BLOWS REQUIRED TO DRIVE 1" O.D. SAMPLING PIPE ONE FOOT USING ONE-HUNDRED & FORTY LB. WEIGHT FALLING THIRTY INCHES.

(22) ELEV. 159.0±

LOAMY SAND.	7	2.5" WATER	
LOOSE FINE SAND & LITTLE GRAVEL.	4		8.0'
LOOSE MEDIUM SAND & FINE GRAVEL.	13		16.0'
FIRM COARSE SAND & GRAVEL.			21.5'

(23) ELEV. 158.5±

LOAMY SAND.		2.0' 2.8' WATER	
LOOSE MEDIUM SAND.	10		5.5'
LOOSE COARSE SAND & GRAVEL.	9		10.0'
LOOSE MEDIUM SAND & GRAVEL.	9		16.5'
FIRM MEDIUM SAND & GRAVEL	12		20.0

(24) ELEV. 158.0±

LOAMY SAND.		2.0' WATER	
LOOSE FINE SAND.	10		7.0'
LOOSE MEDIUM SAND.	5		11.5'
FINE FINE SAND	12		20.0'

(25) ELEV. 159.0±

SOFT PEAT		2.0' 2.5' WATER	
LOOSE FINE SAND.	6		5.5'
LOOSE FINE SAND, GRAVEL	5		8.5'
LOOSE MEDIUM SAND & GRAVEL.	7		16.5'
MEDIUM DENSE CLAY, FINE SAND, LITTLE GRAVEL.	8		20.0'

(26) ELEV. 158.5±

LOAMY SAND		1.5' 2.0' WATER	
LOOSE FINE SAND & GRAVEL.	5		7.5'
FIRM FINE SAND & GRAVEL.	11		13.5'
FIRM MEDIUM SAND, GRAVEL & BOULDERS	14		20.0'

(27) ELEV. 158.0±

LOAMY SAND		2.0' 2.5' WATER	
FIRM MEDIUM SAND, GRAVEL	12		5.5'
HARD MEDIUM SAND, GRAVEL & BOULDERS	17		12.5'
HARD MEDIUM SAND, GRAVEL & BOULDERS	27		20.0'

(28) ELEV. 158.5±

SOFT PEAT.		2.0' 2.5' WATER	
LOOSE FINE SAND	7		9.0'
LOOSE MEDIUM SAND & LITTLE GRAVEL	8		14.0'
FIRM COARSE SAND, GRAVEL & BOULDERS	14		20.0'

(29) ELEV. 158.0±

SOFT PEAT		1.5' WATER	4.0'
LOOSE COARSE SAND & GRAVEL.	6		9.6'
LOOSE COARSE SAND & GRAVEL	5		13.0'
FIRM COARSE SAND, GRAVEL & BOULDERS	14		20.0'

(30) ELEV. 170.0±

LOOSE SAND & GRAVEL.			2.0'
LOOSE FINE SAND.	6		7.0'
FIRM FINE SAND.	11		10.5'
LOOSE MEDIUM SAND & GRAVEL.	6		17.5'
LOOSE COARSE SAND & GRAVEL.	5		26.0'
HARD COARSE SAND, GRAVEL & BOULDERS	17		30.5'
CLAY, FINE SAND, GRAVEL	12		34.0'
LOOSE FINE SAND, GRAVEL & TRACE CLAY	9		36.5'
VERY COMPACT SAND, GRAVEL & TRACE CLAY.			40.0'

(31) ELEV. 158.0±

LOAMY SAND & GRAVEL		2.6' WATER	
LOOSE MEDIUM SAND & GRAVEL	10		7.5'
LOOSE COARSE SAND & GRAVEL	9		16.0'
FIRM COARSE SAND & GRAVEL	13		20.3'

(32) ELEV. 159.0±

LOAMY SAND		2.0' 3.5' WATER	
HARD COARSE SAND & GRAVEL	22		8.0'
HARD COARSE SAND & GRAVEL & BOULDERS	27		10.0'
COMPACT COARSE SAND & GRAVEL & BOULDERS	49		13.5'
REFUSAL			

(33) ELEV. 162.5±

LOAM		1.0'	
COMPACT FINE SAND, GRAVEL & BOULDERS	45	4.5' WATER	
FIRM COARSE SAND & GRAVEL & BOULDERS	11		10.0'
**	35		12.5'

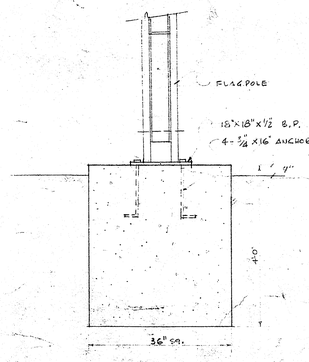
** COMPACT MEDIUM SAND, GRAVEL & BOULDERS

(34) ELEV. 162.0±

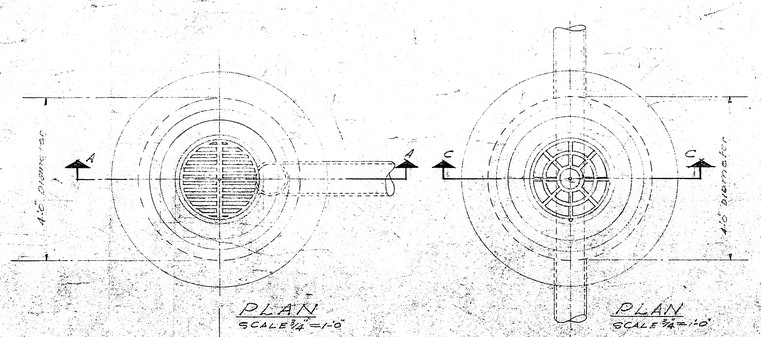
LOAMY SAND		2.5'	
COMPACT FINE SAND, GRAVEL & BOULDERS	35	5.5' WATER	
COMPACT COARSE SAND, GRAVEL & BOULDERS	47		10.0'
			17.5'
REFUSAL			

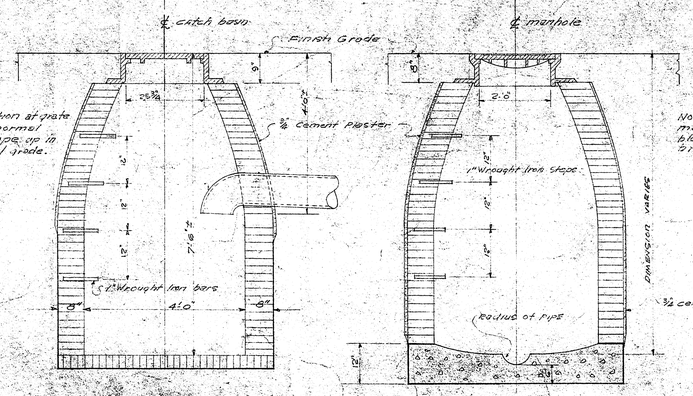
(35) ELEV. 156.0±

SOFT PEAT		1.0' WATER	4.0'
FIRM COARSE SAND & GRAVEL	15		10.5'
HARD COARSE SAND & GRAVEL	22		16.0'
HARD COARSE SAND, GRAVEL & BOULDERS	19		20.0'



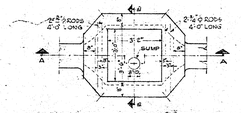
FLAGPOLE BASE DETAIL



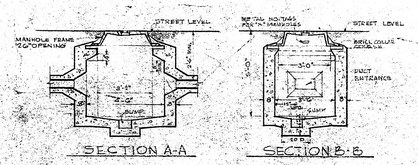


SECTION A-A
DETAILS CATCH BASIN
SCALE 3/4"=1'-0"

SECTION C-C
DETAIL MANHOLE
SCALE 3/4"=1'-0"

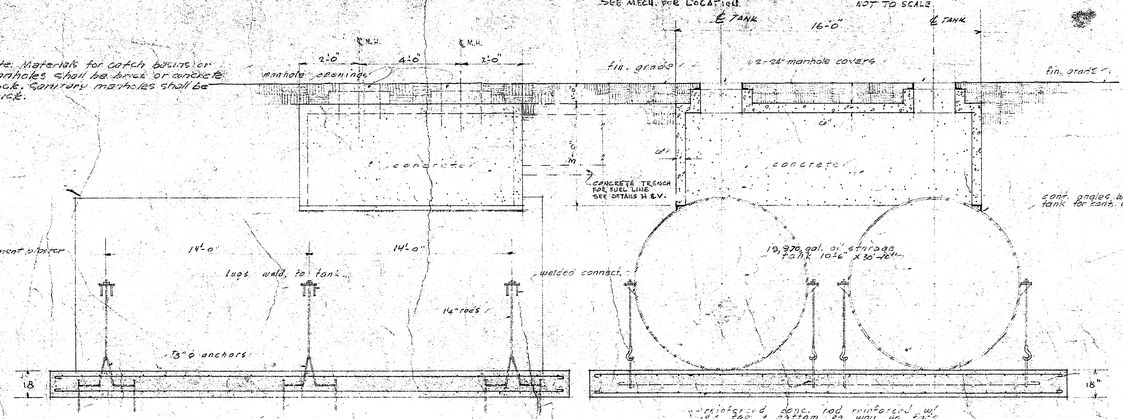


PLAN OF CONCRETE ELECTRICAL MANHOLE



CONCRETE ELECTRICAL MANHOLE DETAILS
SEE MECH. DWG. FOR LOCATION. NOT TO SCALE

Note: Materials for catch basins or manholes shall be brick or concrete block. Sanitary manholes shall be brick.



SIDE VIEW — END VIEW

DETAILS OF OIL STORAGE TANKS
Scale: 3/4"=1'-0"

BORING SCHEDULE and SITE DETAILS

FRAMINGHAM HIGH SCHOOL
FLAGG DRIVE
FRAMINGHAM, MASSACHUSETTS

SAMUEL GLASER ASSOCIATES
ARCHITECTS · ENGINEERS
105 NEWBURY STREET · BOSTON · MASSACHUSETTS

REGISTERED ARCHITECT No. 4931 BOSTON, MASS. COMMONWEALTH OF MASSACHUSETTS

DRAWN BY E.R.	DATE MAY 25, 1956	JOB No. 5608	DRAWING No. X-2
CHECKED BY	APPROVED BY		

RSE ASSOCIATES Inc.

Appendix B

RSE Supplemental Boring Logs

RSE ASSOCIATES Inc.

BORING LOG

Boring No.

RB - 1

Project No.	17143-01	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Drilling Contractc	Northern Drill Services	Driller	Tim Tucker	RSE Field Rep.	L.C. Jen
Start	18 Apr 2019, 9:20am	Finish	18 Apr 2019, 11:45am	Surface Elevation	El. 163.5 +/- (NAVD88)
Depth to Water	4' after pulling casing	Date/Time	4/18/19, 11:20 & 11:30 am	Location	7' east and 65' north from the NE corner of the existing Fuller Middle School building. Elevation based on Figure 2 of McPhail's 10 September 2018 Foundation Report.

Drilling Equipment and Procedures: Tracked Mobile Drill B-48

Casing Type: Rotary drilling with 4"/HW casing

Sampler Type: SPT sampler driven using automatic hammer

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)
	S-1	2 5 6 8	R = 15"		Grass covered Top 4" - top soil Middle 9" - brown to black silty organic SAND Bottom 2" - brown silty SAND trace clay			
							Obstruction at 3'	
5	S-2	11 7 5 6	R = 12"		Brown f-c SAND, trace silt Bott. 5" - black organic SAND with trace silt			5
							Casing: easy push from 7' to 14'	
10	S-3	1/24"	R = 0"		*** Use 3" sampler: ORGANIC SILT, little clay and few PEAT			10
15	S-4	1 3 4 2	R = 10"		Gray organic silt, trace clay Bottom 6": gray to borwn f-c SAND and lenses of silty SAND		Push casing from 14' to 18' Hammer casing from 18' to 19'	15
20	S-5	3 5 4 5	R = 0"		*** Use 3" sampler: brown c-m SAND, trace gravel, few silt.		Push casing from 19' to 22' Hammer casing below 22'	20
25	S-6	3 3	R = 7"		Brown sandy SILT			25

RSE ASSOCIATES Inc.

BORING LOG

Boring No. RB - 1

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	18 Apr 2019, 9:20am	Finish	18 Apr 2019, 11:45am	Surface Elevation	El. 163.5 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)
		3 3						
30	S-7	15 18 8 7			Brown m-c SAND and GRAVEL BoB at 31'. Backfilled with excavated material and gravel.			30
55								55

RSE ASSOCIATES Inc.

BORING LOG

Boring No. RB - 1

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	18 Apr 2019, 9:20am	Finish	18 Apr 2019, 11:45am	Surface Elevation	El. 163.5 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)

RSE ASSOCIATES Inc.

BORING LOG

Boring No. RB - 1

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	18 Apr 2019, 9:20am	Finish	18 Apr 2019, 11:45am	Surface Elevation	El. 163.5 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)

RSE ASSOCIATES Inc.

BORING LOG

Boring No. RB - 1

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	18 Apr 2019, 9:20am	Finish	18 Apr 2019, 11:45am	Surface Elevation	El. 163.5 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)

RSE ASSOCIATES Inc.

BORING LOG

Boring No.

RB - 2

Project No.	17143-01	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Drilling Contracto	Northern Drill Services	Driller	Tim Tucker	RSE Field Rep.	L.C. Jen
Start	4/18/2019, 11:50am	Finish	4/18/2019, 1:40pm	Surface Elevation	El. 162.5 +/- (NAVD88)
Depth to Water	18" (after pulling casing	Date/Time	4/18/2019, 1:20pm	Location	155' east and 88' north from the NE corner of the existing Fuller Middle School building. Elevation Based on Figure 2 of McPhail's 10 September 2018 Foundation Report.
Drilling Equipment and Procedures	Tracked Mobile Drill B-48				
Casing Type	Rotary drilling with 4"/HW casing				
Sampler Type	SPT sampler driven using automatic hammer				

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)
	S-1	1/12" 6 3	R = 10"		Grass Top 5" - top soil Bott/ 5" - Brown m-f SAND, trace silt		Push casing from 0' to 6.5'	
5	S-2	1 1 1 1	R = 9"		Black ORGANIC SILT and few brown PEAT		Hammer casing from 6.5 to 14'	5
10	S-3	2 6 7 7	R = 14"		Brown m-f SAND, trace silt with seams of coarse sand and fine silty sand			10
15	S-4	2 3 3 3	R = 13"		Top 6" - Reddish brown fine SAND Bott. 7" - gray silty SAND		Puh casing from 14' to 19'	15
20	S-5	3 5 5 7	R = 11"		Brown m-f SAND, trace silt, trace gravel		Below 19': hammer casing	20
25	S-6	3 4	R = 9"		Brown m-f SAND, trace silt, trace gravel			25

RSE ASSOCIATES Inc.

BORING LOG

Boring No. RB - 2

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	4/18/2019, 11:50am	Finish	4/18/2019, 1:40pm	Surface Elevation	El. 162.5 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)
		5 5			BoB at 26'. Backfilled with excavated material and gravel.			

30 35 40 45 50 55

RSE ASSOCIATES Inc.

BORING LOG

Boring No.

RB - 2

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	4/18/2019, 11:50am	Finish	4/18/2019, 1:40pm	Surface Elevation	El. 162.5 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)

80

RSE ASSOCIATES Inc.

BORING LOG

Boring No.

RB - 2

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	4/18/2019, 11:50am	Finish	4/18/2019, 1:40pm	Surface Elevation	El. 162.5 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)

RSE ASSOCIATES Inc.

BORING LOG

Boring No.

RB - 2

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	4/18/2019, 11:50am	Finish	4/18/2019, 1:40pm	Surface Elevation	El. 162.5 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)

RSE ASSOCIATES Inc.

BORING LOG

Boring No.

RB - 4

Project No.	17143-01	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Drilling Contracto	Northern Drill Services	Driller	Tim Tucker	RSE Field Rep.	L.C. Jen
Start	4/18/19, 1:51 pm	Finish	4/18/19, 2:50pm	Surface Elevation	El. 165.2 +/- (NAVD88)
Depth to Water	5' (after pulling casing)	Date/Time	4/18/2019, 2:40pm	Location	101'N and 2.5'W from NW corner of the Mass Bay building. In baseball infield near pitcher's mound. Elevation based on Figure 2 of McPhail's 10 September 2018 Foundation Report.
Drilling Equipment and Procedures	Tracked Mobile Drill B-48				
Casing Type	Rotary drilling with 4"/HW casing				
Sampler Type	SPT sampler driven using automatic hammer				

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)
	S-1	2 3 5 4	R = 18"		Baseball infield. Top 5" - Brown silty SAND, trace clay Bottom 13" - black fine SAND, some gravel, trace silt			
5	S-2	3 7 16 17	R = 8"		Gray fine SAND.			5
10	S-3	2 2 4 5	R = 13"		Gray fine SAND, trace silt.			10
15	S-4	7 15 10 14	R = 8"		Gray to reddish brown m-c SAND, some gravel BoB at 16'. Backfilled with excavated material and gravel.			15
20								20
25								25

RSE ASSOCIATES Inc.

BORING LOG

Boring No. RB - 4

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	4/18/19, 1:51 pm	Finish	4/18/19, 2:50pm	Surface Elevation	El. 165.2 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)

30 35 40 45 50 55 60 55

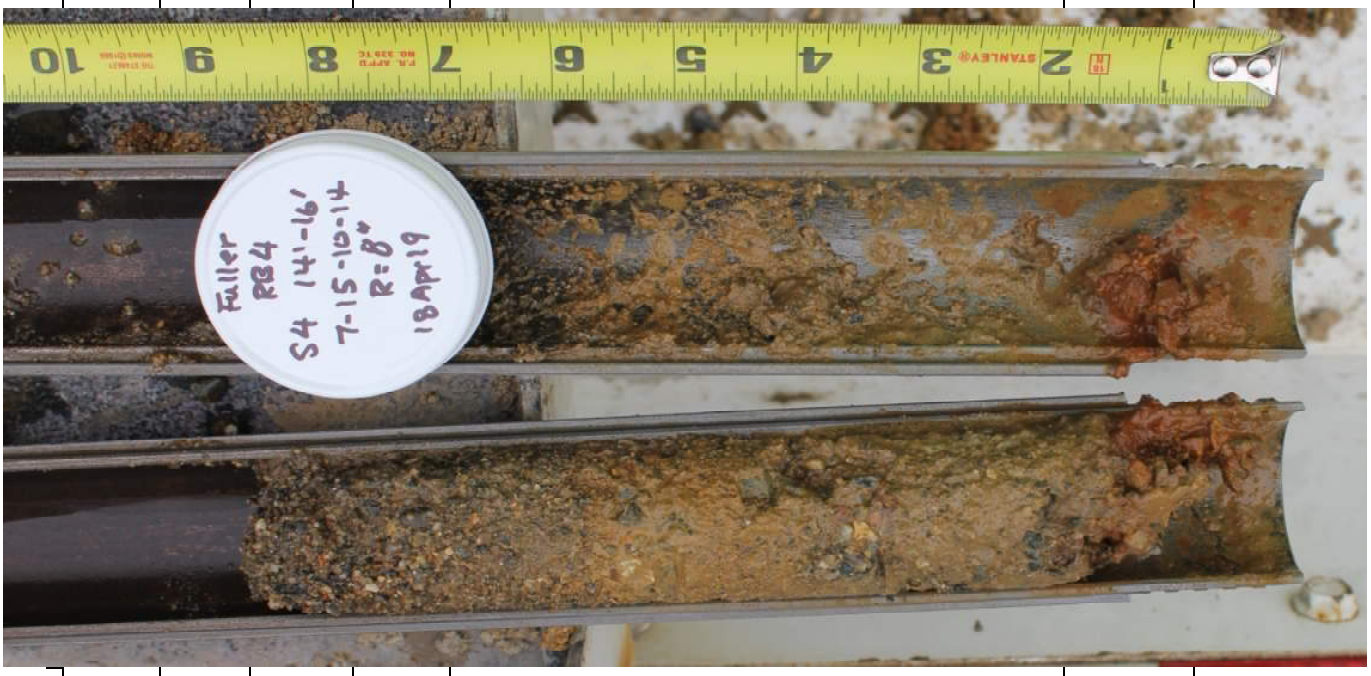
RSE ASSOCIATES Inc.

BORING LOG

Boring No. RB - 4

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	4/18/19, 1:51 pm	Finish	4/18/19, 2:50pm	Surface Elevation	El. 165.2 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)



RSE ASSOCIATES Inc.

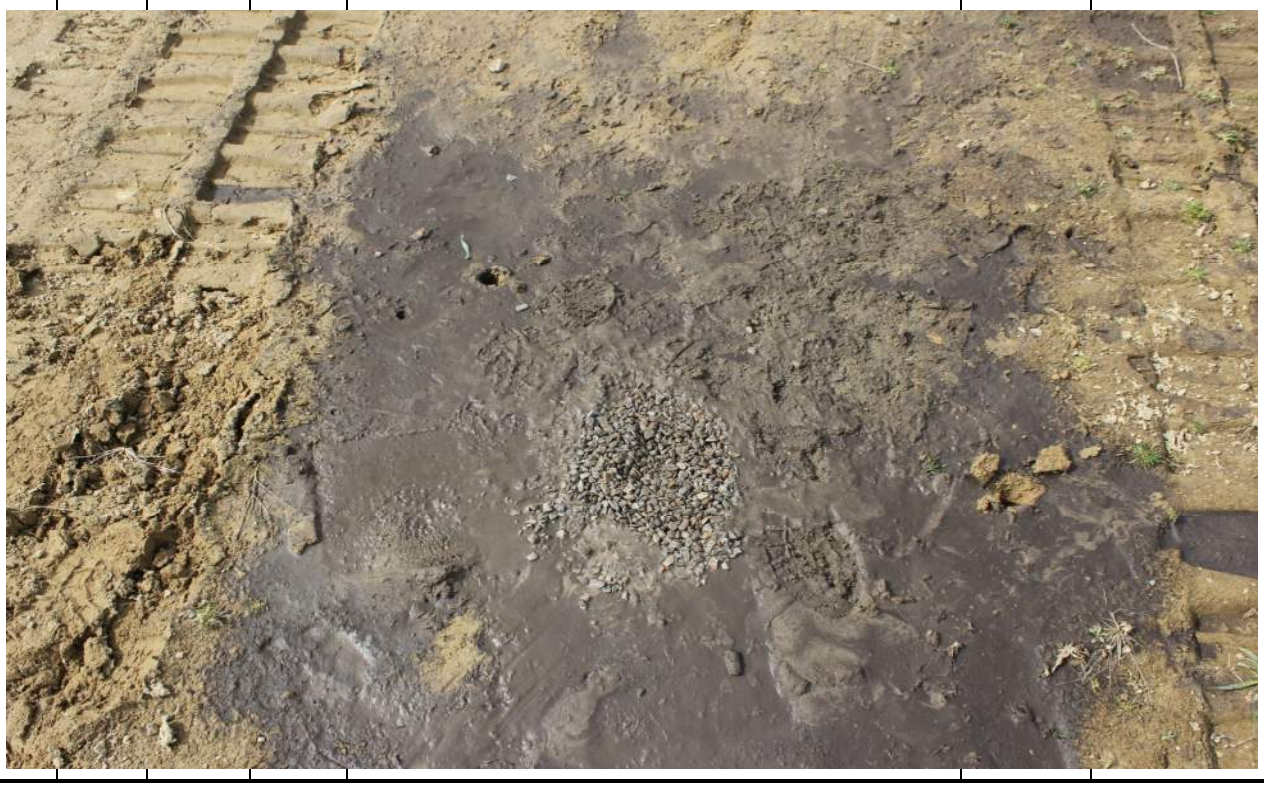
BORING LOG

Boring No.

RB - 4

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	4/18/19, 1:51 pm	Finish	4/18/19, 2:50pm	Surface Elevation	El. 165.2 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)



RSE ASSOCIATES Inc.

BORING LOG

Boring No.

RB - 5

Project No.	17143-01	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Drilling Contracto	Northern Drill Services	Driller	Tim Tucker	RSE Field Rep.	L.C. Jen
Start	4/19/2019, 9:05am	Finish	4/19/2019 2:30pm	Surface Elevation	El. 163 +/- (NAVD88)
Depth to Water	5' (pulling casing)	Date/Time	4/19/2019 1:25pm	Location	150' E and 94'S from NE corner of the existing Fuller School building. Elevation based on Figure 2 of McPhail's 10 September 2018 Foundation Report.
Drilling Equipment and Procedures	Tracked Mobile Drill B-48				
Casing Type	Rotary drilling with 4"/HW casing				
Sampler Type	SPT sampler driven using automatic hammer				

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)
	S-1	16 19 24 28	R = 5"		Asphalt (rollerbit) Brown to gray SAND and GRAVEL (Fill)		Hammer casing - slow progress	
5	S-2	11 9 19 24	R = 8"		Dark gray to gray SAND and GRAVEL, few silt, presence of organics (Fill)			5
						10:18am		
10	S-3	19 17 18 76	R = 9"		Brown GRAVEL & SAND, trace fines			10
						11:00 AM		
15	S-4	19 54 24 17	R = 8"		Top 4": Brown GRAVEL with some f sand, trace silt Bottom 4": Broken pieces of gray weathered rock			15
20	S-5	5 2 4 5	R = 8"		Brown m-c SAND, some gravel, trace silt			20
							Top 3" of casing sheared off. Remove and redrive casing to 24'	
25	S-6	9 11	R = 0"		No recover. Attempt 3" sampler but sand blew into the casing.			25

RSE ASSOCIATES Inc.

BORING LOG

Boring No. RB - 5

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	4/19/2019, 9:05am	Finish	4/19/2019 2:30pm	Surface Elevation	El. 163 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)
		10 12			Did not drive 3" sampler to avoid locking up sampler and casing.			
30	S-7	24 16 13 23	R = 6"		Brown GRAVEL, some silty sand, rock fragments at tip			30
					Boulder at 31.5'		Losing water @ 31.5'	
35	S-8	13 18 12 15	R = 13"		Top 5": Gray GRAVEL and SAND. Bottom 8": Olive brown poorly graded SAND.			35
					BoB at 36'. Backfilled with excavated material and gravel.			
55								55

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BORING LOG

Boring No. RB - 5

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	4/19/2019, 9:05am	Finish	4/19/2019 2:30pm	Surface Elevation	El. 163 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)

75

80

RSE ASSOCIATES Inc.

BORING LOG

Boring No. RB - 5

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	4/19/2019, 9:05am	Finish	4/19/2019 2:30pm	Surface Elevation	El. 163 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)

RSE ASSOCIATES Inc.

BORING LOG

Boring No.

RB - 5

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	4/19/2019, 9:05am	Finish	4/19/2019 2:30pm	Surface Elevation	El. 163 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)

RSE ASSOCIATES Inc.

BORING LOG

Boring No.

RB - 6 OW

Project No.	17143-01	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Drilling Contractc	Northern Drill Services	Driller	Tim Tucker	RSE Field Rep.	L.C. Jen
Start	4/19/2019, 7:25 am	Finish	4/19/2019, 9 am	Surface Elevation	El. 163.5 +/- (NAVD88)
Depth to Water	3' below rim (well)	Date/Time	4/19/2019 10:50am and 1:30pm	Location	On east side of parking lot, 161' E and 114' N from SE corner of the building. Elevation based on Figure 2 of McPhail's 10 September 2018 Foundation Report.
Drilling Equipment and Procedures	Tracked Mobile Drill B-48				
Casing Type	Rotary drilling with 4"/HW casing				
Sampler Type	SPT sampler driven using automatic hammer				

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)
	S-1	10 19 15 25	R = 11"		Asphalt (rollerbit) Dark gray to brown m-f SAND and f-c GRAVEL (Fill)		Hammer casing to 4'	
5	S-2	7 5 3 4	R = 14"		Gray fine SAND, trace silt, some f gravel		Push casing from 4' to 6' Hammer casing to 9'	5
10	S-3	7 23 15 12	R = 0"		Wash in SPT spoon. Sample again with 3" sampler: Gray GRAVEL and SAND, trace silt. BoB at 11'. Installed observation well with bottom of well at 11'. 7' screen. Bentonite at 2 to 4' with cutting from 0 to 2'.			10
15								15
20								20
25								25

RSE ASSOCIATES Inc.

BORING LOG

Boring No. RB - 6 OW

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	4/19/2019, 7:25 am	Finish	4/19/2019, 9 am	Surface Elevation	El. 163.5 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)

30 35 40 45 50 55

RSE ASSOCIATES Inc.

BORING LOG

Boring No. RB - 6 OW

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	4/19/2019, 7:25 am	Finish	4/19/2019, 9 am	Surface Elevation	El. 163.5 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)
60								
65								
70								
75								
80								

RSE ASSOCIATES Inc.

BORING LOG

Boring No.

RB - 6 OW

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	4/19/2019, 7:25 am	Finish	4/19/2019, 9 am	Surface Elevation	El. 163.5 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)

RSE ASSOCIATES Inc.

BORING LOG

Boring No.

RB - 7 OW

Project No.	17143-01	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Drilling Contracto	Northern Drill Services	Driller	Tim Tucker	RSE Field Rep.	L.C. Jen
Start	4/18/2019, 7:20am	Finish	4/18/2019, 9:20am	Surface Elevation	El. 164.4 +/- (NAVD88)
Depth to Water	4.4 ft below rim	Date/Time	4/19/2019, 8:50am	Location	84' North of the middle section of the existing building. 92' west of the east wall for the mid-section of the existing building. (11' east of the Lacrosse field). Elevation based on Figure 2 of McPhail's 10 September 2018 Foundation Report.
Drilling Equipment and Procedures	Tracked Mobile Drill B-48				
Casing Type	Rotary drilling with 4"/HW casing				
Sampler Type	SPT sampler driven using automatic hammer				

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)
	S-1	2 8 8 7	R = 17"		Grass Top 4 - Top soil 2" - Brown fine silty SAND bottom 11" - Brown well graded SAND and GRAVEL.			
5	S-2	2 1 1 5	R = 0"		*** Use 3" sampler: m-c SAND, some gravel, trace silt. Organics from 4.5 to 5.5'.			5
10	S-3	4 6 7 7	R = 11"		Gray to brown m-c SAND, trace silt 8:32am BoB at 11'. Installed observation well with bottom of well at 11'. 7' screen. Bentonite at 2 to 4' with cutting from 0 to 2'.			10
15								15
20								20
25								25

RSE ASSOCIATES Inc.

BORING LOG

Boring No.

RB - 7 OW

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	4/18/2019, 7:20am	Finish	4/18/2019, 9:20am	Surface Elevation	El. 164.4 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)

50

55

55

RSE ASSOCIATES Inc.

BORING LOG

Boring No. RB - 7 OW

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	4/18/2019, 7:20am	Finish	4/18/2019, 9:20am	Surface Elevation	El. 164.4 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)

60

65

70

75

80

RSE ASSOCIATES Inc.

BORING LOG

Boring No. RB - 7 OW

Project No.	**17143-01**	Project Name	Fuller Middle School	Client	Jonathan Levi Architects
Start	4/18/2019, 7:20am	Finish	4/18/2019, 9:20am	Surface Elevation	El. 164.4 +/- (NAVD88)

Depth (ft.)	Sample ID	Sampler Blows per 6 in	Recovery (in)	Casing Depth	MATERIAL DESCRIPTION and other remarks	USCS Symbol	Remarks and Other Tests	Depth (ft.)

RSE ASSOCIATES Inc.

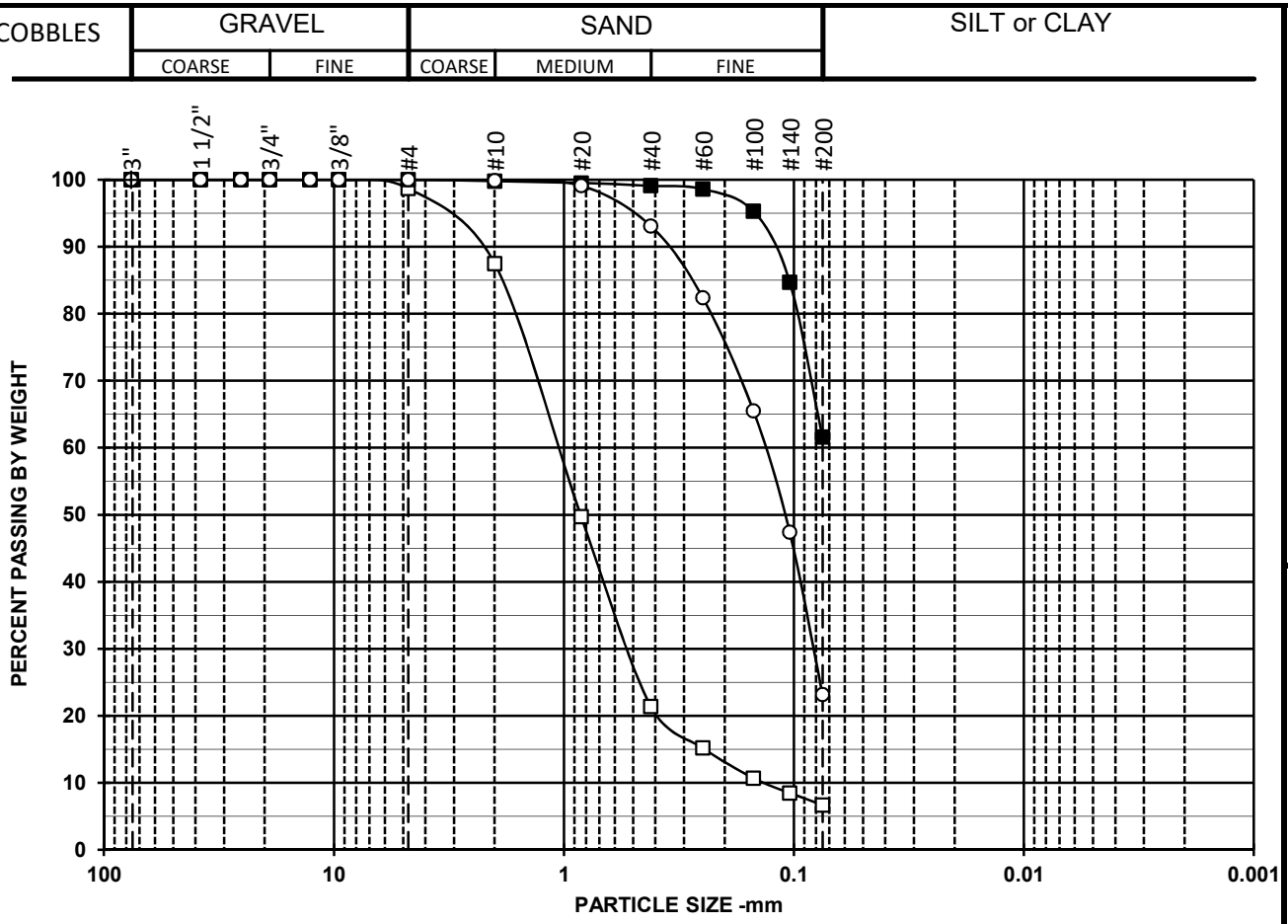
Appendix C

RSE Supplemental Laboratory Tests

RSE Associates. Inc.
Fuller Middle School - Framingham, MA
LABORATORY TESTING DATA SUMMARY

BORING NO.	SAMPLE NO.	DEPTH (ft)	IDENTIFICATION TESTS			REMARKS
			WATER CONTENT (%)	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	
RB-1	S-5	19-21	19.3	SW-SM	6.7	
RB-1	S-6	34-36	21.1	ML	61.6	
RB-2	S-4	14-16	22.9	SM	23.2	
RB-5	S-8	24-26	20.3	SP	2.8	

Note: (1) USCS symbol based on visual observation and Sieve reported.



Symbol	□	■	○
Boring	RB-1	RB-1	RB-2
Sample	S-5	S-6	S-4
Depth	19-21	34-36	14-16
% +3"	0.0	0.0	0.0
% Gravel	1.3	0.0	0.0
% SAND	92.0	38.4	76.8
%C SAND	11.2	0.2	0.1
%M SAND	66.1	0.7	6.8
%F SAND	14.7	37.5	69.9
% FINES	6.7	61.6	23.2
D_{100} (mm)	9.530	4.750	4.750
D_{60} (mm)	1.065		0.134
D_{30} (mm)	0.518		0.082
D_{10} (mm)	0.133		
Cc	1.900		
Cu	8.0		

Sieve Size/ID #	Percent Finer Data		
6"	100.0	100.0	100.0
4"	100.0	100.0	100.0
3"	100.0	100.0	100.0
1 1/2"	100.0	100.0	100.0
1"	100.0	100.0	100.0
3/4"	100.0	100.0	100.0
1/2"	100.0	100.0	100.0
3/8"	100.0	100.0	100.0
#4	98.7	100.0	100.0
#10	87.5	99.8	99.9
#20	49.7	99.5	99.1
#40	21.4	99.1	93.1
#60	15.2	98.6	82.4
#100	10.7	95.3	65.5
#140	8.5	84.7	47.4
#200	6.7	61.6	23.2
5μ m			
2μ m			
1μ m			

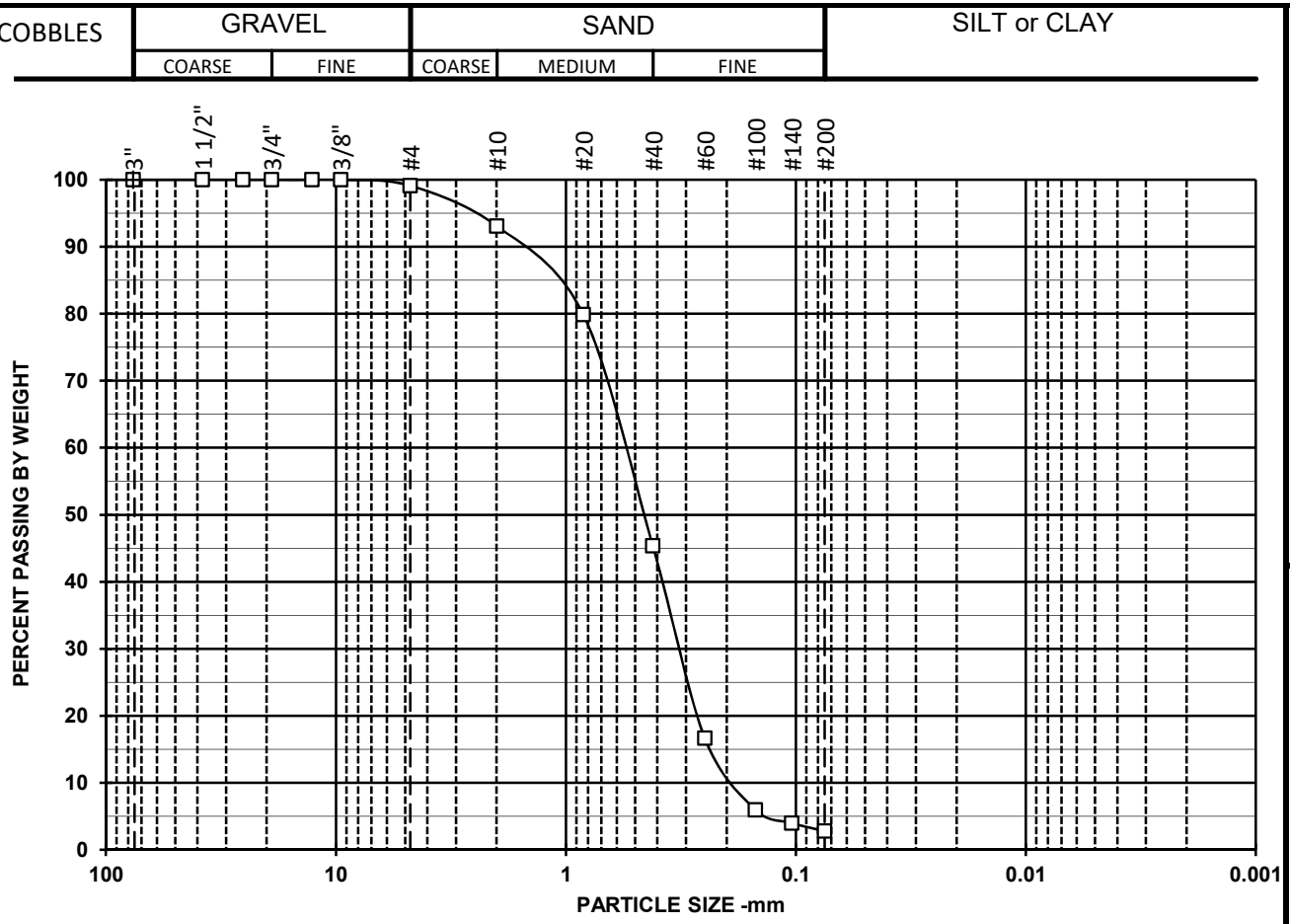
SYMBOL	w (%)	LL	PL	PI	USCS	AASHTO	USCS DESCRIPTION AND REMARKS	DATE
□	19.3				SW-SM		Yellowish brown, Well-graded sand with silt	04/24/19
■	21.1				ML		Brownish gray, Sandy silt	04/24/19
○	22.9				SM		Gray, Silty sand	04/24/19

RSE Associates. Inc.

TerraSense, LLC #8091-19001

Fuller Middle School
Framingham, MA

PARTICLE SIZE DISTRIBUTION



Symbol	□	■	○
Boring	RB-5		
Sample	S-8		
Depth	24-26		
% +3"	0.0		
% Gravel	0.9		
% SAND	96.3		
%C SAND	6.0		
%M SAND	47.7		
%F SAND	42.6		
% FINES	2.8		
D_{100} (mm)	9.530		
D_{60} (mm)	0.563		
D_{30} (mm)	0.317		
D_{10} (mm)	0.181		
Cc	1.000		
Cu	3.1		

Sieve Size/ID #	Percent Finer Data		
6"	100.0		
4"	100.0		
3"	100.0		
1 1/2"	100.0		
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	99.1		
#10	93.1		
#20	79.9		
#40	45.4		
#60	16.7		
#100	6.0		
#140	4.0		
#200	2.8		
5μ m			
2μ m			
1μ m			

SYMBOL	w (%)	LL	PL	PI	USCS	AASHTO	USCS DESCRIPTION AND REMARKS	DATE
□	20.3				SP		Brown, Poorly graded sand	04/24/19
■								
○								

RSE Associates. Inc.

TerraSense, LLC #8091-19001

Fuller Middle School
Framingham, MA

PARTICLE SIZE DISTRIBUTION

RSE ASSOCIATES Inc.

Appendix D

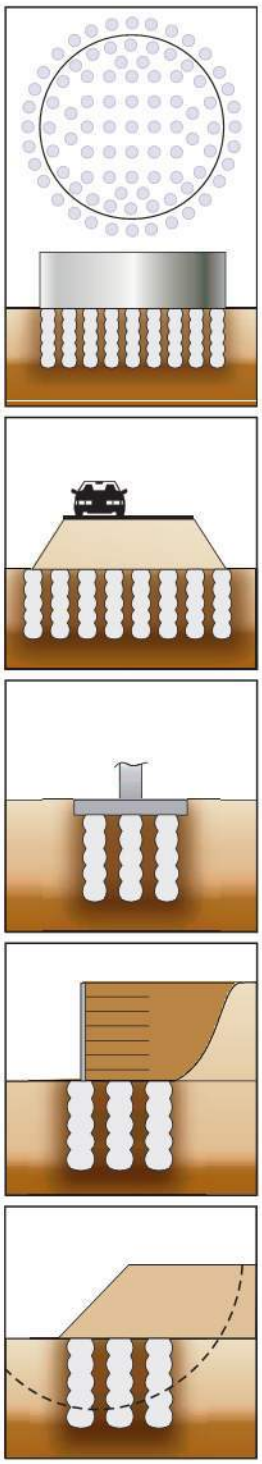
General Information on Aggregate Piers and Rigid Inclusions

HAYWARD BAKER INC.

VIBRO PIERS®

Aggregate Piers for Shallow Foundations

With over 60 years of experience on thousands of projects, Hayward Baker can mobilize quickly to install a Vibro Pier system that is often more cost-effective than other foundation systems.



Vibro Piers, also known as aggregate piers, are typically installed to intermediate depths of 5 to 20 feet for the support of new loads. Suited for light to heavy loads, on large or small projects, Vibro Piers are quick to install and very effective at reinforcing the surrounding soil.

Vibro Piers reinforce the ground to increase bearing capacity, reduce settlement, increase global stability and decrease seismic deformations. Vibro Pier technology utilizes a powerful down hole vibrator to compact select aggregate in lifts. The dense aggregate interlocks to form a stiff pier that engages the surrounding soil to provide reinforcement and increased shear resistance.

As North America's largest geotechnical contractor, Hayward Baker has the resources to design, build and warranty your project. The vibrators are manufactured in-house, ensuring that performance and reliability are the best in the industry. Hayward Baker's network of regional offices and strategically-located, full-service equipment yards means fast mobilization and reduced start-up costs.

HAYWARD BAKER
Geotechnical Construction
KELLER

Vibro Pier Technology…

Vibro Piers incorporate the best aspects of the deep vibratory densification technique with the most cost-effective equipment to install aggregate reinforcement for the support of new loads. The technique was specifically developed as a fast and economical treatment for poorly placed fills and shallow cohesive, mixed and layered soils.

Construction Process

Typical construction begins with pre-drilling the pier location to create a full-depth hole with a diameter that is equal to the final pier design diameter. In soft soils, a slightly smaller diameter may be used due to pier enlargement during compaction.

Aggregate is then introduced to the hole and compacted in lifts by repetitive ramming with a powerful, specially-designed vibrator.

The technique will yield reinforced ground conditions to increase bearing capacity and shear resistance, and reduce settlement from new loads. Anchor bars are incorporated during pier construction when tension resistance is required.

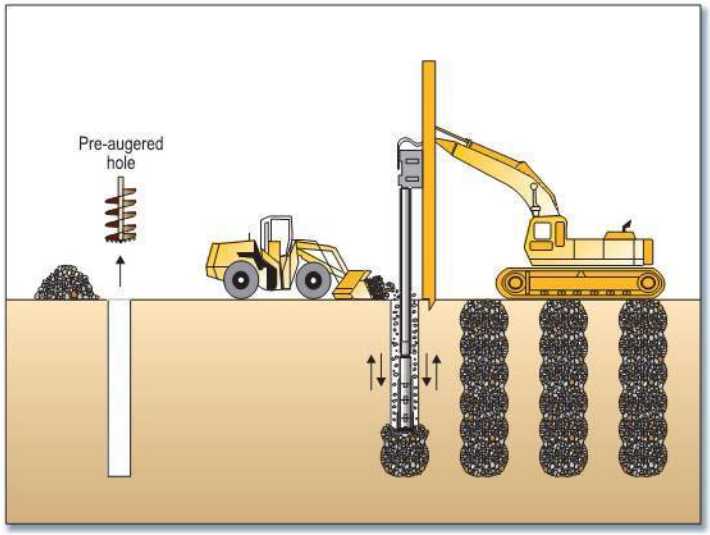
For soils in which the pre-drilled hole will not stay open, the bottom feed process can be used to avoid the need for casing. In the bottom feed process, aggregate is fed through a tremie pipe attached to the vibrator.

For seismic applications, Vibro Piers can be very effective in reducing dynamic settlement. If loose granular layers are present, the process is a very effective densification technique, reducing the liquefaction potential.

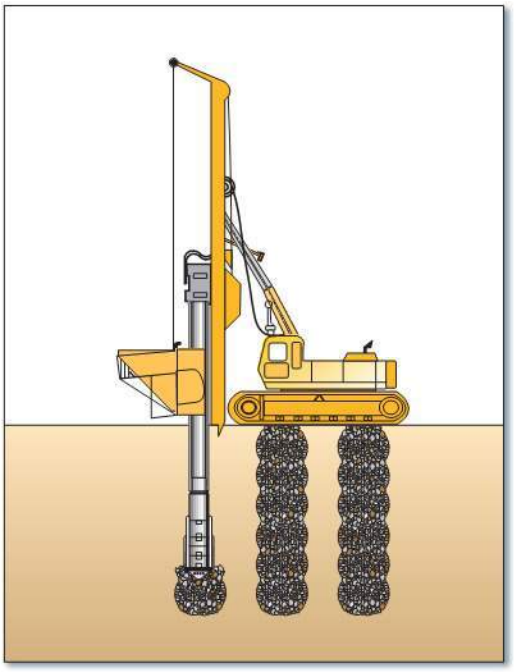
Application

Vibro Piers are suited for support of lightly to heavily loaded structures where soil conditions are soft to medium stiff. Structures that have been successfully supported by Vibro Piers include:

- *Multi-story buildings*
- *Commercial centers*
- *Parking structures*
- *Retaining walls*
- *Warehouses*
- *Wind turbine towers*
- *Storage tanks*
- *Roadway embankments*
- *Schools*
- *Slopes*



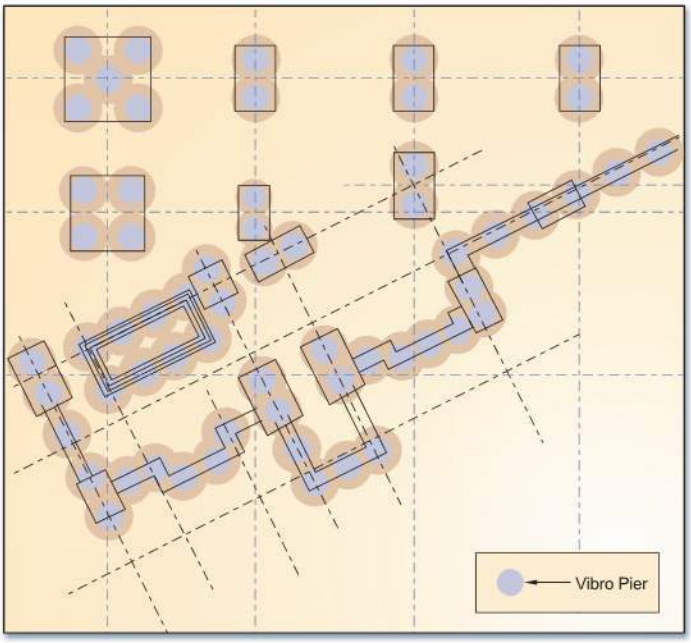
Vibro Pier construction utilizes a pre-drilled hole which stays open during pier construction. A graded, crushed aggregate is then added and compacted in lifts.



With the bottom feed process, the aggregate is conveyed through a tremie pipe to the vibrator tip. The method eliminates the need for casing in unstable soils.

HAYWARD BAKER
Geotechnical Construction

" Vibro Piers significantly reduce construction schedules and project costs by permitting the use of shallow spread footings rather than traditional deep foundation systems."



A typical arrangement of Vibro Piers for the support of a new building foundation.

Site Investigation

Determining the following ground conditions assists in the design:

- *Gradation of the strata*
- *Location of the existing groundwater table*
- *Variation of stratigraphy across the project site*
- *Shear strength and compressibility of the soil*
- *Sensitivity and Atterberg limits*

Design

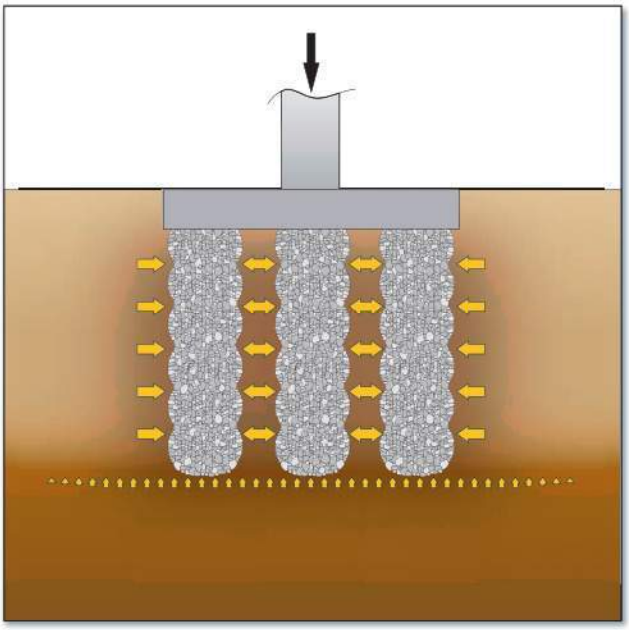
Hayward Baker will design, construct and warranty the Vibro Pier ground reinforcement system.

Quality Control / Quality Assurance

Quality control and quality assurance plans are an essential part of each Vibro Pier program and ensure that the foundation system will meet the project's needs.

Quality control includes procedural inspection and documentation of the work activity, pre-drill diameter and depth, time and energy parameters, aggregate quantity and treatment depth.

Performance of the Vibro Pier system is verified by a Vibro Pier Modulus Test to confirm the pier modulus used in the design.



Schematic of subsurface stress distribution.

Vibro Pier Modulus Test to verify system performance.

HAYWARD BAKER
Geotechnical Construction

Advantages of Vibro Piers

- *Fastest and least expensive of all the ground reinforcement methods for cohesive soils*
- *Cost savings over deep foundation designs*
- *Reduces seismic deformations*
- *Installed with the highest imparted energy of any aggregate pier system*
- *Piers are sized for the design load and soil conditions*
- *Installation methods are customized for the site conditions*
- *Applicable for stabilization of new embankments*
- *Permits construction on soft or uncontrolled fills*

Why Should You Choose Hayward Baker Vibro Piers?

Hayward Baker's network of regional offices and full-service equipment yards means fast mobilization and reduced startup costs. From the job start-up to installation of the last Vibro Pier, attention to quality control ensures that project specifications are achieved.

Using Vibro Piers as part of your foundation system significantly reduces construction schedules and project costs by permitting the use of shallow spread footings rather than a traditional deep foundation system.

Hayward Baker, North America's leader in specialty geotechnical construction, is committed to providing the most economical solution that satisfies the technical requirements of each project. Whether a common situation, or one that requires unparalleled experience and creativity, Hayward Baker assists engineers, contractors and owners with identifying and implementing the right solution for their project.

HAYWARD BAKER
Geotechnical Construction
KELLER

Design-Build Services for the Complete Range of Geotechnical Technologies

Grouting
Cement Grouting (High Mobility Grouting)
Chemical Grouting
Compaction Grouting (Low Mobility Grouting)
Fracture Grouting
Jet Grouting
Polyurethane Grouting

Ground Improvement
Dry Soil Mixing
Dynamic Compaction
Injection Systems for Expansive Soils
Rapid Impact Compaction
Rigid Inclusions (Controlled Stiffness Columns)
Vibro Compaction
Vibro Concrete Columns
Vibro Piers® (Aggregate Piers)
Vibro Replacement (Stone Columns)
Wet Soil Mixing

Structural Support
Augercast Piles
Drilled Shafts
Driven Piles
Franki Piles (PIFs)
Helical Piles
Jacked Piers
Macropiles®
Micropiles
Pit Underpinning

Earth Retention
Anchors
Anchor Block Slope Stabilization
Gabion Systems
Micropile Slide Stabilization System (MS³)
Secant or Tangent Piles
Sheet Piles
Soil Nailing
Soldier Piles & Lagging

Additional Services
BioJet™
Earthquake Drains
Sculpted Shotcrete
Slab Jacking
Slurry Walls
TRD Soil Mix Walls
Wick Drains

Website www.HaywardBaker.com
Email info@HaywardBaker.com

Hayward Baker Inc.
A member of the Keller worldwide group of companies

H1-MAR-20003-JW June 2015

For a complete list of our offices, visit:
www.HaywardBaker.com

THINK SAFE

HAYWARD BAKER INC.

RIGID INCLUSIONS

Rigid Inclusions offer an economical approach for building on sites underlain by soft soil.

Above: HBI installed Rigid Inclusions on a congested downtown site for a hotel constructed on shallow spread footings.

Above right: HBI installed Rigid Inclusions beneath a highway embankment. Rigid Inclusions provided support of the embankment and limited settlement and wait time between embankment construction and paving operations.

Rigid Inclusions (RIs) are high modulus/controlled stiffness grout columns typically installed through weak, highly compressible soils to reduce settlement and increase bearing capacity. A ground improvement system, RIs are not directly connected to foundations. A load transfer platform is often installed between the foundation and the RIs. Settlement reduction is achieved by reinforcement of the highly compressible soils. The geometry, composition, and spacing of RIs are designed based on the subsurface conditions, planned loading and the performance requirements. RIs have been constructed beneath buildings, embankments, and large loaded areas, such as tanks.

HBI has a long history of designing and constructing ground improvement solutions for small and large projects across North America. With its fleet of specialized equipment, HBI has successfully improved a wide variety of poor soil conditions while working on sites with operational and logistical challenges. Internally developed data acquisition software allows for production efficiency and a high level of quality control.

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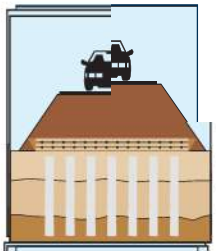
Geotechnical Construction
KELLER

THINK SAFE

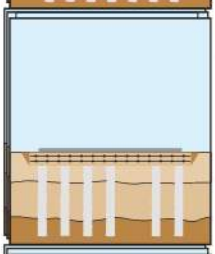
Technology & Applications

Rigid Inclusions reinforce highly compressible soils using [illegible]ut columns. Below are examples of structures that are well suited for support by RIs.



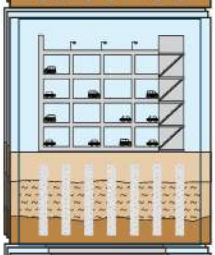
Roadway Embankments

Embankments can be built soon after construction of RIs without the surcharge and wait time required for consolidation to occur, reducing the schedule of transportation infrastructure projects.



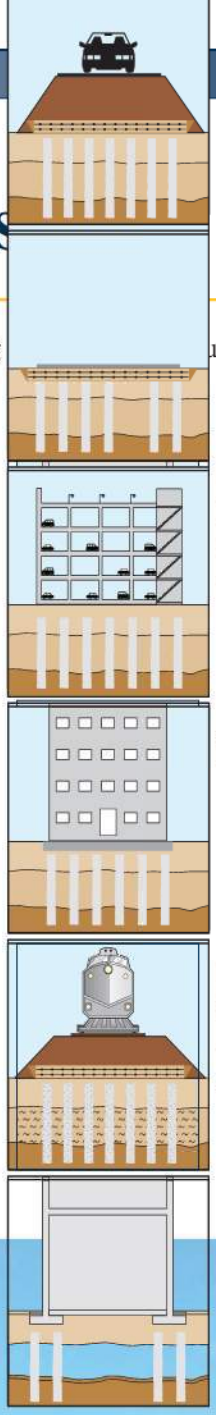
Storage Tanks

RIs can support heavily-loaded aboveground storage tanks to accelerate construction schedule, reduce total settlement, and protect against differential settlements that can threaten structural integrity.



Parking Structures

Multi-level parking structures often have concentrated loads with large, shallow foundations which are well suited for support by RIs.



Isolated Spread Footings

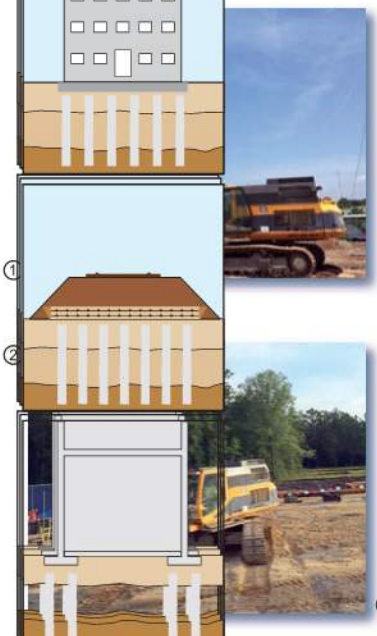
RIs are well suited for reinforcement of soft soils beneath planned isolated or continuous spread footings.

Mat Foundations

Mat foundations are well suited to support buildings constructed over soft soils reinforced with RIs.

Railway Embankments

Similar to roadway embankments, railway embankments can be built over soft soils reinforced with RIs.



① *RIs to support future fill and building loads for a grocery store.*

② *A 110,000-square-foot addition to a building required RIs for slab and foundation support.*

③ *RIs for an outlet mall through a thick compressible clay deposit. RIs reduced the total settlement of new fill required to achieve the planned finished floor elevation. RIs reduced the schedule compared to surcharging and waiting for consolidation to occur.*

④ *RIs to support and mitigate settlment of a new highway embankment.*

⑤ *A university's research building founded on RIs.*

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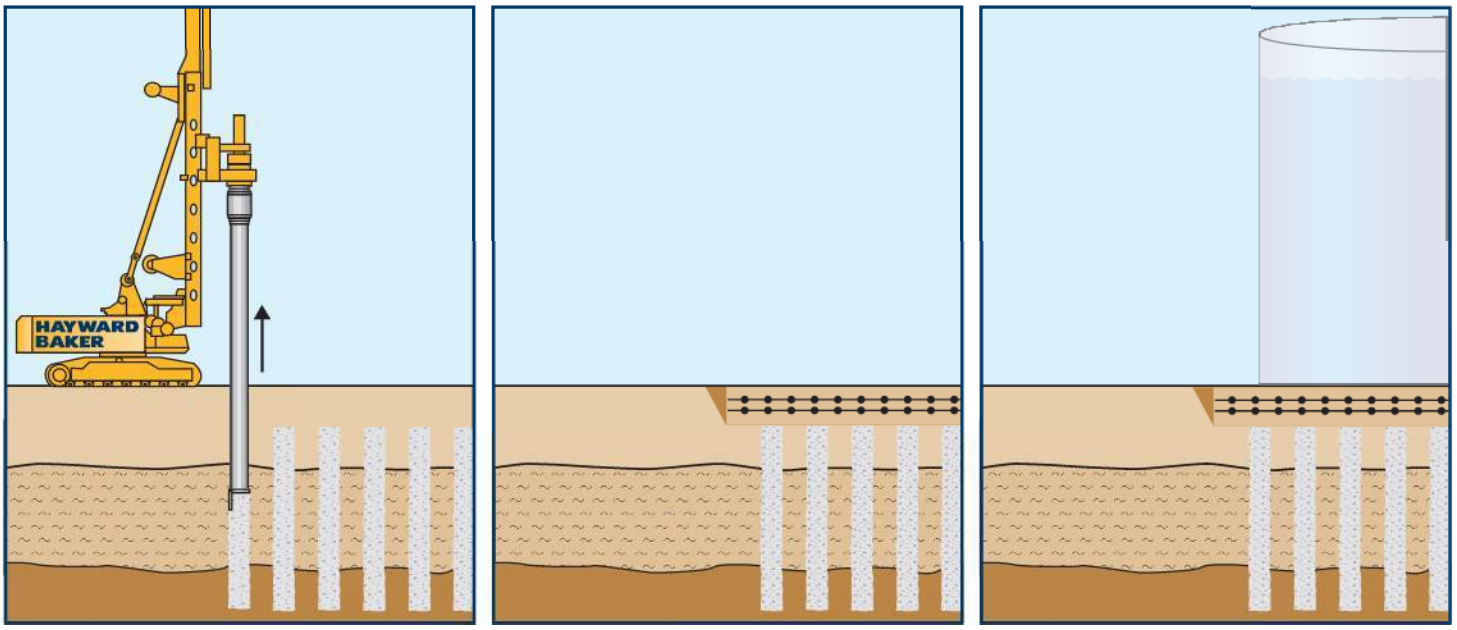
Procedures & Design Considerations . . .



Rigid Inclusion Procedure

The typical installation procedure incorporates a displacement tool mounted on a track-based rig. The equipment advances the tool to the design depth. Granular bearing soils, if present, are densified by displacement. As the tool is raised, the tip opens and the grout mix is pumped through the tool while maintaining a positive grout head during extraction.

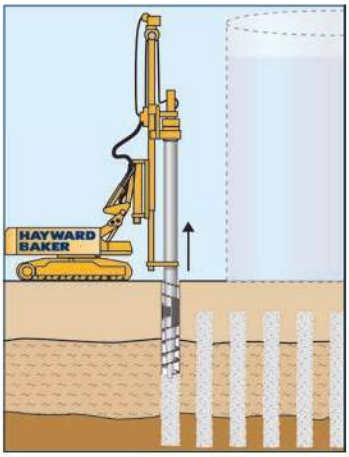
Design Considerations

RIs are particularly well suited for highly compressible soils. The size, length, and spacing of the RI reinforcement elements are designed based on the initial compressibility of the soil and performance criteria for the project.

Because of the complicated soil-structure interaction involved with RI design, Finite Element analysis often supplements traditional geotechnical and structural design calculations.

Load Transfer Platform

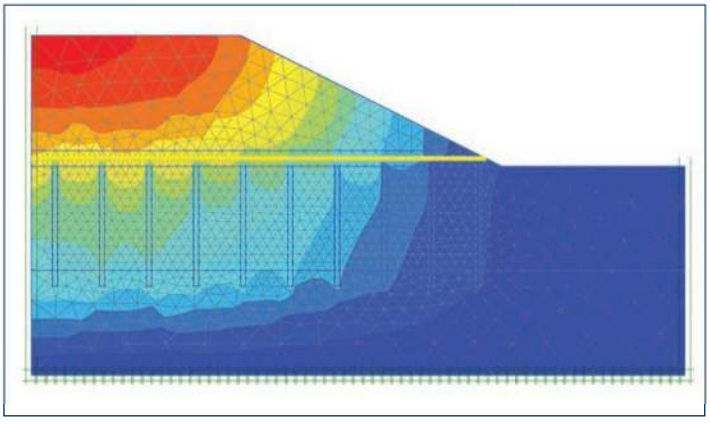
Load distribution to RIs can be provided by a load transfer platform (LTP), which is located between the top of the RIs and the bottom of foundations, slab, and/or embankments. A naturally occurring dense or hard stratum near the ground surface may reduce or eliminate the need for the LTP if the layer has sufficient engineering properties to transfer the load to the RIs.



Above: RI vibratory installation construction sequence.

Left: RI rig with drilled displacement tool.

Below: Finite-Element analysis is typically needed to evaluate the complex soil-structure interaction for the design of RIs.



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Equipment & Materials . . .

Rigid Inclusions have been used to increase allowable bearing pressure and decrease settlement for planned structures, embankments, and tanks.

Rigid Inclusion Rig

The RI rig is typically a fixed-lead track unit equipped with a displacement tool. When installation requires penetration of hard or dense soils, the locations can be predrilled or a drilled auger displacement process can be used.

Grout Delivery

The RI grout mix is either produced on site or delivered by ready mix trucks. A concrete pump is used to transfer the grout to the tool. The grout exits the bottom of the tool, filling the void created by the extraction of the tool. Data acquisition systems can be used to monitor grout placement versus extraction speed.

Grout Mix

The RI grout consists of Portland cement, aggregate, and water and may contain a mineral admixture and fluidifier. Each component is proportioned to produce a pumpable grout with sufficient mechanical properties to maintain column geometry in the soils being treated. The grout mix is designed to provide the 28-day unconfined compressive strength required to meet the design.

Pump transfers grout to RI tool.

Load Transfer Platform

When a load transfer platform is required, it is generally constructed immediately above the completed RIs. The platform consists of granular, structural fill soils and may be reinforced with one or more layers of biaxial geogrid and/or geotextile. The tops of the RIs are typically left slightly below the working surface to reduce the risk of damage by equipment performing subsequent earthwork.

Compaction of granular structural fill during construction of an LTP for a slab supported by RIs.

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Quality Control . . .

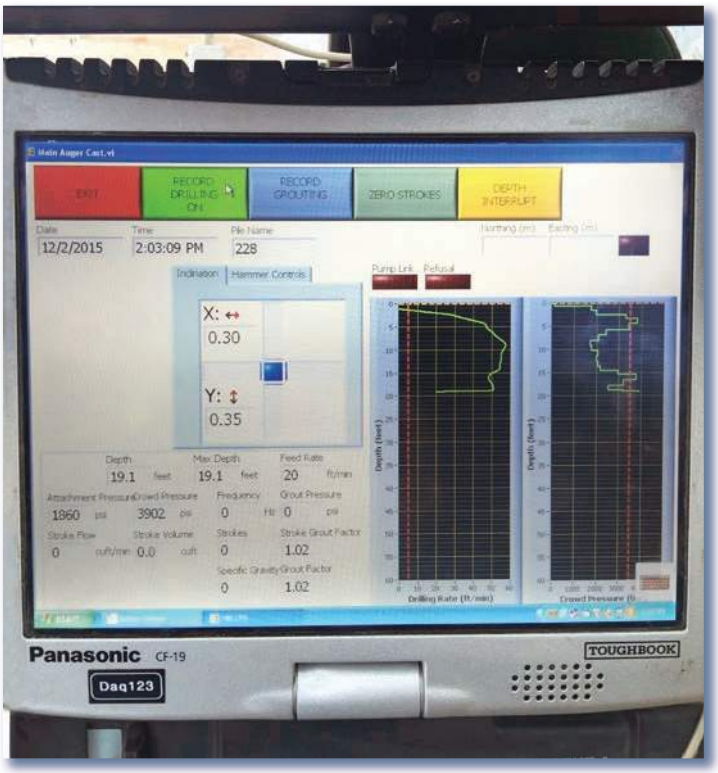
HBI has developed proprietary data acquisition (DAQ) equipment and software for real-time monitoring of all parameters during the Rigid Inclusion process.

Quality control in the field begins with accurate layout of the RI locations. The tool is centered at each staked location within the specified tolerance. For each RI a log is generated providing the following:

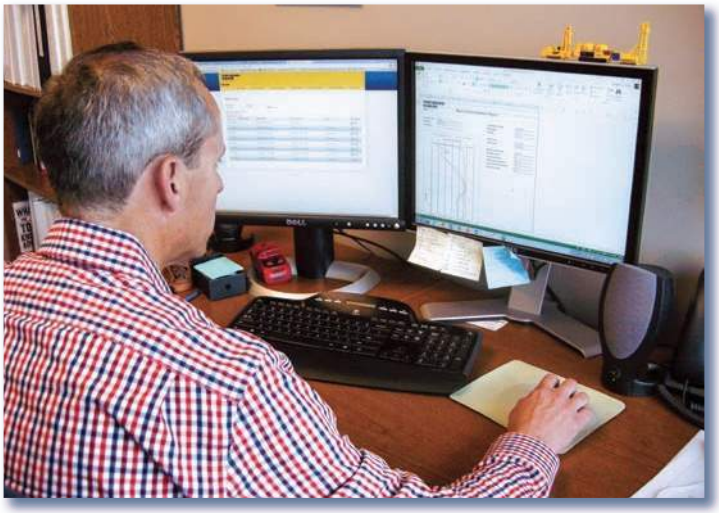
- Project Information
- Column Identification
- Diameter
- Length
- Start Time
- End Time
- Penetration Depth
- Pump Stroke Count
- Neat Grout Volume (Theoretical)
- Actual Grout Volume
- Penetration Rate
- Crowd Pressure or Applied Torque

HBI has developed proprietary data acquisition (DAQ) equipment and software for real-time monitoring and recording of all parameters during the RI construction process. In-cab monitors display real-time quality control feedback to the operator and/or field engineer during construction, and graphically display data such as grout volume and depth alongside specified target values. The DAQ system transmits all data in near real-time to an online central database via cell modem.

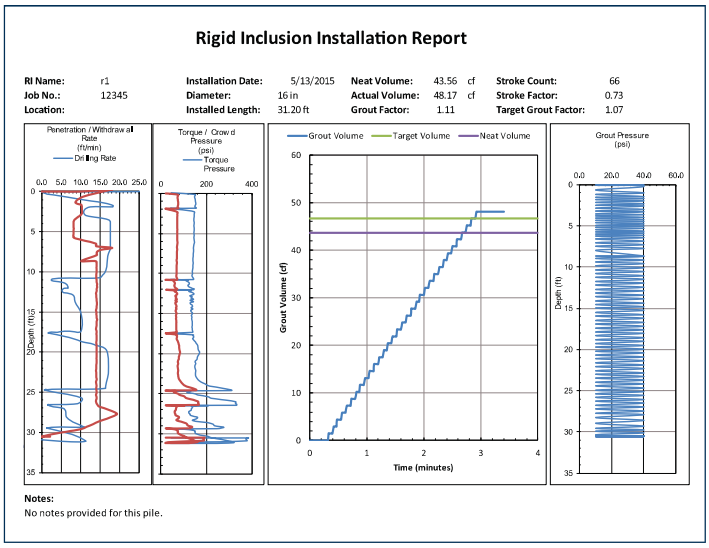
The grout is regularly sampled and cast into cylinders for strength testing after curing. Load testing of a test RI, or group of RIs, can be performed to verify the design assumptions.



In-cab DAQ monitor displaying real-time quality control feedback during RI construction.



Data are transmitted from the field to a server to allow the project manager and designer to review. Reports are available to management and clients shortly thereafter.



Sample RI report.

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Advantages of Hayward Baker Rigid Inclusions

- *Advanced DAQ systems to document performance and provide quality control*
- *Over 40 techniques allow for alternate approaches when required by subsurface conditions*
- *Experienced in load transfer platform design*
- *Variety of equipment and tooling for a range of subsurface conditions and limited access*
- *Experienced with multiple installation methods*
- *Nearly 40 years of experience with a wide variety of applications*

Rigid Inclusion installation for a planned hotel.

You have a strong partner with Hayward Baker

Hayward Baker Inc. (HBI) is North America's leader in geotechnical construction, offering the full range of pre- and post-construction services for foundation rehabilitation, settlement control, liquefaction mitigation, soil stabilization, groundwater control, slope stability, excavation support, underpinning, and environmental remediation. HBI is annually ranked #1 in the profession by Engineering News-Record (ENR).

Headquartered in Hanover, Maryland, HBI has over 30 offices servicing North and Central America. Since its inception, HBI has established itself in the forefront of geotechnical specialty contracting, evolving and expanding to meet the increasingly complex needs of the construction community. HBI offers full design-build services for any geotechnical construction application.

HBI has the experience and innovation to assist engineers, contractors, and owners with identifying and constructing the most economical solution that satisfies the requirements of each project, typical or unique.

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Grouting
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Chemical Grouting
Compaction Grouting (Low Mobility Grouting)
Fracture Grouting
Jet Grouting
Polyurethane Grouting

Ground Improvement
Dry Soil Mixing
Dynamic Compaction
Injection Systems for Expansive Soils
Rapid Impact Compaction
Rigid Inclusions (Controlled Stiffness Columns)
Vibro Compaction
Vibro Concrete Columns
Vibro Piers® (Aggregate Piers)
Vibro Replacement (Stone Columns)
Wet Soil Mixing

Structural Support
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Drilled Shafts
Driven Piles
Franki Piles (PIFs)
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Gabion Systems
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WHITE PAPER

CMC RIGID INCLUSIONS VS. VIBRO STONE COLUMNS/AGGREGATE PIERS

CMC RIGID INCLUSIONS VS. VIBRO STONE COLUMNS/AGGREGATE PIERS

INTRODUCTION Engineers that are unfamiliar with the numerous types of ground improvement techniques often fail to make the appropriate distinctions between Controlled Modulus Column (CMC) rigid inclusions and Vibro Stone Columns (VSCs)/Aggregate Piers (APs), particularly at the design stage. It is necessary to be aware of the various design parameters and site-specific construction considerations when recommending the appropriate technique for a given project site.

BACKGROUND VSCs and APs are inclusions of stone, often installed using a predetermined area replacement ratio that is based on an empirically determined soil improvement factor. VSCs were initially developed to expand the potential uses of the vibroflotation equipment beyond the limits of pure Vibro Compaction (VC). VC is a common means of ground improvement to treat clean, granular soils but is generally ineffective in silty or clayey sands with higher fines content. With the introduction of a granular media, such as sand or stone, the engineering properties of the in situ soil could be enhanced. The added granular material reinforces in situ soils and allows the soil mass to be analyzed as an improved soil with enhanced equivalent stiffness, yielding increased bearing capacity and reduced settlement properties. As the VSC technique developed, design models (Elastic, Priebe, Balaam & Boker) using concepts such as area replacement ratios, stiffness ratios and sand/aggregate friction angles allowed engineers to calculate predicted settlements for specific loads.

VSCs and APs are ideal solutions for soils that can be categorized as being too compressible for economical shallow foundations but not weak enough to warrant a deep pile foundation. In practice, a stiffness ratio typically between 5 to 10 (ratio of the modulus of the column over the modulus of the surrounding soils [Mc/Ms]) is used in design to determine an equivalent composite modulus for the improved layer. A settlement improvement factor (i.e., the ratio between the settlement of the improved and unimproved soil) of 3 is typically the highest value that can be achieved. This limits the effectiveness of VSCs for highly compressible soils. Therefore, in very soft soils the expected stiffness of the VSC/AP-reinforced soils may be less than what is needed to meet the project settlement requirements.

Furthermore, where there are very soft soil conditions, VSCs and APs themselves may not be internally stable, leading to bulging or shearing failures under vertical loading due to a lack of horizontal confinement. Historically, despite the limitations of VSCs and APs in very soft soils, the use of VSCs and APs has grown tremendously across the United States in areas and for structures where intermediate foundation solutions can be used to the benefit of a project.

Development of CMC Rigid Inclusions

The initial development of CMC rigid inclusions has been directly related to the limitations of VSCs and APs in very soft or organic soils. CMC rigid inclusions are installed using a displacement tool and are made of concrete or mortar that sets up to form an internally stable element to reinforce poor soils, without a risk of bulging in layers with low lateral confinement. The concrete or mortar has a modulus of deformation several orders of magnitude higher than the surrounding soils. As a result, CMC rigid inclusions remain highly effective in very soft soils and in certain situations can reduce settlement 10 to 20 times more effectively than VSCs and APs. CMCs are typically designed using finite element models and are predicated on the ability of the load from the structure to arch through a Load Transfer Platform (LTP) into the CMC rigid inclusion, effectively bypassing the soft soils and carrying the load to a more competent layer at depth.

Differences in Design Approach between VSCs/APs and CMC Rigid Inclusions

Most design methods for VSCs and APs assume the following hypotheses based on the fact that the stiffness of the soil and the columns are in the same relative range:

1. Equal settlement planes/strain compatibility between columns and soil
2. Lateral expansion of the columns
3. Load transfer is a function of the area replacement ratio

On the other hand, because the stiffness of the CMC rigid inclusions and the surrounding soils is several orders of magnitude different, the strain compatibility hypothesis cannot be used for CMC rigid inclusions. The load

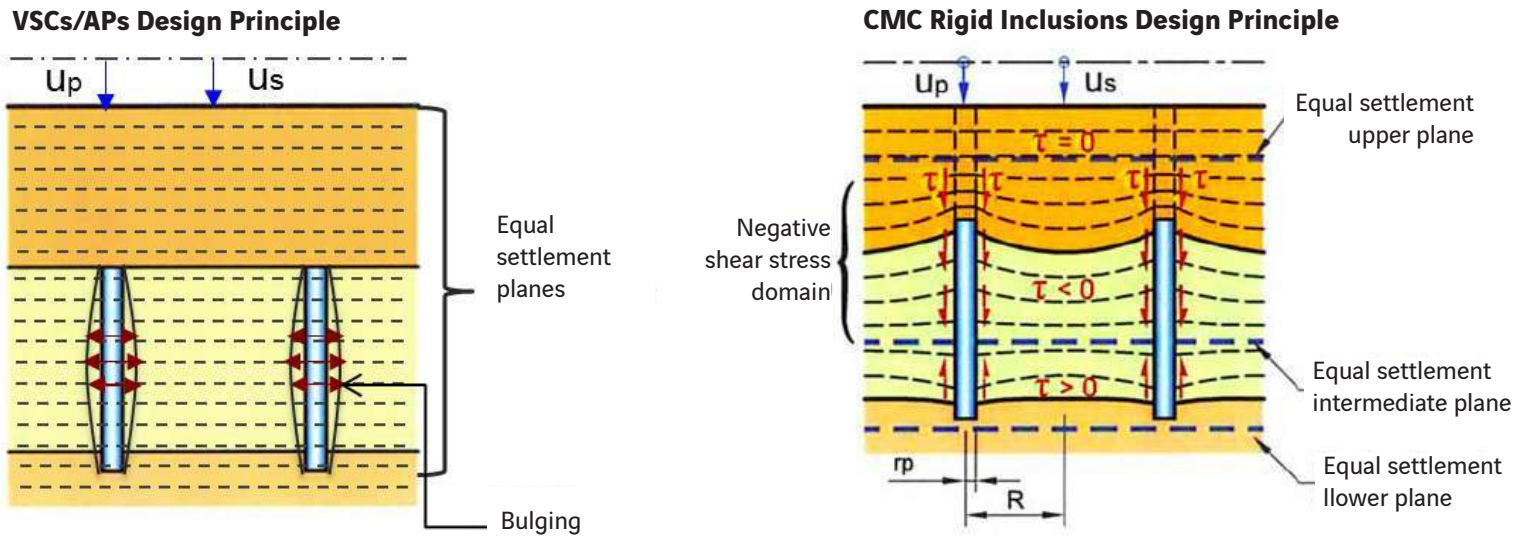

***Fig 1**: Differences in behavior of VSCs/APs and CMC rigid inclusions*

transfer between soil and columns is a more complex phenomenon created by differential strain between soil and columns along the side of the columns. There is only one plane of equal settlement between soil and columns (neutral plane) located along the shaft of the columns at depth, but everywhere else the soil and columns do not deform equally and shear stresses are created at the interface. Because of this complicated soil-structure interaction, finite element analysis is often used to accurately model the interactions at play. Applying the methods used for VSCs and APs (i.e., strain compatibility hypothesis) to a CMC rigid inclusion solution would lead to erroneous results that may not be conservative.

Another fundamental difference between the behavior of VSCs/APs and CMC rigid inclusions is the way the load fom the structure is transmitted to the elements. In the case of VSCs/APs, because of the strain compatibility hypothesis, the load is directly transmitted and distributed between the soil and the columns. Therefore, only a very thin LTP (if any) is necessary to equalize the stresses below a slab, for example. For CMC rigid inclusions, the LTP is a key element of the design, as it allows the creation of an arch that will transmit the load from the structure to the CMC rigid inclusions while limiting the load that is directly transmitted to the poor soils.

Ground Improvement Applications and Soil Type

VSCs are typically installed in soils that range in classification from loose sands with fines to soft clays and silts. VSCs are also the preferred soil improvement technique in soils that have high liquefaction potential, when the fines content is too high for pure VC to be effective. The benefit of using VSCs for liquefaction mitigation is threefold: first, the shear strength of the columns helps to reinforce the soil mass. Second, the stone column installation densifies the liquefiable layers between the columns. And third, the void space in the VSCs' granular material allows for quick dissipation of excess pore water pressures.

Conversely, the soil conditions where VSCs are least suitable are very soft clays and silts with low shear strengths, typically less than 300 to 500 psf. In these conditions, the soil is not stiff enough to provide adequate confinement for the column, and the VSC itself is then at risk of bulging when a vertical load is applied, potentially creating large deformations.

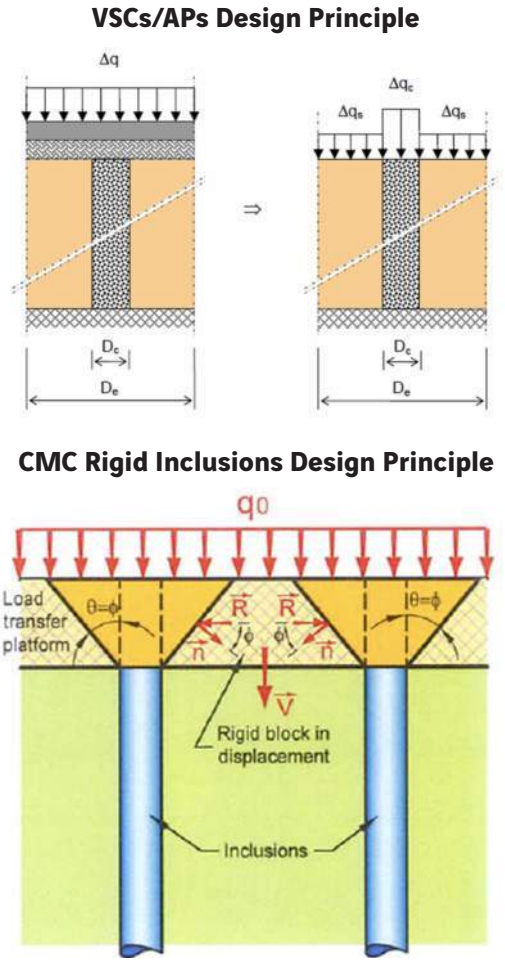

***Fig 2**: Differences in load transfer mechanism in the LTP*

Fig 3 *Installation of VSCs (dry bottom feed method) and of CMC rigid Inclusions (displacement auger)*

CMC rigid inclusions can be used in virtually all soil types, including gravel, sand, clay, silt, peat, and various fills. CMC rigid inclusions are most commonly used to reinforce very soft cohesive soils, where the use of aggregate-based columns is not appropriate. In granular soils, CMC rigid inclusions are often used as a solution on projects where improvement is needed adjacent to settlement- and vibration-sensitive structures, where non-vibratory techniques are necessary. In highly seismic areas, CMC rigid inclusions may need structural reinforcement and/or a hybrid approach with stone columns/earthquake drains to effectively mitigate seismic risk.

Construction Considerations

For VSCs, where stiff or dense soils are encountered or when high area replacement ratios are required, predrilling may be required to achieve the design stone column diameter and depth.

CMC rigid inclusions may also need to be predrilled in very stiff or obstructed layers. However, the drill rigs that install CMC rigid inclusions (high torque and high thrust/pull down force) can penetrate much stiffer/denser ground than can be penetrated with vibratory flots.

CMC rigid inclusions are often installed on grids ranging from 4 to 10 feet on center, but should not be installed on spacings less than 3.5 times the diameter. Similarly, it is extremely rare to see VSCs/APs installed with replacement ratios higher than 25 to 30%.

Obstructions such as buried foundations, slabs and naturally occurring cobbles/boulders will not be able to be penetrated with either VSCs or CMC rigid inclusions, and predrilling or relocation of either type of ground improvement system may be necessary.

Uplift resistance may be provided with either technique, though it is highly simplified and more economical to use the CMC rigid inclusion, as steel reinforcement can simply be set in the fresh grout upon installation of the column.

Both VSCs and CMC rigid inclusions can be installed to depths of over 100 feet, but because of significantly faster installation rates for very deep applications, CMC rigid inclusions are typically more economical. CMC rigid inclusions also allow for greater bearing pressures and a tighter settlement performance in many cases.

CMC RIGID INCLUSIONS VS. VIBRO STONE COLUMNS/AGGREGATE PIERS

CONCLUSION Both VSC/APs and CMC rigid inclusions offer economical intermediate foundation solutions. Selection of one technique over the other is often based either on economic considerations or on the presence of very soft or organic layers within the profile requiring improvement. The load applied by the structure to the compressible soils is also a consideration, as the settlement reduction factor with VSCs/APs is typically limited to 2 to 3. To achieve higher performance with VSCs/APs would require replacement ratios that are typically not constructible.

Other considerations that play a role in the selection of the proper ground improvement technique are depth of the improvement, nature of the improvement required (e.g. settlement reduction, enhanced bearing capacity, slope failure prevention, liquefaction mitigation) and schedule and equipment availability.

GOING FORWARD: Do you have a project that you think would be a good candidate for a VSC/APs or CMC Rigid Inclusions?

Get in touch with Menard today at **412-620-6000** or visit us at **www.menardgroupusa.com** today to find your local Menard representative. For more information, sign up for Menard's newsletter, The Column.

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GEOENVIROMENTAL DATA

1.1 SUMMARY

A. Subsurface soil investigations have been made and chemical analysis on the representative soil samples has been performed. This report entitled " *SOIL MANAGEMENT PLAN - FULLER MIDDLE SCHOOL, FRAMINGHAM MASSACHUSETTS*", dated December 18, 2018 was prepared by McPhail Associates LLC, Cambridge MA, Project 6473.9.00, and is bound herewith.

B. The report describes both existing sub surface soil conditions and environmental site history and regulatory requirements for off-site soils re-use. The data contained herein is to characterize the in situ fill material for off-site reuse.. The Contractor is required to review the SOIL MANAGEMENT PLAN and estimated quantities of fill material that may be excavated during construction. This document provides the Contractor with information in preparation of Bids including Unit Prices. The Architect and Owner will not assume responsibility for variations in subsoil chemical composition, quality or condition.

1.2 CONTENTS

A. The attached 283 pages include as part of this document the following:

1. Report Letter
2. Soil Management Drawings and boring locations.
3. Boring PID headspace results.
4. Boring Chemical results.
5. Appendix A – Limitations.
6. Appendix B – Boring Logs.
7. Appendix C – Laboratory Analytical Results.

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Section 00 41 14

FORM FOR TRADE CONTRACT BID

TO: CONSIGLI CONSTRUCTION COMPANY (Construction Manager)

A. The undersigned bidder proposes to furnish all labor and materials required for completing, in accordance with the hereinafter described plans, specifications and addenda, all work specified in Trade Contract Specification Section No. _____ of the project manual and any subsections included as part of the same Trade and in any plans specified in such sections, prepared by Jonathan Levi Architects, LLP., for Fuller Middle School in Framingham, Massachusetts, for the Contract Sum of

……Dollars
(total Trade Contract bid amount in words)

($ ……)
(total Trade Contract bid amount in numbers)

Alternates: The following alternate prices, are to be added to or subtracted from the above stated Trade Contract proposal. (In the event that an alternate does not affect the Contract Price, the Trade Contract bidder shall remark "No Change".)

For Alternate No. 1: _____.	Add $ ……	Subtract $ ……
For Alternate No. 2: _____.	Add $ ……	Subtract $ ……
For Alternate No. 3: _____.	Add $ ……	Subtract $ ……
For Alternate No. __:	Add $ ……	Subtract $ ……

B. This Trade Contract bid includes the following addenda:

(……) (……) (……) (……) (……) (……)
(indicate addendum numbers received)

C. The undersigned agrees that, if he is selected as a Trade Contractor, he will, within 5 days, Saturdays, Sundays and legal holidays excluded, after presentation of a Trade Contract by the Construction Manager, execute such Trade Contract in accordance with the terms of this Trade Contract bid, and pursuant to section 44D 3/4 , furnish a performance and payment bond of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority (Owner), in the full sum of the Trade Contract price.

D. The names of all persons, firms and corporations furnishing to the undersigned labor or labor and materials for the class or classes or part thereof of work for which the provisions of the section of the specifications for this Trade Contract require a listing in this paragraph, including the undersigned if customarily furnished by persons on his own payroll and in the absence of a contrary provision

in the specifications, the name of each such class of work or part thereto and the bid price for such class of work or part thereof are:

Name	Class of Work	Bid price
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

(Do not give bid price for any class or part thereof furnished by undersigned.

E. The undersigned agrees that the above list of bids to the undersigned represents bona fide bids based on the hereinbefore described plans, specifications and addenda and that, if the undersigned is awarded the contract, they will be used for the work indicated at the amounts stated, if satisfactory to the Awarding Authority.

F. Overhead and Profit for Changes to the Contract: The undersigned Bidder agrees to the maximum mark-up percentages for overhead, profit and taxes, computed on the total of labor and materials only, for additional work authorized by the Awarding Authority during the performance of the Work as indicated in the Conditions of the Contract.

G. The undersigned agrees that the above list of bids to the undersigned represents bona fide bids based on the hereinbefore described plans, specifications and addenda and that, if the undersigned is awarded the contract, they will be used for the work indicated at the amounts stated, if satisfactory to the Awarding Authority (Owner).

H. The undersigned further agrees to be bound to the Construction Manager by the terms of the hereinbefore described plans, specifications, including all supplementary instructions, general conditions stated therein, and addenda, and to assume toward him all the obligations and responsibilities that he, by those documents, assumes toward the Awarding Authority (Owner).

I. The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that he will comply fully with all laws and regulations applicable to awards of subcontracts subject to section forty-four F.

The undersigned further certifies under penalties of perjury that this sub-bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the commonwealth under the provisions of section twenty-nine F of chapter twenty-nine, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

Date of Bid: ……

.....
(Name of Trade Contractor - Company Name)

BY .....
(SIGNATURE of person signing Bid & Title)

.....
(PRINTED Name of person signing Bid & Title)

.....
(Business Mailing Address)

.....
(City/Town, State and Zip Code)

.....
(Business Telephone Number)

Corporate Seal

Note: If the bidder is a corporation, indicate state of incorporation under signature and affix corporate seal; if partnership, give full names and residential address of all partners; and if an individual give residential address if different from business address.

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CITY OF FRAMINGHAM

AGREEMENT FOR CONSTRUCTION MANAGER AT RISK SERVICES

OWNER - CONSTRUCTION MANAGER AGREEMENT

NEW FULLER MIDDLE SCHOOL

AWARDING AUTHORITY: CITY OF FRAMINGHAM

This Agreement ("Contract") is made as of the fourteenth day of February in the year two thousand and nineteen by and between the City of Framingham (the "Owner"), acting by and through the School Building Committee, with a principal place of business at 150 Concord Street, Framingham, Massachusetts 01702 and Consigli Construction Co., Inc. hereinafter called the "Construction Manager" or "CM", with a principal place of business at 72 Sumner Street, Milford, Massachusetts 01757.

The terms used in this Owner - Construction Manager Agreement, are defined in the General Conditions of the Contract and in this Owner – Construction Manager Agreement.

The scope of the work is generally described as follows:

The performance of pre-construction services and construction services, as described in the Contract Documents, during the design and construction of a new three-story Fuller Middle School on the site of the existing Fuller Middle School. The project replaces the aged existing middle school for grades 6-8.

The new school will contain 136,790 GSF in a three-story all new construction east of the existing Fuller Middle School. This concept strives for a compact building footprint while still providing small learning communities as envisioned during the planning stages. The design provides flexibility for multiple organizational concepts, currently as grade-level grouping. The building is clearly and intentionally zoned with public and private areas for safety and security reasons. The site provides adequate parking, fields, separation of cars and buses, and an access road around the building.

PRELIMINARY STATEMENT

A. Pursuant to M.G.L. c. 149A the City of Framingham ("Owner") is undertaking the construction of the New Fuller Middle School (the "Project").

B. The Construction Manager ("CM") shall perform the obligations, responsibilities and liabilities of the Construction Manager under this Agreement.

C. OWNER has engaged Symmes Maini & McKee Associates, Inc. (the "Project Manager"), under a separate agreement to assist OWNER in connection with the Project, as provided in M.G.L. c. 149A, section 2. The Project Manager will assist the Owner in the administration and management of the Project during design and construction. The CM shall fully cooperate with the Project Manager

including, but not limited to, complying with any instructions that the Project Manager may issue on OWNER's behalf.

D. OWNER has engaged the architectural firm of Jonathan Levi Architects (the "Designer"), under a separate agreement to provide design services for the Project. The CM shall fully cooperate with the Designer including, but not limited to, complying with any instructions that the Designer may issue on the Project.

E. Until further written notice from the OWNER to the CM, the CM shall not perform, or permit the performance of, any Construction Phase services, and execution of this Agreement by the OWNER shall constitute authority for the CM to perform, or arrange for performance of, Preconstruction Phase Services only.

NOW, THEREFORE, in consideration of the mutual agreements and obligations of the parties set forth below, OWNER and the Construction Manager do hereby agree as follows:

Article 1. The Work.

1.1 The Construction Manager's Responsibilities. The CM shall perform the Work as required by the Contract Documents to construct the Project.

1.2 Site. The Site is shown in the Site Plans that accompanied the Request for Proposals for Construction Management Services issued by the Owner.

1.2.1 Site Inspection. By executing this Agreement, the CM acknowledges that it has visited the Site and has learned as much about the Site as may reasonably be learned from such an inspection. No information which would reasonably have been obtained by such a site inspection may serve as the basis for any change order proposal or claim for additional costs and/or additional time.

1.2.2 Site Conditions. Information about soil and other subsurface conditions at the Site is provided in the Specifications and the Request for Proposals. Neither the Owner, the OPM nor the Designer represents that such information is a fully complete or accurate indication of subsurface conditions. No change order proposal or claim for additional services and/or additional time resulting from the CM's reliance on such information shall be allowed except as expressly provided in the Contract Documents.

Article 2. The Contract Documents.

2.1 Contract Documents. The following documents forming the Contract, are incorporated by reference herein, and are referred to as the "Contract Documents".

- The Request for Qualifications (RFQ) for Construction Management Services for the Project, including amendments thereto.
- The CM's Response to the Request for Qualifications, as accepted by the Owner.
- The Request for Proposals (RFP) for Construction Management Services for the Project, including exhibits and amendments thereto.
- The Construction Manager's Proposal, as accepted by the Owner.

- The Owner-Construction Manager Agreement, including amendments thereto.
- The General Conditions of the Contract.
- The Plans and Specifications prepared by the Designer, including Addenda.
- All Approved Change Orders/Contract Modifications issued after execution of the Owner Construction Manager Agreement.

Article 3. Relationship of the Parties.

3.1 CM's Obligation. The CM accepts the relationship of trust and confidence between OWNER and the CM established by this Agreement and covenants with OWNER to cooperate at all times with OWNER , the Project Manager, the Designer and any other consultants or project representatives engaged or employed by OWNER, and to utilize the CM's best skill, efforts and judgment in furthering the interest of the OWNER to furnish efficient business administration and supervision; to furnish at all times an adequate supply of workers and materials; and, consistent with the requirements of the Contract Documents, to perform the Work in the best way and most expeditious and economical manner consistent with the interests of OWNER and to make every reasonable effort to achieve time savings and construction efficiencies with respect to the Work. The CM, in performing its services under this Agreement, is an independent contractor and is not an agent or employee of, or a joint venture with, OWNER. The CM shall work in harmony and cooperation with the OWNER, the Project Manager, the Designer, and separate contractors and other persons or entities engaged by OWNER or otherwise employed in connection with the Project, as well as other public agencies having jurisdiction with respect to the Project.

3.2 Standard of Performance. The CM represents that it is experienced and skilled in construction of projects of the type, magnitude and complexity described in the Contract Documents, that it is familiar with the special problems and requirements of construction of the type required for the Project and in the location of the Site, and that it will furnish a complete and fully operable Project as indicated by and reasonably inferable from the Contract Documents.

Article 4. Contract Time.

4.1 Commencement Date. The CM shall begin preconstruction and construction phase services pursuant to the terms and conditions included in written Notices to Proceed ("NTP") that are issued by the OWNER.

4.1.1 Preconstruction Services. The NTP for preconstruction services shall be issued within a reasonable time following execution of the Contract. It may, in OWNER's discretion, instruct the CM to begin only certain portions of the preconstruction services.

4.1.2 Construction Services. The NTP for construction services shall be issued within a reasonable time following the execution of the Guaranteed Maximum Price ("GMP") Amendment as defined in Subsection 6.5.2, provided that, the OWNER intends to issue several NTPs that will authorize the CM to perform the construction of enabling and early packages of work prior to the execution of the GMP Amendment, as described in the Request for Proposals. When an NTP is issued prior to the execution of the GMP Amendment, OWNER may, in its discretion, limit the scope of the NTP in whatever manner it deems appropriate.

4.2 Substantial and Final Completion. The CM shall achieve Substantial Completion of the designated phases of the work and the entire Work, in accordance with Subsection 4.4.1, subject to any adjustments in the Contract Time approved by OWNER in accordance with the Contract Documents (the "Substantial Completion Date"). The CM shall achieve Final Completion for each Phase of the Work, no later than 45 days after substantial completion of the phase of the work. The Substantial and Final Completion Dates for the phases of work shall be subject to extensions of Time that may be approved by OWNER in accordance with the Contract Documents.

4.3 Time is of the Essence. The CM acknowledges that the times of Substantial Completion of the Work, Final Completion of the Work, any other milestones for completion of portions of construction, times for submitting proposals for contract modifications, and other times set forth in the Contract Documents are essential conditions of this Agreement.

4.4 Owner's Damages for Delay

4.4.1 Liquidated Damages. Phase 3. If the CM shall neglect, fail or refuse to achieve Substantial Completion of a Phase of the construction within the Contract Time, as such time may be adjusted in accordance with the provisions of the Contract Documents, the CM shall pay OWNER the amounts set forth in this Subsection 4.4.1 below, not as a penalty, but as liquidated damages to cover certain losses, expenses and damages of OWNER for such failure to substantially complete the applicable phase of the contract in a timely manner in breach of this Agreement. The CM acknowledges that delay in Substantial Completion of the Project will cause Owner to incur administrative, professional, rental, storage, moving, transportation and other costs in the event of such delay. Delay in Substantial Completion will also require OWNER to incur additional costs for compensation to the Designer, the Project Manager and other consultants or contractors for extended or additional work on the Project. In light of the difficulty of determining the costs the Owner will incur, in the event of a delay to the Substantial Completion Date of a phase of the work, the parties have agreed upon the liquidated damages stated below, and said amounts may be retained by the City on or after the scheduled date of Substantial Completion from current progress payments or any other amounts owing to the CM. The liquidated damages amounts that the Owner may assess for not achieving Substantial Completion for a phase of the Work are as follows:

Phase One "Enabling Work" – If the CM fails to achieve Substantial Completion of the Enabling Work by the scheduled date of Substantial Completion, the Owner may assess liquidated damages in the amount of $2,000.00 for each calendar day that the actual Substantial Completion date for this Phase exceeds the contract date for Substantial Completion, as such completion date may be extended by an approved extension of time granted pursuant to Article VI of the General Conditions.

Phase Two "Building Completion" – If the CM fails to achieve Substantial Completion of the Work by the scheduled date for Substantial Completion, the Owner may assess liquidated damages in the amount of $3,000.00 for each calendar day that the actual Substantial Completion date for this Phase exceeds the contract date for Substantial Completion, as such completion date may be extended by an approved extension of time granted pursuant to Article VI of the General Conditions.

Phase Three "Demolition and Site Work Completion" – If the CM fails to achieve Substantial Completion of the Work by the schedule date for Substantial Completion, the Owner may assess liquidated damages in the amount of $1,500.00 for each calendar day that the actual Substantial Completion Date for this Phase exceeds the contract date for Substantial Completion, as such

completion date may be extended by an approved extension of time granted pursuant to Article VI of the General Conditions.

The date of determining when Substantial Completion has occurred for purposes of the assessment of liquidated damages shall be the date of Substantial Completion as stated in the Designer's Certificate of Substantial Completion applicable to each Phase of the Work.

4.4.3 Except as otherwise expressly provided, none of the following shall constitute a waiver of the CM's or its surety's obligations to pay liquidated damages or actual damages, as provided in Subsection 4.4.1 or **4.4.2:**

(a) Acceptance of any portion of the Work or payment to the CM or its surety therefor;

(b) Completion of a portion of the Work or the use or occupancy of a portion of the Work by OWNER or others;

(c) OWNER's requiring or allowing the CM or its surety to complete the Work after the Substantial Completion Date has passed.

4.5 Phasing of the Work.

A summary of the construction phases and substantial completion dates for the Project is as follows:

Phase 1 – "Enabling Work" – August 20, 2019

Phase 2 – "Building Completion" – June 15, 2021

Phase 3 – "Demolition and Site Work Completion" – December 20, 2021

4.5.1 The work will be performed on a phased schedule. Each phase of construction shall have a substantial completion date. On or before the substantial completion date for each phase, the CM shall turn over the completed work for use and occupancy by the Owner for its intended purpose. The CM and the Owner shall agree to a phased completion schedule that shall be incorporated into the Contract. That phased completion schedule shall be in accordance with the Project Schedule included in the Request for Proposals for Construction Management Services.

4.5.2 The phased completion dates, as agreed to, shall be subject to extensions of time as may be approved by the Owner, in the same manner as the Substantial Completion Date of the Entire Work may be subject to extensions of time.

4.5.3 In the event the CM fails to meet the Substantial Completion Date for a particular Phase of the Work, other than the date for the Substantial Completion of the Entire Work, and the Owner does not approve an extension to the phased Substantial Completion Date, the Owner shall be entitled to assess damages in accordance with Subsection 4.4, as applicable.

Article 5. Construction Manager's Services.

5.1 Preconstruction Services. Commencing upon the date of this Agreement, unless otherwise directed in a NTP issued by OWNER, the CM shall perform preconstruction services as provided in this Article and elsewhere in the Contract Documents. The CM's scope of services during the Preconstruction Phase is described in the Request for Proposals, a copy of which is incorporated by reference into this Agreement. Preconstruction services shall be considered complete when all Preconstruction Services as

described in the RFP have been achieved including all sub trade and subcontractor bidding services and the completion and execution of a GMP.

5.1.1 Construction Planning. The CM shall attend regular Project meetings with OWNER, the Project Manager and the Designer. If requested by OWNER, the CM shall schedule and lead such meetings and keep (take) minutes of such meetings. The CM shall consult with OWNER, the Project Manager and the Designer concerning planning for construction of the Project. The CM shall make recommendations as to the purchase and assist in expediting the procurement of long lead items, which are required for the Project to ensure their delivery by the required dates. The CM shall review and, if appropriate, make recommendations with respect to the phasing of the Work, in conjunction with the needs of the Owner. The CM shall advise the Designer with respect to the division of the Work into subtrade categories to facilitate the development of bid and proposal packages, bidding, and awarding of subcontracts, taking into consideration such factors as economies, time of performance, availability of labor and materials, and provisions for temporary facilities.

5.1.2 Construction Services. The CM's scope of services during the Construction Phase is described in the Request for Proposals, a copy of which is incorporated by reference into this Agreement.

5.2 Preconstruction and Construction Services The CM shall perform its preconstruction and construction services, responsibilities and obligations concurrently as necessary during the term of this Agreement.

5.2.1 Design Review. The CM shall review, on a continuous basis, the development of the Drawings, Specifications and other design documents produced by the Designer. Review of the documents is to discover inconsistencies, error and omissions between and within design disciplines. The CM shall consult with OWNER, Project Manager and the Designer regarding the selection of materials, building systems and equipment, and shall recommend alternative solutions whenever design details impact construction feasibility, schedules, cost or quality (without, however, assuming the Designer's responsibility for design) and shall provide value engineering services to OWNER. Without limitation, the CM shall review the design documents for clarity, consistency, constructability, maintainability/operability and coordination among the trades, coordination between the specifications and drawings, compliance with M.G.L. c. 149A for procurement, and sequence of construction, including recommendations designed to minimize adverse affects of labor or material shortages. The CM reviews shall be performed by those project team members approved by the Owner, and provided in writing with detailed notations on the drawings and specifications and coordinated with a detailed spreadsheet of the notations and recommended solutions in order to track the issues to final resolution. The CM shall attend meetings as necessary with the Designer, OWNER and the Project Manager in order to discuss and resolve all issues.

5.2.2 Master Development Schedule. The CM shall develop detailed project schedules, including a for the Work that allows the Owner to take use and occupancy of designated areas of the Work on a Phased basis, and in accordance with the milestone bid packages stated in Section 4.5 of this Agreement. The CM will cooperate with the Project Manager during the development and analysis of these documents. The CM shall coordinate and integrate its Project schedules with scheduling information developed by the Project Manager and other parties. The requirements provided herein are in addition to and not in limitation of the CM's obligation to prepare and maintain the Baseline Critical Path Method (CPM) Schedule and other schedules as provided in the Contract Documents.

5.2.3 Cost Estimates. The CM shall provide four detailed cost estimates to the Owner during the Contract period, as follows:

(a) Within ten days after the CM Contract has been executed, based on the Schematic Design Documents; ; (2) after CM has received the Design Development Pricing Documents; (3) after CM has received 60% Complete Pricing Construction Documents; and (4) after CM has received 90% Complete Pricing Construction Documents. The CM shall prepare, for the review by the Designer and the Project Manager, and approval of OWNER, detailed estimates of the Construction Cost (hereafter defined) with supporting data including but not limited to unit costs of materials, equipment and labor hours required to complete all sections of the work. Estimates are to be prepared in Uniformat II, level 3 and CSI MasterFormat 6-digit format to level 3. As used herein, "Construction Cost" shall mean the total cost or, to the extent the Project is not completed, the total estimated cost of constructing the Project, including the Cost of the Work, the General Conditions Payment, Permit Fees, CM Contingency, and the CM Fee. The Construction Cost does not include costs of land acquisition, financing costs, Owner purchased furnishings and equipment, project manager fees or design fees. The CM shall provide value engineering analysis and recommendations during design and construction in order to maintain the limits of the project budget during design, and the Guaranteed Maximum Price (GMP), thereafter, and as requested by Owner.

(b) The CM shall update and refine its estimate of Construction Cost at appropriate intervals agreed to by OWNER, the Designer and the CM.

(c) Owner may, but shall not be required to, arrange for the preparation of its own periodic estimates of Construction Cost, to be performed by the Designer and/or the Project Manager. The CM shall work in good faith and in cooperation and coordination with the Project Manager and the Designer, and any other consultants involved in preparing estimates of Construction Cost, in order to reconcile any differences between cost estimates prepared by the CM and the cost estimates prepared by such other parties, to clarify assumptions upon which cost estimates are based, and otherwise to address any concerns or questions with respect to such cost estimates raised by the Designer, the Project Manager, OWNER or such other consultants. If the agreed-upon, reconciled estimate of Construction Cost exceeds the initial Construction Budget established by OWNER , the CM shall advise and cooperate with OWNER , the Project Manager and the Designer in identifying, specifying and recommending changes in, or additional specification of materials, equipment, component systems and types of construction, or other adjustments in the scope or quality of the Project (collectively, "Cost Reduction Alternatives"), including contingencies or alternative bid items, so as to facilitate revision of the design of the Project to reduce the Construction Cost so as to comply with the Owner's fixed limit of construction cost. Implementation of any Cost Reduction Alternative shall be subject to the approval of OWNER, and OWNER shall have the right, in its sole discretion, to choose which of the Cost Reduction Alternatives shall be implemented.

(d) The process and responsibilities of the CM described in this Section 5.2 shall also apply to any separate cost limits within the Construction Budget that have been established by OWNER for certain phases, components or elements of the Work.

(e) In addition to the detailed estimates of Construction Cost required under subparagraph (a), the CM shall upon request by the Owner, provide additional cost estimating services related to value engineering and for estimating costs related to Proposed Change Orders , at no additional cost to the Owner.

5.2.4 Permits and Approvals. Consistent with the General Conditions, the CM shall assist OWNER and the Designer in identifying all governmental permits, user fees, approvals and licenses of any kind which must be obtained and be met in connection with the construction and use and occupancy of the Project The CM shall comply with all conditions and mitigation requirements in the permits and approvals that have been issued for the Project. The CM shall be responsible for obtaining all permits, user fees and approvals, including the costs thereof. The CM shall obtain and pay for all permits, inspections and certificates of occupancy for the Project. All applications, requests, appeals, filings and other documents, materials and information prepared by the CM to be submitted to governmental authorities in connection with the Permits and Approvals shall be subject to the prior approval of the Owner, and shall be delivered to the Owner sufficiently in advance of the time of their proposed filing or submission so as to permit a reasonable period for the review and comment of the Owner and its consultants. If requested by the Owner at any time, any such documents or materials to be used in connection with the permits and approvals may be prepared by the Owner or other persons designated by the Owner, and the Owner or other persons designated by the Owners may appear on behalf of the Owner at any hearing, presentation or conference. In addition, the CM shall promptly complete and provide such other documentation as may be requested by the Owner, any of its agencies, or such other parties as the Owner may indicate.

5.2.5 Progress Reports. The CM shall furnish to the Owner's Project Manager monthly reports, on the 5th day of the month, concerning the progress of the work which address: (a) compliance with the construction schedule, (b) status of major scopes of work being performed by the CM and subcontractors, (c) status of shop drawings, submittals, RFI's and material procurement, (d) manpower status, (e) safety/occurrences, (f) status of change orders, (g) 30 day look ahead schedule, (h) MBE/WBE status updates, and (i) other matters relating to the progress of work as directed by the Owner's Project Manager or the Massachusetts School Building Authority (MSBA).

5.2.6 Subcontracts. Unless the Owner authorizes the CM to self-perform any of the Work during construction, all Work shall be performed by the CM pursuant to Subcontracts awarded by the CM in accordance with the General Conditions of the Contract, particularly Appendix C: Procedures for Award of Subcontracts. The CM shall perform the overall management of the effort required to solicit and prequalify, receive subbids and proposals and award subcontracts to the subcontractors who perform services hereunder, in accordance with the procedures specified in Appendix C, provided, however, that the Owner shall procure bids from Trade Contractors, as provided in Appendix C.

(a) The CM shall consult with OWNER with respect to the procurement of bids for all subcontracts. The CM understands and agrees that OWNER or the Project Manager may, to the extent described in the General Conditions of the Contract, Appendix C - Procedures for Award of Subcontractors, participate in negotiations with Subcontractors and that OWNER and its representatives shall have access to any documents submitted by all Trade Contractors and Other Subcontractors to the CM, for review as to compliance with bidding and proposal procedures and other requirements of the Contract Documents. No Subcontract or other agreement between the CM and any third party for the furnishing or supply of any labor, materials or equipment in the performance of the Work shall be entered into without

OWNER's prior written approval. Such written approval by Owner may take the form of an approval of a list of subcontractors and the dollar value of the subcontracts that CM intends to execute on this Project. Standard forms of subcontract agreement for all Trade Contractors are attached to the General Conditions of the Contract. No material revisions shall be made to any such Subcontract or other agreement approved by the Owner without the prior approval of the Owner. Copies of all executed Subcontracts shall be provided to the Owner promptly. The CM shall include all costs, with respect to the procurement of bids for all subcontracts, however the Owner shall pay for reproduction costs associated with the procurement of bids for Trade Contractors.

(b) CM shall develop and assemble the front-end documents, the Scope of Work, and Supplementary General Conditions and any other documents for use with the Trade Contractors.

(c) In the case of procuring non-trade subcontracts, the CM shall oversee and manage the complete bidding process, including distribution of Bid Documents, management and tracking of plan holders and deposits, receipt of bidder questions, and issuance of Addenda in consultation with Owner, Project Manager and Designer.

5.3 Construction Services. In accordance with the Notice to Proceed with Construction, the CM shall perform Construction Services as provided in these paragraphs and elsewhere in the Contract Documents.

5.3.1 Construction Cost Monitoring. The CM shall provide a system of Project cost monitoring and reporting, and shall develop cash flow reports and forecasts in the format approved by OWNER upon the advice of Project Manager. The CM shall identify variances between actual costs and its estimated costs and shall immediately advise OWNER whenever projected costs exceed previous estimates. Such reports and other information shall be included in the Monthly Progress Reports to be submitted to the Owner.

5.3.2 Costs of Construction shall, in no event, exceed the Guaranteed Maximum Price that will be negotiated between CM and Owner.

5.3.3 Quality Assurance/Quality Control. In addition to the Owners independent testing and inspection services, the CM shall be responsible for insuring that adequate quality assurance and quality control programs are developed, implemented and enforced by the CM's staff and all Subcontractors. The CM shall designate an experienced quality manager, employed by the CM, whose responsibility shall be quality assurance and quality control and who shall be responsible for reviewing and coordinating the quality control activities of all Subcontractors and monitoring the implementation and enforcement thereof in connection with all aspects of the Work. The CM shall report to the Owner, Project Manager and Designer any deficiencies, and a recommended plan for corrective action.

5.3.4 Prevailing Wage. Work under this project is subject to the prevailing wage laws M.G.L. c. 149, §26-27 H. The schedule for prevailing wages will be provided as applicable and prior to the negotiation of the GMP. The CM and its subcontractors shall be responsible for anticipating the costs of future changes to the prevailing wage rates in their bid prices, provided that for change order work, the CM and the subcontractor will be entitled to apply the wage rates in effect at the time the extra work is performed.

5.3.5 CM Responsibility for Managing Construction The CM shall be responsible for managing, coordinating, scheduling, and supervising all aspects of the construction of the Work, as described in this Agreement, the General Conditions, and all other Contract Documents.

5.4 General Requirements for Preconstruction and Construction Services

5.4.1 Design Related. CM shall provide Owner with recommendations and advice concerning design of the Project and modifications or alternatives. If the CM recognizes or discovers that any portion of the Drawings and Specifications are in error, unclear, ambiguous, or at variance with applicable laws, the CM shall promptly notify the Designer, the Project Manager and OWNER in writing. By providing such notice, it is understood that the CM does not assume any obligations or responsibilities for the design of the Project, which obligations shall remain with the Architect. If, however, the CM proceeds with work based on Drawings and Specifications that CM knows are in error, unclear, ambiguous, or at variance with applicable laws, without providing such notice to the Designer and the Project Manager, the CM shall bear all costs related to the correction of such work.

5.4.2 CM's Organization and Staff. The CM shall establish a table of organization and lines of communication required to carry out the requirements of this Agreement in order to organize and direct the efficient construction of the Project. A listing of the CM's key staff who will perform services directly on this Project, has been provided in CM's Proposal in Form D and Form E and is incorporated herein. All key staff shall be available for and actively participate in the performance of the services provided under the Contract Documents. No substitution of any assigned and approved key staff shall be made by the CM without the prior written consent of OWNER in its reasonable discretion. Before any such substitution is made, the CM shall submit to OWNER the qualifications of any proposed replacement. The removal or replacement, without OWNER's consent, of any of the key staff listed in CM's Proposal, other than as a result of retirement, disability, death or bona fide termination of employment, shall constitute a material breach of this Agreement and the Owner reserves the right to terminate the Agreement and assess damages. Within thirty (30) days after execution of this Agreement, the CM shall furnish to OWNER a detailed organizational chart (the "Organizational Chart") for approval by OWNER. Such chart shall reflect the same persons as set forth in the Proposal unless otherwise approved by OWNER, and shall identify each staff position, the anticipated start date and end date for each identified staff person and the estimated personnel cost on account of each such staff person. All modifications to the Organizational Chart after initial approval by the Owner must be approved by the Owner, such approval not to be unreasonably withheld. The Owner may require replacement of any member of the CM's staff with or without cause, and may require increased levels of staffing by the CM, at no increase in the Contract Price, if necessary to achieve proper production, management, administration or superintendence, or if otherwise necessary to maintain progress in accordance with the Project Schedule. By executing this Agreement, the CM certifies that the CM and each member of its key staff comply with all licensing, registration and other requirements applicable to the CM and the performance of its services hereunder pursuant to Applicable Laws. Furthermore, the Owner shall have the right to require the CM and any Subcontractor to replace any on-site personnel who it reasonably finds objectionable, with other personnel approved by the Owner.

Article 6. Contract Price

6.1 Contract Price.

6.1.1 OWNER shall pay to the CM the Contract Price for the CM's proper performance of the Contract and completion of the Work. The "Contract Price" consists of the Pre-Construction Services Fee described in Section 6.2.1, the General Conditions Amount, described in Section 6.2.2, the Cost of the Work, as defined in Article 7, and the CM Fee as defined in Section 6.3. The total payments to the CM (the Contract Price) shall not exceed the Guaranteed Maximum Price ("GMP") to be agreed to by the Parties in a Contract Amendment that will be negotiated after Contract execution.

6.1.2 For Change Orders or Contract Modifications authorized by the Owner pursuant to the Contract Documents, the Contract Price shall be adjusted as provided in Section 6.2.4 below and Article VII of the General Conditions and not otherwise. After the GMP has been agreed to by OWNER and the CM, any increase or decrease in the Contract Price authorized by OWNER by execution of a Change Order, shall increase or decrease the GMP, accordingly.

6.1.3 The CM's Fee Proposal, submitted on Forms F, G, and H, designates the contract amounts for the Pre-Construction Services Fee, the Construction Manager's Fee, and the General Conditions. Forms F, G and H are made part of this contract at Exhibit 1.

6.2 Contract Price Breakdown

6.2.1 Preconstruction Services Fee. The Pre-Construction Services Fee is in the lump sum amount of [redacted]. From the commencement of the Preconstruction Period through the end of the Preconstruction Period, monthly payments for the Pre-Construction Services shall be in accordance with the Pre-Construction Services Fee specified on Exhibit 1, subject to a cap of [redacted]

6.2.1.1 The Owner may, after execution of the Contract, authorize the CM to spend additional amounts for testing and exploratory work, during the Pre-Construction Phase.

6.2.1.2 In the event that conditions arise that cause the Pre-Construction Services to be extended, the Owner reserves the right to negotiate a revision to the monthly amount of the Pre-Construction Services Fee, to reflect any changes in the CM's workload during the extended Pre-Construction Phase period. Those revisions may include a reduction in the value of the monthly Pre-Construction Services Fee, reflecting workload decreases or reductions in the number of the CM's personnel assigned to the Project.

6.2.2 General Conditions Amount. In consideration of the performance by the CM of the items of work described in the Contract Documents as General Conditions, OWNER shall pay to the CM, as full and complete compensation for all General Conditions costs incurred in the performance of such work, the lump sum amount specified on Exhibit 1, for General Conditions. The Amount of General Conditions is in the lump sum amount of [redacted] The total dollar value for General Conditions Costs set forth in Exhibit 1 represents the maximum amount to be paid to the CM for all General Conditions Costs during the Construction Phase, unless Owner agrees to a Change Order that revises the cost items covered by General Conditions. Those revisions may include a reduction in the value of the monthly General Conditions Costs, reflecting decreases of the monthly General Conditions required on the Project.

6.2.3 Construction. During the Construction Period, monthly payments shall be made to the CM on account of General Conditions Costs. Prior to the commencement of construction services, the Owner and CM shall agree to a Schedule of Values for the payment of General Conditions during the Construction period. For each month or partial month during the period from the

commencement of the Construction Period through Final Completion, the CM shall submit a monthly invoice to the Owner requesting payment of the Construction Period General Condition Costs.

6.2.4 General Conditions Mark-Up on Change Orders. If the Construction Manager performs additional work under a Change Order approved by OWNER, compensation, if any, due to the Construction Manager for General Conditions related to the Change Order work shall be computed as a percent markup on the direct costs of the Change Order, as described in Article VII of the General Conditions of the Contract.

6.2.5 General Conditions Breakdown. The CM shall provide a detailed breakdown of its General Conditions costs that complies with the General Conditions cost breakdown required by the Massachusetts School Building Authority. Payments for the CM's invoices for General Conditions costs shall not be processed until the CM has provided a breakdown of the General Conditions in a format that is acceptable to the Owner and the MSBA.

6.3 Construction Manager's Fee.

6.3.1. Construction Manager's Fee for Construction Services. In further consideration of the performance of the Construction Services by the CM, OWNER shall pay to the CM a fee associated with performing the construction services in the amount identified on Exhibit 1 as Fee/Profit. The Construction Manager's Fee is in the lump sum amount of [redacted] Payment of the Construction Manager's Fee shall be made on a monthly basis. The amount of the monthly payments shall be determined by applying the percentage of the Cost of the Work approved for payment by OWNER, to the total amount of the Construction Manager's Fee set forth in Exhibit 1 and deducting from such value any amounts previously paid to the CM on account of the Construction Manager's Fee. Owner and CM may alternatively agree to pay the Construction Manager's Fee based upon a fixed monthly amount, provided the cumulative amount of such monthly payments shall not exceed the Construction Manager's Fee.

6.4 No Retainage on Pre-Construction Services; Retainage on Payments during Construction. The Owner shall not assess retainage against the payments for the Pre-Construction Services Fee. Payment to the CM for the Cost of Work and the Construction Manager's Fee shall be subject to the procedures contained in Article VIII of the General Conditions, including a five percent retainage on monthly payments.

6.5 Guaranteed Maximum Price.

6.5.1 Upon the request of the Owner, the CM shall submit to OWNER a proposed GMP, which shall be the sum of the estimated Cost of the Work, the Construction Contingency (hereafter defined), the General Conditions Amount, the CM Fee for Pre-Construction Services, and the Construction Manager's Fee. The CM shall include with the GMP proposal a written statement explaining the basis of the GMP, in form and substance satisfactory to OWNER, which shall include at least:

(a) a list of the Project design documents upon which the GMP proposal is based;

(b) a list of allowances and a statement of their basis;

(c) a list of any assumptions, qualifications and clarifications made by the CM and mutually agreed upon with the Owner, the OPM and the Designer in the preparation of the GMP proposal to supplement the information contained in the Project design documents;

(d) a statement that the proposed GMP is based on the Baseline CPM Schedule and the Substantial Completion Dates for each phase of the work specified in this Agreement;

(e) the proposed GMP, including a detailed statement of the actual and estimated Cost of the Work organized in accordance with the categories of work used in the CSI (Construction Specification Institute) format with quantities, units, and unit rates, Preconstruction and Construction General Conditions Costs, allowances, Construction Contingency, Preconstruction Services Fee and Construction Manager's Fee and other items that comprise the GMP;

(f) a schedule of applicable alternate prices;

(g) a schedule of applicable unit prices; and

(h) the time limit for acceptance of the GMP proposal (which shall not be less than 90 days).

6.5.2 The CM shall meet with OWNER, the Project Manager and the Designer, as necessary, to review the GMP proposal and the written statement of its basis. In the event that OWNER, Project Manager or the Designer discover any inconsistencies or inaccuracies in the GMP proposal and accompanying information, they shall promptly notify the CM, which shall make appropriate revisions thereto. OWNER may elect, in its sole discretion, to accept or not to accept the CM's GMP proposal, as such proposal may be revised by agreement with the CM and Owner. Prior to OWNER's acceptance of the CM's GMP proposal, the CM shall not incur any cost to be reimbursed by OWNER, except as provided in this Contract or as OWNER may specifically authorize in writing. If OWNER accepts the CM's GMP proposal, OWNER and CM shall execute and deliver within fifteen (15) days after such acceptance, an amendment to this Agreement, in form acceptable to OWNER and the CM incorporating the GMP amount into the Contract (the "GMP Amendment"). The CM shall execute and deliver together with the GMP Amendment, performance and payment (labor and materials) bonds in the form provided by the Owner, executed by a surety licensed by the Massachusetts Division of Insurance and acceptable to the Owner. Each such bond shall be in the full amount of the GMP. These bonds shall be substituted for the bonds obtained from the CM at the time of signing the Contract, which said bonds shall be returned to the CM by the Owner.

6.5.3 If OWNER does not accept the CM's GMP proposal, OWNER may elect to solicit bids or proposals for the construction of the Project from other contractors, using any solicitation method or methods chosen by OWNER, consistent with applicable laws and procedures, or, if OWNER determines that it is in its best interest to do so, OWNER, through the Selection Committee, may enter into negotiations for a contract and guaranteed maximum price amendment with one additional proposer starting with the next highest ranked proposer that submitted proposals in response to the Request for Proposals for this Contract. Pursuant to M.G.L. c. 149A, s. 7, in the event a contract and guaranteed maximum price amendment cannot be successfully negotiated between the Selection Committee and the next highest ranked proposer, the OWNER shall terminate the procurement process and shall instead procure the project in accordance with M.G.L. c. 149 ss. 44A-44J. If OWNER does not accept the CM's GMP proposal within the time limit for acceptance specified in the GMP proposal, as it may be extended by agreement of the parties, then this Contract shall

terminate upon the completion of the CM's performance of the Work then in progress or upon notice from OWNER as provided in the General Conditions.

6.5.4 In the event the Contract is terminated for failure to agree to a GMP, Owner's obligations to CM shall be limited to those provided in Article XVII, para. 2 of the General Conditions, for a Termination for Convenience.

Article 7. Cost of the Work.

7.1 Cost of the Work. The "Cost of the Work" shall mean those costs listed in this Section.

Cost of the Work shall not include any item included in the General Conditions Costs or the CM's Fee for Pre-Construction Services or the CM's Fee for Construction Services. Costs of the work include:

7.1 .1 Subcontract Costs. Payments made by the Construction Manager to any Subcontractor in accordance with the requirements of an approved Subcontract.

7.1.2 Costs of Materials and Equipment Incorporated in the Completed Construction

(a) Costs, including transportation, of materials and equipment incorporated or to be incorporated in the completed construction, less all discounts and rebates.

(b) Costs of materials described herein which are in excess of those actually installed, but which are required to provide reasonable allowance for waste and spoilage. Unused excess materials, if any, shall be delivered to OWNER at the completion of the Work or, at OWNER's option, shall be sold by the Construction Manager. Amounts realized, if any, from such sales shall be credited to OWNER as a deduction from the Cost of the Work.

7.1.3 Costs of Work CM Self Performs. The CM's direct costs for construction work it self-performs, provided that in no event shall such work include cost items included in the General Conditions Costs, the CM's Fee for Pre-Construction Services or the CM's Fee for Construction Services.

7.1.4 Emergencies and Repairs to Damaged or Nonconforming Work.

The following costs incurred by the Construction Manager shall become a part of the Cost of the Work:

(a) in taking action to prevent threatened damage, injury or loss in case of an emergency affecting the safety of persons and property, as provided in the General Conditions.

(b) in repairing damaged Work, provided that such damage did not result from the fault or negligence of the Construction Manager or the Construction Manager's personnel or any Subcontractor, and only to the extent that the cost of such repairs is not recoverable by the Construction Manager from others or the Construction Manager is not compensated therefor by insurance or otherwise.

(c) in correcting defective or nonconforming Work, provided that such defective or nonconforming Work did not result from the fault or negligence of the Construction Manager or the Construction Manager's personnel or any Subcontractor or material

supplier, and only to the extent that the cost of correcting the defective or nonconforming Work is not recoverable by the Construction Manager from third parties or the Construction Manager is not compensated by insurance or otherwise.

Any costs incurred by the CM which would otherwise be within the scope of this Subsection, but are excluded because such costs result from the fault or negligence of the CM, the CM's personnel, any Subcontractor or any other party for whom the CM is responsible, may only be charged against the Construction Contingency to the extent permitted by Paragraph 7.2.1 (e), and any such costs incurred after the Construction Contingency has been exhausted shall not be reimbursable as a Cost of the Work.

7.1.5 Miscellaneous Costs of the Work

The following costs shall be included in the Cost of the Work:

(a) Subcontractor Bond premiums.

(b) Royalties and license fees paid for the use of a particular design, process or product required by the Contract Documents in accordance with the General Conditions.

(c) Other costs incurred in the performance of the Work if and to the extent approved in advance in writing by OWNER as Costs of the Work.

7.2 Construction Contingency.

7.2.1 The term "Construction Contingency" shall mean the line item included by the CM in the GMP and the Schedule of Values that is available to cover the net amount of any additional costs resulting from unforeseen conditions and events not reasonably anticipated at the time that the CM awards a Subcontract or the parties execute the GMP Amendment, as applicable, to the extent that such conditions or events do not result in or constitute a change in the Work. Examples of such unforeseen conditions and events include, but are not limited to, the following:

(a) minor concealed or unknown conditions encountered in the performance of the Work which are determined not to be materially different from those indicated in the Contract Documents;

(b) unanticipated cost overruns during the CM's procurement of Subcontracts or other purchases of materials or labor costs, provided that the same are not caused by the fault, negligence, or breach of contract of the CM or any Subcontractor;

(c) expediting or acceleration costs required to meet the Baseline CPM Schedule, as long as the same are not made necessary by the oversight, omission, fault, negligence, or breach of contract of the CM or any Subcontractor; and

(d) such other unforeseen events and conditions as may be specified in the Contract Documents as chargeable to the Construction Contingency.

After execution of the GMP Amendment, if the contract price of any recommended subcontract award or of any recommended line item "hold" amount is less than the amount carried for such subcontract in the GMP breakdown, the Construction Contingency may be increased at the discretion of the Owner, by the amount of such savings. If the amount of subcontract award or any

line item "hold" amount is greater than the amount carried for such subcontract in the GMP breakdown, the CM shall be able to charge the Construction Contingency for the increased costs.

7.2.2 The CM shall maintain and update monthly a report describing each item that has been funded from the Construction Contingency and each item for which the CM has requested funding from the Construction Contingency, that is pending with the Owner.

7.2.3 Costs authorized to be reimbursed from the Construction Contingency by Paragraph 7.2.1 shall be paid to the CM as Cost of the Work only if and to the extent approved by OWNER. The Construction Contingency shall be reduced by the additions to the Cost of the Work resulting from the use of the Construction Contingency as authorized by Paragraph 7.2.1. In the event the CM demonstrates that it has incurred or is about to incur additional costs for unforeseen conditions or events that fall within the parameters of subparagraphs (a) through (d) of Paragraph 7.2.1, the CM shall be entitled to be paid for such costs from the Construction Contingency, with the prior approval from OWNER at its discretion. The CM shall not receive any CM Fee in connection with any use of the Construction Contingency.

7.2.4 Contingency Interim Return/Balance. Prior to the execution of the GMP, the CM and the OWNER shall mutually agree to a milestone schedule to target contingency balances that shall be returned to the OWNER pending the financial status of the project and assessment of risk for both the CM and the Owner. The method of contingency reductions (percentage of total contingency or specified values) shall be defined prior to the execution of the GMP. At the completion of each milestone, the CM shall credit uncommitted contingency and buyout balances to the extent they are in excess of the milestone targets established prior to the GMP. If, at the time the OWNER issues the final payment to the CM pursuant to Article VIII of the General Conditions of the Contract, there is a balance in the Construction Contingency, such balance shall be the sole property of the Owner.

7.3 Non-Compensable Costs. Neither the Cost of the Work nor the General Conditions Costs shall include compensation for any of the items set forth below:

(a) Salaries, bonuses and other compensation of the Construction Manager's personnel stationed at the Construction Manager's principal offices, or other offices, other than the site office for the Project, unless those personnel are specifically listed on Form H, or unless there is a mutual agreement between Owner and CM to include those personnel costs in either General Conditions costs or the Cost of Work.

(b) Expenses of the Construction Manager's principal offices, site office or other offices, except the site office for this Project (including, without limitation, in-house computer costs, and other costs of doing business, services, and related expenses to maintain such offices).

(c) Overhead and general expenses of any kind, including but not limited to office or fabrication shop overhead and drafting, other than the items covered by the General Conditions Amount.

(d) The CM's capital expenses, including interest on the CM's capital employed for the Work.

(e) Costs of machinery and equipment owned or rented by the CM, except as specifically provided in the Contract and approved by the Owner.

(f) Costs incurred due to the fault, negligence or breach of contract of the CM, Subcontractors, anyone directly or indirectly employed by any of them, or for whose acts any of them may be

liable, including, but not limited to, death or injury to person or damage to property, the correction of damaged, defective or nonconforming Work, disposal and replacement of materials and equipment incorrectly ordered or supplied, unanticipated cost overruns incurred by the CM in the procurement of Subcontracts, materials or labor, and making good damage to property not forming part of the Work, except: (i) to the extent reimbursement is received through the recovery of insurance proceeds, or (ii) to the extent such items may be charged to the Construction Contingency with the prior approval of the Owner pursuant to Paragraph 7.2.1(e).

(g) Cost for purchase and maintenance of tools, materials, supplies and facilities not consumed during construction or incorporated into the Work, except as specifically provided in the Contract and approved by the Owner.

(h) Penalties, fines or costs imposed by governmental authorities in connection with, or resulting from any violation of, or noncompliance with Applicable Laws, by the Construction Manager or any Subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable.

(i) Any legal fees incurred by the Construction Manager, unless the same are incurred at the written direction, or with the prior written approval, of OWNER.

(j) Travel or meal expenses and personnel relocation expenses except as approved by the Owner for personnel who have been assigned to the Project.

(k) General Conditions Costs in excess of the total of compensation to be paid to CM for all General Conditions as set forth in Exhibit 1.

(l) Any cost incurred by the CM as a result of a knowing violation of or failure to comply with this Agreement or the other Contract Documents by the CM.

(m) Costs that would cause the GMP to be exceeded.

(n) Costs incurred by the CM after final payment; provided, however, that to the extent there is a balance in the Construction Contingency remaining at final payment, such Contingency shall be available to pay costs incurred during the one year period after substantial completion, but only if such Contingency would have been available, subject to reasonable approval by the OWNER, to pay such costs had such costs been incurred prior to final payment and only if CM has satisfied Owner that it has made commercially reasonable efforts to have subcontractors and suppliers pay for costs relating to defective or incomplete work items or warrantee items.

7.4 Discounts, Rebates, Refunds and Expenses. Cash discounts obtained on payments made by the CM shall accrue to OWNER if (a) before making the payments the CM included them in an Application for Payment and received payment therefor from OWNER, or (b) OWNER has deposited funds with the CM with which to make payments; otherwise, cash discounts shall accrue to the CM. The CM shall notify OWNER of the availability of any cash discounts so that OWNER may elect to pay or deposit such funds with the CM in order to obtain such cash discount. Such cash discounts and any other trade discounts, rebates, refunds and other amounts received from sales of surplus materials and equipment shall be credited to the Cost of the Work, and the CM shall make provisions so that they can be secured and credited accordingly. Any utility or government rebates associated with the Work are the property of the Owner.

7.5 **Accounting Records**

7.5.1 The Construction Manager shall check all materials, equipment and labor used on the Work, and shall keep full and detailed accounts and exercise controls as may be necessary for proper accounting and financial management under this Agreement. All books and records shall be maintained in accordance with generally accepted accounting principles, consistently applied. Without limitation, the CM shall comply with the requirements set forth in Article XI of the General Conditions. OWNER and its authorized representatives shall, upon request by OWNER, be afforded copies of, and at all times shall be afforded access to, all of the Construction Manager's records, books, correspondence, instructions, drawings, receipts, invoices, vouchers, memoranda, estimates, budgets, breakdowns, accounting data, bid proposals, cost control information and any other documents and data relating to this Agreement, including data in electronic media or any other media (collectively, "records") and the Construction Manager shall preserve all such records for a period of six years, or for such longer period as may be required by law, after Final Payment. With respect to work performed by the CM's own forces on a lump sum basis, the CM shall only be required to maintain certified payrolls, documentation required by the Supplementary Conditions for Equal Employment Opportunity, Non-Discrimination and Affirmative Action, and such other records as are required by Applicable Laws or the terms of the Contract Documents.

7.5.2 Without limitation of the foregoing, OWNER shall have the right, at any time and from time to time, upon notice to the Construction Manager, to audit the Construction Manager's records in connection with the Work at the Construction Manager's offices. The Construction Manager shall facilitate any such audit by making necessary facilities available to OWNER and its accountants or other representatives for up to two years after substantial completion of the project.

7.5.3 Subcontractors shall have the same obligations to maintain books and records and to permit audits by the Construction Manager or OWNER as are applicable to the Construction Manager under the Contract Documents.

7.5.4 If any inspection of the Construction Manager's or any Subcontractor's books, records or other documents reveals an overcharge, the Construction Manager shall pay OWNER or, at OWNER 's election, OWNER may reimburse itself by taking as a credit against future payments due the Construction Manager, an amount equal to the overcharge. Nothing contained in this provision is intended as a limitation of any other rights or remedies which may be available to the Owner, be they civil or criminal.

Article 8. Payments to Construction Manager.

8.1 Based upon Applications for Payment submitted by the CM, OWNER shall make payments to the CM on account of the Contract Price as provided in Article VIII of the General Conditions of the Contract, the provisions of the Owner-Construction Manager Agreement and elsewhere in the Contract Documents.

Article 9. Equal Employment Opportunity, Nondiscrimination and Affirmative Action

9.1 The CM and all of its Subcontractors shall comply at all times and in all respects with Applicable Laws affecting or regulating employment of persons in connection with the Work, and with the

provisions in the General Conditions of the Contract relating to Equal Employment Opportunity, Nondiscrimination and Affirmative Action.

Article 10. Miscellaneous Provisions

10.1 Successors and Assigns. OWNER and the CM bind themselves, their partners, successors, assigns and legal representatives to the other party hereto and to the partners, successors, assigns and legal representatives of such other party in respect to all covenants, agreements and obligations contained in the Contract Documents. Neither the CM nor any partner of the CM shall assign or transfer the Contract or sublet or subcontract it (other than subcontracting portions of the Work as expressly permitted by and in accordance with the Contract Documents), or otherwise transfer or assign any of its or their rights or obligations under all or any portion of the Contract Documents without the prior written consent of OWNER, which consent may be withheld by OWNER in its sole discretion, nor shall the CM or any partner of the CM assign any moneys due or to become due to it hereunder, without such prior written consent of OWNER . Any assignment of the Contract or any interest therein by the CM or any partner of the CM without the prior written approval of the Owner, shall be void, and the assignee in such case shall acquire no rights in the Contract or in such moneys. OWNER may assign the Contract to any successor or assignee of OWNER's interests, provided that OWNER demonstrates to the reasonable satisfaction of the CM that such successor or assignee has the capability of fulfilling OWNER's obligations under the Contract.

10.2 Additional Information. Recognizing that OWNER may find it necessary during the progress of the Work to establish the current status of performance under the Contract Documents, the CM shall, without limitation of any other requirements of the Contract Documents, promptly provide upon request statements, documents or information to OWNER, the Project Manager and the Designer or others regarding the status of the Work, compliance of the Work with the Contract Documents, compliance by the CM or any Subcontractor with the Contract Documents, the names of Subcontractors or suppliers, amounts due or to become due or amounts previously paid to Subcontractors or suppliers, estimates of the portion of the Work completed and the cost of completing the Work, and such other matters within the scope of the CM's performance under the Contract Documents as OWNER may reasonably require.

10.3 Information Confidential. To the extent permitted by law, the CM shall treat as confidential any information relating to the Project that is specifically designated or identified by OWNER as confidential or proprietary, and shall not permit the release of such information to other parties without OWNER's prior written authorization.

10.4 Governing Law. The Contract shall be governed by the laws of the Commonwealth of Massachusetts, regardless of choice of law principles.

10.5 No Personal Liability; Consequential Damages

10.5.1 No member, officer, consultant, volunteer, participant, employee, agent or representative of OWNER, Project Manager or Designer shall be personally liable to the CM under any term or provision of this Contract for OWNER 's payment obligations or otherwise, or because of any breach hereof.

10.5.2 In no event shall OWNER, the Project Manager or the Designer be liable to CM except for obligations expressly assumed by OWNER, the Project Manager or the Designer under the Contract Documents, nor shall OWNER, the Project Manager or the Designer ever be liable to the CM for indirect, special or consequential damages.

10.6 Conflict of Interest. The CM understands that the Massachusetts Conflict of Interest Law, Chapter 268A of the Massachusetts General Laws, applies to the CM with respect to the services required to be provided under this Agreement, and shall familiarize its employees assigned to perform services under this Agreement with the provision of said law. The CM and its officers, employees, agents, subcontractors and affiliated agencies shall not participate in any activity which constitutes a violation of the Massachusetts Conflict of Interest Law or which creates an appearance of a violation of the Massachusetts Conflict of Interest Law. The CM warrants and represents that it currently has no interest and shall not acquire any interest, direct or indirect, which would be adverse to or conflict in any manner with the performance of its services under this Agreement or with the interest of the Owner or the Project. The CM further agrees that in the performance of this Agreement no person or entity having any such adverse or conflicting interest shall be employed or granted a Subcontract. Except with the Owner's knowledge and express consent, the CM shall not engage in any activity, or accept any employment, interest or contribution that would reasonably appear to be adverse to the interest of the Owner or to compromise the CM's professional judgement with respect to the Project. The CM has a continuing obligation to divulge to the Owner all circumstances of its relationships with third parties, as well as any other interests that may have an effect on the Owner or the Project at the time of execution of this Agreement or during its effectiveness. If the Owner believes that there is or has been a conflict of interest, or the appearance of a conflict of interest, it will so notify the CM. The CM shall make full disclosure of all materials facts, and shall have a period of thirty (30) days after receipt of such notice to cure the conflict of interest or the appearance of conflict of interest, including the right to request a meeting with the Owner to explain its position. If the conflict of interest or appearance of conflict of interest is not cured to the satisfaction of the Owner or the controversy otherwise resolved prior to expiration of such thirty (30) day period, the CM shall be deemed to be in default of this Agreement and the Owner may exercise any remedies available to it under this Agreement or applicable law.

10.7 Termination of Contract. The Contract may be terminated as provided in Article XVII of the General Conditions.

10.8 Exhibits. The following Exhibits are attached to and incorporated in this Agreement:

Exhibit 1.	CM Contract Amount Breakdown
Exhibit 2.	Insurance Certificates and Bonds (may be added after contract execution and prior to construction services).
Exhibit 3.	Prevailing Wage Rates (may be added after contract execution and prior to construction services).
Exhibit 4.	Certificate of Vote.

Article 11. Approved Subcontractors. No Trade Contractors or Other Subcontractors shall be used to perform any portions of the Work other than the work described in their subcontracts, without the prior written approval of OWNER.

Article 12. Certifications. By entering into this Agreement, the CM certifies under penalties of perjury that its proposal was made and submitted in good faith and without collusion or fraud with any person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals. By entering into this Agreement, the CM certifies under the penalties of perjury, pursuant to M.G.L. c.62C, Section 49A(b), that it has complied with all laws of the Commonwealth relating to taxes, to reporting of

employees and contractors, and to withholding and remitting child support. The individual signing this Contract on behalf of the Contractor further certifies under penalties of perjury that the Contractor is not presently suspended or debarred from doing public construction work in the Commonwealth under the provisions of M.G.L. c. 29, s. 29F, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder and is not presently suspended or debarred from doing public construction work by any agency of the United States.

By submitting a Proposal, Bid or signing a contract for the Project, the Construction Manager hereby certifies, pursuant to G.L. c.30 Section 39S, the following under the pains and penalties of perjury:

(1) that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work

(2) that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and who will furnish documentation of successful completion of said course with the first certified payroll report for each employee; and

(3) that all employees to be employed in the work subject to this bid have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration.

Article 13. Minority Business Enterprise and Women Business Enterprise Participation Goals and Minority/Women Workforce Utilization Percentages See Appendix A, Appendix B, Appendix C and Appendix D to the General Conditions of the Contract and Article XIII of the General Conditions of the Contract, with which the CM shall comply.

Article 14. Contract Execution

IN WITNESS WHEREOF, the parties have caused this instrument to be executed in triplicate as of the date set forth above.

OWNER – CITY OF FRAMINGHAM

By:_____
Name: Thatcher W. Kezer, III
Title: Chief Operating Officer
City of Framingham

CONSTRUCTION MANAGER

By:_____
Name: Christian Riordan
Title: Project Executive

I certify that the amount of $78,000,000.00 is available for compensation to the CM for the work described in this Contract and that the signatory named has been authorized to execute the Contract and approve all requisitions and change orders, pursuant to M.G.L. c.44, s.31C.

1400960 9
3133216 58200 32837
3133216 54910 32837

_____
City Accountant
City of Framingham

Approved as to Form:

_____
City Solicitor

CITY OF FRAMINGHAM

NEW FULLER MIDDLE SCHOOL

CONSTRUCTION MANAGER AT RISK CONTRACT

GENERAL CONDITIONS OF THE CONTRACT

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ARTICLE I: DEFINITION OF TERMS

All terms that this Contract defines may be used with or without initial capital letters. Other terms, abbreviations and references are defined as they appear herein. Words and abbreviations that are not defined in the Contract Documents but which have recognized technical or trade meanings are used in accordance with those meanings.

The following words shall have the following meanings as used in this Contract:

Approval: (or Approved): An approval in writing signed by the authorized signatory of THE OWNER. Depending upon the nature of the approval, the Designer or the Project Manager may, when authorized by the Owner, issue approvals on the Owner's behalf.

Architect: The architect identified in the Owner-CM Agreement, also referred to as the Designer.

As directed, as permitted, as required, as determined or words of like effect: The direction, permission, requirement or determination of the Owner unless otherwise stated in the Contract Documents. Similarly, *approved*, *acceptable*, *satisfactory* or words of like import shall mean approved by or acceptable or satisfactory to the Designer and THE OWNER.

Building Code: All applicable rules and regulations to which THE OWNER is subject and which are contained or referenced in the code authorized by M.G. L. c. 143 §93 et seq., including all amendments thereto.

Certificate of Use and Occupancy: A certificate signed by the Designer pursuant to the requirements of Article VI of these General Conditions of the Contract, indicating that (1) the Work has been completed in accordance with the Contract Documents, except for Punch List items, (2) certificates of inspection, testing and/or approval (including a certificate of occupancy under the Building Code), operating permits for any mechanical apparatus which may be required to permit full use and occupancy of the Work by its intended users have been delivered to THE OWNER, (3) any applicable written warranties, operating instructions and related materials have been delivered to THE OWNER, and (4) the Work may be used for its intended purpose without substantial inconvenience or interference.

Change Order: (1) A written order not requiring the consent of the CM, approved by the Owner and signed by the Project Manager and designated as a Change Order, directing the CM to make changes in the Work within the general scope of the Contract.

Construction Manager, Contractor, CM and General Contractor These words are used interchangeably and mean the person, corporation or other entity with whom THE OWNER has executed the CM Agreement.

Construction Manager's Key Personnel: The personnel listed in the Construction Manager's Proposal and the Owner-CM Agreement, all of whom shall be dedicated to the Project on a full time basis, unless otherwise agreed to. Such personnel shall include at a minimum the Project Executive, the Project Manager, the Superintendent (who shall be a properly licensed construction supervisor), and the Project Scheduler. Unless otherwise designated by the CM, the Project Executive shall have complete authority to act for the CM.

Contract: The Contract formed by the Contract Documents.

Contract Documents: The documents listed in Article 2 of the Owner-CM Agreement.

Contract Modification: Any alteration of the Contract Documents accomplished by a written agreement properly executed by the parties to this Contract.

Contract Price: The Contract Price constitutes full compensation to the CM for everything to be performed and furnished in connection with the Work and for all damages arising out of the performance of the Work for which the Owner is responsible, and constitutes the maximum compensation regardless of any difficulty incurred by the CM in connection with the Work or in consequence of any suspension or discontinuance of the Work. See also definition of Guaranteed Maximum Pice.

Day: calendar day.

Designer: The architect or engineer identified as the Designer in the Owner-CM Agreement.

Drawings: The Drawings are the graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, generally including Plans, elevations, sections, details, schedules, and diagrams.

Final Acceptance: The written determination by THE OWNER upon recommendation of the Designer, that the Work has been 100% completed, except for the CM's indemnification obligations, warranty obligations, obligations to continue to

maintain insurance coverage for the time periods provided in the Contract Documents, and any other obligations which are intended to survive Final Acceptance and/or the termination of the Contract.

Guaranteed Maximum Price: Guaranteed maximum price or "GMP" is the agreed total dollar amount for the construction management at risk services, including the cost of the work, the general conditions and the fees charged by the CM, also known as the Contract Price.

Laws: All applicable statutes, regulations, ordinances, codes, laws, orders, decrees, approvals, certificates and requirements of governmental and quasi-governmental authorities.

MSBA: The Massachusetts School Building Authority which has agreed to finance a portion of the costs for the Project, whose procedures require the Owner and CM to submit payment related information in a format acceptable to the MSBA.

Mockup: Full scale representation of either exterior or interior portions of the building to be built on site using approved materials, installed to display the minimum level of quality and workmanship expected by all trades. Mockup will be examined and must pass the approval of the Architect prior to installing those building components in the structure. Mockup will be used to reference to the level of workmanship required throughout the Project.

Notice to Proceed (NTP): The written notice provided by THE OWNER to the CM which authorizes the CM to commence the Work as of a date specified therein, from which date the times specified in Article 4 of the Owner-CM Agreement are measured. THE OWNER may issue more than one NTP, for Preconstruction and Construction Services, in which case the date from which the time for completion of construction is measured shall be as stated in the appropriate NTP.

Or equal (or words of like import): Equal in the opinion of THE OWNER determined pursuant to the provisions of M.G.L. c.30, § 39M and the provisions of the Contract.

Owner: The City of Framingham acting by and through the School Building Committee.

Owner's Representative: The On-Site representative of the Owner, who may be an employee of the Project Manager or may work directly for the Owner. The Owner's Representative has no authority to make changes in the Work, interpret provisions of the Contract, approve or disapprove payment requests from the CM, or otherwise provide direction to the CM.

Owner-CM Agreement: The Owner-Construction Manager Agreement between the Owner and the CM for the Project, which is incorporated into the Contract Documents.

Plan(s): Drawing(s).

Product Data: Product data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the CM or its Subcontractors and suppliers to illustrate materials or equipment for some portion of the Work. Product data shall also include any such information or instructions produced by the manufacturer or distributor of such materials or equipment and made readily available by said manufacturer or distributor.

Progress Schedule: The progress schedule submitted by the CM and approved by THE OWNER in accordance with the Contract Documents.

Project: The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by separate contractors.

Project Manager: The Owner's Project Manager identified in the Owner-CM Agreement.

Punch List: A list of items determined by THE OWNER upon the recommendation of the Designer, to be minor, incomplete or unsatisfactory work items that do not materially impair the use of the Work by THE OWNER for its intended purpose.

Samples: Samples are physical examples, that illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged.

Schedule of Values: The schedule prepared by the CM and approved by THE OWNER pursuant to Article VIII of these General Conditions of the Contract which allocates the Contract Price to the various portions of the Work and is used as a basis for determining payments due to the CM.

School Building Committee: Appointed by the City to oversee the design, implementation, management, and construction of the Project.

Shop Drawings: Drawings, diagrams, details, schedules, and other data specially prepared for the Work by the CM or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate a portion of the Work.

Site: The land and, if any, building(s) or space within any such building(s) on which or in which the CM is to perform the Work.

Specifications: The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards, and workmanship for the Work and performance of related services.

Subcontractor: Person or entity with whom the CM or a subcontractor contracts in order to perform the Work, except as otherwise specifically provided or required herein or by Law. "Subcontractor" also means "Trade Contractor" except when otherwise specified.

Substantial Completion: "Substantial Completion" shall occur when (1) the CM fully completes the Work or substantially completes the Work, or a designated Phase thereof (for purposes of substantially completing that phase only), so that the value of the Work remaining to be done is, in the estimate of the Designer, less than one percent of the adjusted contract price (or the portion thereof for the designated Phase), or (2) the CM substantially completes the Work and THE OWNER takes possession for occupancy, whichever occurs first.

Superintendent: The licensed construction supervisor who is an employee of the CM designated to be in full time attendance at the Site throughout the prosecution and progress of the Work and who shall have complete authority to act for the CM.

Trade Contractor: Subcontractors under Contract with the CM to perform the work of the trades listed in paragraph 1.1 of the Procedures for Award of Subcontracts at Appendix G, and selected under the process authorized in M.G.L. c. 149A and Section I of the aforementioned Procedures by the CM. Sometimes referred to as "Filed Subcontractor" or "Filed Sub bidder".

User Agency: The City of Framingham School Department.

Other terms, abbreviations and references are defined as they appear herein.

ARTICLE II: EXECUTION OF THE CONTRACT, SCOPE OF WORK, INTERPRETATION OF CONTRACT DOCUMENTS, DISTRIBUTION OF WORK, SUBCONTRACTS

1. Execution.

The execution of the Owner – CM Agreement by the CM is a representation that the CM has visited the Site, has become familiar with local conditions under which the Work is to be performed, has correlated observations at the site with requirements of the Contract Documents and is aware of requirements contained in the permits that have issued that apply to the construction of the Work as well as the requirements of the MSBA, as stated in the Project Funding Agreement between the MSBA and the Owner.

2. Scope of Work.

The Work consists of all the work identified in the Contract Documents. The Work includes Pre-Construction Services the CM has agreed to provide as well as the completed construction required by the Contract Documents and includes all labor, tools, materials, supplies, equipment, permits, approvals, paperwork, calculations, submittals, and certificates necessary to develop, construct and complete the Work in accordance with all Laws, and all construction and other services required to be supervised, overseen, performed or furnished by CM or that the Contract Documents require the CM to cause to be supervised, overseen, performed or furnished. The CM shall provide and perform all of the Work, duties and obligations set forth in the Contract Documents.

3. Interpretation.

A. The Plans and Specifications and other Contract Documents are to be considered together and are intended to be mutually complementary, so that any work shown on the Plans though not specified in the Specifications, and any work specified in the Specifications though not shown on the Plans, is to be executed by the CM as a part of this Contract. Should a conflict occur in or between or among any parts of the Contract Documents that are entitled to equal preference, the better quality or greater quantity shall govern, unless THE OWNER directs otherwise. Figured dimensions shall take precedence over scaled dimensions.

B. All things that in the opinion of THE OWNER may be reasonably inferred from the Plans, Specifications and other Contract Documents are to be executed by the CM. The Designer shall determine whether the detail Plans conform to the general Plans and Contract Documents, except as may be otherwise determined by THE OWNER.

C. The tables of contents, titles, headings and marginal notes or sub-scripts contained herein are solely to facilitate references, are not intended to be construed as provisions of the Contract, and in no way affect the interpretation of the provisions to which they refer.

D. Where reference is made in the Contract Documents to publications, standards, or codes issued by associations or societies, such reference shall be interpreted to mean the current edition of such publications, standards, or codes, including revisions in effect on the date of the issuance of the RFP for the contract notwithstanding any reference to a particular date. The foregoing sentence shall not apply to the dates, if any, specified with respect to insurance policy endorsement forms.

E. In case of any conflict among the Contract Documents, unless the context clearly otherwise requires, the Contract Documents shall be construed according to the following priorities:

First Priority:	Contract Modifications and Change Orders
Second Priority:	Owner-CM Agreement as amended
Third Priority	General Conditions of the Contract as amended
Fourth Priority	Drawings as amended – Schedules take precedence over enlarged detail Drawings, and enlarged detail Drawings take precedence over reduced scale Drawings; figured dimensions shall prevail over scale.
Fifth Priority	Specifications as amended.
Sixth Priority:	Owner's Request for Proposals as amended.
Seventh Priority	CM's Proposal as amended
Eighth Priority:	Owner's Request for Qualifications

F. All plans, general and detailed, are to be deemed a part of the Contract, and the Drawings and Specifications and Contract are to be considered together, and are intended to be mutually complementary, so that any work shown on the Drawings, though not specified in the Specifications, and any work specified in the Specifications, though not shown on the Drawings, is to be executed by the CM as part of the Contract. All things which in the opinion of the Designer may reasonably be inferred from the Contract Documents are to be executed by the CM in accordance with the terms of the Contract. In the event of a conflict, CM is to assume that the Contract requires the greater quantity or quality of work, and the CM shall immediately bring to the attention of the Designer said purported conflict.

G. The CM shall refer to all of the Drawings, and to all of the sections of the Specifications, and shall perform all work reasonably inferable therefrom as being necessary to produce the indicated results. Neither THE OWNER nor the Designer assume any liability arising out of jurisdictional issues raised or claims advanced by Subcontractors, trade organizations or other interested parties based on the arrangement or manner of subdivision of the content of the Specifications and Drawings. In the event of any claim arising out of any duplication, conflict, inconsistency or discrepancy within the Specifications or on the Drawings as to the allocation of the Work among the Subcontractor the CM shall be solely responsible for resolving the claim and shall be responsible for ensuring that all of the Work is completed, regardless of where it appears in the Specifications or on the Drawings.

4. Distribution of Work.

Other than as required by M.G.L. c. 149A and any other applicable provisions of the Massachusetts General Laws and these Contract Documents, the CM shall be responsible for distributing the Work in the best interests of the Project.

5. Subcontracts

Procedures for the procurement and the award of contracts by the CM for the furnishing of labor, materials and equipment in the performance of the Work ("Subcontracts") shall be as specified in the procedures attached hereto as Appendix "G". The CM shall not replace any Subcontractor previously selected without the prior written approval of THE OWNER. The CM shall maintain and periodically update and distribute to THE OWNER, the Project Manager and the Designer a Project Directory listing the names, addresses and telephone numbers of the principal members of the staff of each Subcontractor. The principal contact and a back-up for each Subcontractor and each of their office telephone numbers, mobile telephone numbers and pager numbers, if available, shall be indicated in the Project Directory so that such persons can be reached in emergency situations occurring beyond regular business hours.

All work shall be performed pursuant to written subcontracts. When subcontracting with Trade Contractors the CM shall use the Form for Trade Contract attached hereto.. All subcontracts shall require the Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the CM by the terms of the Contract Documents, and to assume toward the CM all the obligations and responsibilities which the CM, by the Contract Documents, assumes toward THE OWNER. Each Subcontract shall preserve and protect the rights of THE OWNER under the Contract Documents with respect to the Work to be performed by the Subcontractor so that the subcontracting thereof will not prejudice such rights. The CM shall require each Subcontractor to enter into similar agreements with its Subcontractors. The CM shall provide to each proposed Subcontractor, prior to the execution of a Subcontract with such Subcontractor, copies of the Contract Documents to which the Subcontractor will be bound by this Paragraph.

In the event of termination of the Contract due to the default of the CM or for any other reason, THE OWNER shall have the right (but shall have no obligation) to assume, and/or accept assignment of and further assign to a general contractor or construction manager or other third party who is qualified and has sufficient resources to complete the Work, the rights of the CM under the Subcontract with such Subcontractor. In the event of such assumption or assignment by THE OWNER, the Subcontractor shall have no claim against THE OWNER or such third party for work performed by such Subcontractor or other matters arising prior to termination of the Contract, and THE OWNER or such third party, as the case may be, shall be liable only for obligations to the Subcontractor arising after such assumption or assignment.

No Subcontract, and nothing contained herein or in any Subcontract, shall be construed to create any contractual relationship between any Subcontractor and THE OWNER.

6. Contract Price.

The Contract Price constitutes the amount of compensation authorized to be paid to the CM for everything to be performed and furnished by the CM in connection with the Work, as provided in the Owner CM Agreement, and constitutes the maximum compensation regardless of any difficulty incurred by the CM in connection with the Work or in consequence of any suspension or discontinuance of the Work.

ARTICLE III: CONTROL OF WORK / ADMINISTRATION OF THE CONTRACT

1. Designer.

Notwithstanding anything to the contrary expressed or implied in this Contract, any of the powers, rights, and duties of the Designer may be exercised by THE OWNER, provided that THE OWNER shall be under no obligation to do so. THE OWNER may rely on the Designer for the performance and exercise of certain rights and obligations of the Owner hereunder. Except as otherwise authorized by the Owner, any Approval required to be obtained from THE OWNER hereunder shall not be valid without the signature of THE OWNER. THE OWNER may explicitly overrule in writing any action, determination or decision of the Designer should THE OWNER choose to do so, except to the extent that the same would violate applicable law. Subject to the foregoing, the Designer shall be responsible for the general administration of the Contract and shall perform the duties and exercise the rights herein conferred on the Designer. Except as otherwise specifically provided herein, the Designer shall decide all questions which may arise as to the conduct, quantity, quality, equality, acceptability, fitness, and rate of progress of the several kinds of work and materials to be performed and furnished under this Contract, and shall decide all questions which may arise as to the interpretation of the Plans and Specifications. In the case of the death, resignation, inability or refusal of the Designer to act, or the termination of his or her or its employment, THE OWNER may appoint another person to act as Designer for the purposes of this Contract. THE OWNER shall give written notice to the CM of any such appointment.

2. Right of Access to Work.

THE OWNER, the Project Manager, and the Designer (and persons designated by them) may for any purpose enter upon the Work, the Site, and premises used by the CM, and the CM shall provide safe facilities therefor. Other contractors of THE OWNER may also enter upon the same for the purposes which may be required by their contracts or work. Any differences or conflicts which may arise between the CM and other contractors of THE OWNER with respect to their work shall be initially resolved by the Project Manager.

3. Inspection No Waiver.

No inspection by THE OWNER, the Designer, the Project Manager, or employees or agents of either of them, and no order, measurement, certificate, approval, payment order, payment, acceptance or any other action or inaction of any of them, shall operate as a waiver by THE OWNER of any provision of this Contract.

ARTICLE IV: GENERAL PERFORMANCE OBLIGATIONS OF THE CM

The CM shall complete for the Contract Price all of the Work in a proper, thorough, and workmanlike manner in accordance with the Contract Documents. Without limiting the foregoing and without limiting the CM's obligations under any other provision of the Contract Documents, the CM shall for the Contract Price perform the following general obligations:

1. Review of Contract Documents and Field Conditions.

A. Before commencing the Work, the CM shall carefully study the Contract Documents and carefully compare all Specifications, Plans, Drawings, figures, dimensions, lines, marks, scales, directions of the Designer, and any other information provided by THE OWNER and shall at once report to the Designer any questions, errors, inconsistencies, or omissions which the CM may discover.

B. Before commencing the Work, the CM shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the CM with the Contract Documents and shall at once report to the Designer any questions, errors, inconsistencies, or omissions.

2. Supervision and Construction Procedures; Coordination; Cutting, and Patching.

A. The CM shall supervise and direct the Work, using the CM's best skill and attention. The CM shall be solely responsible for, and shall have control over, construction means, methods, techniques, sequences and procedures, and shall be responsible for coordinating all portions of the Work under the Contract.

B. The CM shall be responsible for the proper fitting of all Work and the coordination of the operations of all trades, Subcontractors, and materialmen engaged upon the Work.

C. All necessary cutting, coring, drilling, grouting, and patching required to fit together the several parts of the Work shall be coordinated by the CM.

D. The CM shall be responsible to THE OWNER for the acts and omissions of the CM's employees, agents and Subcontractors of all tiers, and their agents and respective contractors employees, and other persons performing portions of the Work or supplying materials therefor.

E. The CM shall be responsible for the inspection of portions of the Work already performed under this Contract to determine that such portions are in proper condition to receive subsequent Work.

F. The Designer shall establish baselines and benchmarks on the Drawings for the location of the Work but all other lines and grades shall be determined by the CM. The CM shall employ a registered land surveyor to perform any engineering required for establishing grades, lines, levels, dimensions, layouts, and reference points for the trades. The CM shall be responsible for maintaining benchmarks and other survey marks and shall replace any benchmarks or survey marks that may have become disturbed or destroyed. The CM shall verify the materials shown on the Drawings before laying out the Work and shall be responsible for any error resulting from its failure to exercise this precaution.

G. Work shall be performed during regular Working Hours which, unless otherwise approved by the Owner shall be 7:00 a.m. to 7:00 p.m. School drop off and pickup time for arrival is from 7:30 AM to 8:30 AM, and for dismissal is from 2:00 PM to 3:00 PM, from construction commencement through completion of Phase 2. School hours from the completion of Phase 2 through the completion of Phase 3 will be provided by the Owner prior to commencement of Phase 3. Due to school operations, deliveries are to be scheduled to avoid the school arrival and dismissal times, unless otherwise specifically approved by the Owner. If the CM desires to carry on the Work outside of regular working hours or on Saturdays, Sundays, or Massachusetts or federal holidays, the CM shall provide the Owner's Representative with 48 hours' notice to allow satisfactory arrangements to be made for inspecting Work in progress. Any work performed during regular Working Hours or at any other time shall comply with all City Ordinances. The additional costs incurred by the Designer, the Project Manager or the Clerk of Works to monitor work during extended hours, shall be paid by the CM out of an allowance which shall be included in the GMP for such purposes.

H. Work performed outside of regular Working Hours without prior notice to the Designer and/or THE OWNER shall be subject to additional inspection and testing as directed by the Designer. The Owner's costs for this inspection and testing shall be borne by the CM whether the Work is found to be acceptable or not. THE OWNER shall be entitled to assess and issue the CM a credit to cover such cost from payments due the CM.

I. Under no circumstances shall the CM or its subcontractors and suppliers allow trucks to be parked or idling along any streets in the neighborhoods adjacent to the Project site.

J. Under no circumstances shall the CM its subcontractors, consultants or suppliers park personal vehicles along any streets in the neighborhoods adjacent to the Project site unless approved in writing by the Owner. All parking for workers will be on the Project site or at a designated off site location as included in the Contract Documents. Adequate on-site parking shall be provided for the Architect, Project Manager and Owner personnel.

3. <u>Key Personnel.</u>

The CM shall employ the Key Personnel as defined in Article I of the General Conditions unless otherwise agreed to by THE OWNER. The Project Executive shall be the CM's senior person on Site and shall have full authority to accept communications to, make decisions for, and otherwise fully represent the CM in connection with all matters relevant to the Project. The CM's Project Manager(s) shall be responsible for one or more portions of the Work as assigned by the Project Executive. CM's Project Manager may be the designee of the Project Executive to exercise the Project Executive's responsibilities in the CM's Project Executive's absence. The Superintendent shall be properly licensed in accordance with the Building Code. The OWNER shall have the right to direct the CM to remove and replace any of the CM's Key Personnel for failure to comply with the CM's obligations hereunder, inappropriate conduct, or lack of appropriate skills or qualification.

A. In addition to the Project Manager(s) the CM will have a full-time on-site MEP Manager with a minimum 15 years' experience and demonstrated experience managing the MEP portion of at least one similar sized Project.

4. <u>Labor.</u>

A. The CM shall employ only competent workers. All workers shall have OSHA 10 hour Certification. The CM shall enforce and shall require all its Subcontractors to enforce strict discipline and good order among their respective employees and other persons carrying out the Work. The CM shall not permit employment of unfit persons or persons not skilled in tasks assigned to them. Whenever the Designer or THE OWNER shall notify the CM in writing that any worker is, in the Owner's opinion, incompetent, unfaithful, disorderly, or otherwise unsatisfactory, such employee shall be discharged from the Work and shall not again be employed on the Project except with the consent of THE OWNER. See Paragraph 9 of this Article.

B. The CM shall ensure that all its Subcontractors employ a sufficient number of workers to carry on the Work with all proper speed in accordance with Laws, the requirements of the Contract Documents, and the Progress Schedule.

C. The CM shall procure materials from such sources and shall manage its own forces and the forces of its Subcontractors in such a manner as will result in harmonious labor relations on the Project Site. The CM shall cause persons to be employed in the Work who will work in harmony with others so employed. Should the Work be stopped or materially delayed in the Owner's reasonable judgment due to a labor dispute, the Owner shall have the right to require the CM to employ substitutes acceptable to the Owner.

5. Notices and Permits.

A. The CM shall obtain all approvals, permits, user fees, certificates and licenses required by Laws, pay all charges and fees, and pay for or cause the appropriate Subcontractor to pay for all utilities required for the proper execution of the Work. The costs of any required permits shall be considered Cost of the Work. The CM shall perform the work in strict accordance with all permit requirements that have issued for the Project.

NOTE: The City of Framingham has waived the costs for all City issued permits that the CM and its subcontractors will need to obtain to perform the work on the Project.

B. The CM shall comply with all Laws and shall give all notices required thereby.

C. If the CM observes that portions of the Contract Documents are at variance with the requirements of Laws, the CM shall promptly notify the Designer and THE OWNER in writing, and necessary changes shall be accomplished by an appropriate Contract Modification.

D. If the CM performs Work knowing it to be contrary to Laws without giving such notice to the Designer and THE OWNER, the CM shall bear full responsibility for such Work and all costs attributable thereto, including, without limitation, corrections to the Work.

6. Excavation.

The CM shall prevent by sheeting and shoring or bracing, if necessary, any caving or bulging of the sides of any excavation made by the CM, leaving sheeting and shoring in place, or if any is removed, filling solid the spaces left thereby.

7. Corrections to the Work; Inspection No Bar to Subsequent Corrections.

The review of the Work by the Designer, THE OWNER or its consultants shall not relieve the CM of its responsibilities to fulfill the Contract obligations. Defective work may be rejected by the Designer, THE OWNER or its consultants whether or not such work and/or materials have been previously overlooked or misjudged by the Designer, THE OWNER or its consultants and accepted for payment. If the Work or any part thereof shall be found defective at any time before the Final Acceptance of the whole Work, or during the Warranty Period, the CM shall forthwith correct such defect in a manner satisfactory to the Designer, THE OWNER or its consultants. If any material brought upon the Site for use in the Work, or selected for the same, shall be rejected by the Designer, THE OWNER or its consultants as unsuitable or not in conformity with the Contract Documents, or as damaged by casualty or deteriorated due to improper storage at the Site or to any other factor, the CM shall forthwith remove such materials from the Site. The CM shall pay for the cost of making good all work or property of other contractors or of the Owner destroyed or damaged by such removal or replacement; repair any injury, defect, omission or mistake in the Work as soon as it is discovered, finish and immediately make good any defect, omission or mistake in the Work and complete and leave the Work in perfect condition. The costs of correcting such defects or mistakes shall not be considered Cost of the Work, unless the Owner approves funding such cost as a Construction Contingency Item, as provided in Section 7.2 of the CM Agreement.

8. School Project; No Contact with Students and CORI Reporting

A. The CM shall ensure that all the workers on the Project shall not intermingle with the student population or otherwise enter Owner-occupied premises, except with the knowledge and approval of the Owner. The Principal of the School and the Owner shall have the ability to immediately stop work in the event such work has not been authorized in advance, or is being performed in a manner that threatens the safety of the existing Fuller Middle School occupants, the building structure, or otherwise interferes with the User Agency's educational program. The CM's and subcontractor's costs for complying with the Massachusetts CORI Reporting requirements shall be considered as a Cost of the Work.

B. CORI Reporting: Except to the extent otherwise provided for in law, in accordance with G.L. c. 71 Section 38R, the Superintendent of Schools or School Principal shall require criminal offender record information ("CORI") from the Department of Criminal Justice Information Services, relating to any worker who is scheduled to work on the Project site. The Contractor and the subcontractor shall submit all CORI documentation to the Superintendent of Schools or Principal a minimum of two (2) weeks prior to the workers arrival on site. The Superintendent or Principal will notify the Contractor of any worker who will not be allowed to work on the Project, as a result of the CORI check. The Owner reserves the right to stop work if there has been a failure to comply with this paragraph, in which event the Contractor and subcontractors shall have no claim for damages, delays or time extensions against the Owner. The CM shall be responsible for administering the CORI qualification system with the Subcontractors and for coordinating reviews of forms with City personnel.

C. The Owner and the CM shall develop a system that ensures that all workers and visitors to the Project can be immediately identified as authorized to be on the Project. The CM shall be responsible for administering that system.

9. Sanitary Facilities.

The CM shall provide and maintain sanitary facilities for all persons employed on the Work, beginning with the first worker at the Site. Said facilities shall meet the following minimum requirements unless otherwise specified in Division 1 of the Specifications.

A. There shall be no fewer facilities than the number required by applicable Laws;

B. Facilities shall be kept in a clean sanitary condition at all times and shall be adequately screened to be inaccessible to flies.

10. Temporary Offices.

A. Except as otherwise specified in the Contract Documents, the CM shall erect the following temporary offices near the Site as directed by the Owner and shall adequately furnish and maintain them in a clean, orderly condition:

(1) A CM's field office at which CM's authorized representatives shall be present at all times while work is in progress. Instructions, notices, and other communications delivered there by the Designer or THE OWNER or the Project Manager, shall be deemed delivered to the CM. CM's trailer shall be a double wide trailer (1,600 +/- SF) that will accommodate meetings with a conference table and chairs sufficient to accommodate 12 persons at one time and 54" flat digital TouchScreen or equivalent technology or as mutually agreed upon prior to the execution of the GMP Amendment.

(2) Office Trailer for the Architect/Project Manager/On-Site Rep. Such trailer shall be in close proximity to the CM's field office, shall be roughly 800 +/- square feet in area, and shall be equipped with four offices, electric lights, heat, air conditioning, window screens, secure locking devices, and a toilet room with a working chemical toilet. Such office shall be equipped with at least the following new furniture and equipment: 3 lockable steel desks, 3 swivel chairs, two stools, 2 metal plan racks, plan table at least 32 by 84 inches, 3 metal filing cabinets with locks, 12 feet of 10 inch deep shelving, one electric water cooler with disposable cups and water supply service, one hard hat for each project representative and 15 visitor hard hats and one networked plain paper copy machine with a legal and standard paper tray or as mutually agreed upon prior to the execution of the GMP, all of which shall become the property of the CM at the conclusion of the Work.

(3) CM shall also provide the Owner's office with the following:

- 4 internet data lines and secure Wi-Fi service with a minimum service as defined in GMP
- Internet access for email service, provide a hub for multi-use.

- 4 telephone outlets
- 3 telephone lines - (1) tel line, (2) hunt lines
- Networked copier or as mutually agreed upon prior to the execution of the GMP.
- (3) Computers with all applicable hardware and software to communicate and coordinate efforts between the CM, Designer and Owner or as mutually agreed upon prior to the execution of the GMP.
- Miscellaneous tack boards and white boards.

11. Contract Documents and Samples at the Site.

The CM shall provide the Owner's On-Site Project Manager one (1) complete set of drawings, specifications, addenda, change orders, approved shop drawings, product data, samples, updated progress schedule and all other submittals. The CM shall maintain at the Site for the use and information of THE OWNER one record copy of the Drawings, Specifications, Addenda, Change Orders, Approved Shop Drawings, Product Data, Samples, updated Progress Schedule, and all other submittals, all in good order and marked currently to record changes and selections made during construction. These shall be available to the Designer and Project Manager and shall be delivered to the Designer for submittal to THE OWNER upon completion of the Work. The Drawings, Specifications and other documents prepared by the Designer, and copies thereof furnished to the CM, are for use solely with respect to this Project. The CM shall not permit their release to other parties except as may be necessary in dealing with governmental authorities in the ordinary course of permitting and constructing the Project. Further, they are not to be used by the CM or any Subcontractor or Supplier on other projects without the specific written consent of THE OWNER and the Designer.

12. Telephones. See Division 1 of the Specifications. In addition to Division 1 of the specifications, the CM shall provide its on-site personnel with telephones that have "push to talk" capabilities matching the school's service provider or as mutually agreed upon prior to the execution of the GMP Amendment.

13. Health, Safety, and Accident Prevention.

A. In performing the Work, the CM shall:

(1) Ensure that no laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his/her health and/or safety as determined under construction safety and health standards promulgated by the U.S. Secretary of Labor by regulation;

(2) Protect the lives, health, and safety of other persons; and

(3) Prevent damage to property, materials, supplies, and equipment.

B. For these purposes, the CM shall:

(1) Comply with 84 Stat. 1590, the "Occupational Safety and Health Act of 1970" (OSHA) and with regulations and standards issued by the U.S. Secretary of Labor at 29 CFR Part 1926; and

(2) Comply with the Trench Safety Law set forth in M.G.L. c. 82A and regulations promulgated by the Department of Public Safety (DPS) and Occupational Safety (DOS) in 520 CMR 14.00 et seq.; the CM shall execute a Trench Application and Permit form

(3) Include the terms of this Section 13 in every subcontract so that such terms will be binding on each subcontractor; and

(4) Designate by notice to the Owner a responsible member of its organization at the Site whose duties shall include ensuring safety, implementation of the CM's Safety Plan referenced below and preventing accidents.

C. The CM shall maintain an accurate record of exposure data on all accidents incident to the Work resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies, or equipment, and shall report this data in the manner prescribed by 29 CFR Part 1904. Without limiting the foregoing, the CM shall submit to the OWNER without delay verbal and written reports of all accidents involving bodily injury or property damage arising in connection with the Work.

D. In any emergency affecting the safety of persons or property the CM shall immediately act in the exercise of reasonable judgment to prevent threatened damage, injury, or loss. The CM shall immediately notify the OWNER of such emergency.

E. The CM shall be responsible for its Subcontractors' compliance with the provisions of this Section 13.

F. Before commencing any portion of the Work, the CM shall submit a written Project-specific plan for implementing this Section 13. The plan shall include an analysis of the significant hazards to life, limb and property inherent in the performance of the Work and a plan for controlling these hazards.

G. Without limiting the foregoing provisions of this Section 13, the CM shall comply with all health and safety Laws applicable to the Work. Without limitation,

(1) If the CM uses or stores toxic or hazardous substances it shall comply with M.G.L. c. 111F, § 2, the "Right to Know" law and regulations promulgated by the Department of Public Health, 105 CMR 670, the Department of Environmental Protection, 310 CMR 33, and the Department of Labor and Workforce Development, 441 CMR 21; and shall post a Workplace Notice obtainable from the Department of Labor and Workforce Development.

(2) The CM shall comply with the Federal Resource Conservation and Recovery Act, the Federal Comprehensive Environmental Response, Compensation and Liability Act, M.G.L. c. 21C, M.G. L. c. 21E, and any other Laws affecting toxic or hazardous materials, solid, special or hazardous waste (collectively "Hazardous Materials Laws). Should the CM discover unforeseen materials subject to Hazardous Materials Laws at the Site, the CM shall immediately comply with any and all requirements for handling such materials and notify all required government authorities and the OWNER of such discovery.

(3) The CM shall be responsible for the location of all utilities in connection with the Work. Without limiting the foregoing, the CM shall comply with Dig-Safe Laws. Dig-Safe is the Utility Underground Plant Damage Prevention System, 11 Upton Drive, Wilmington, MA 01887, Telephone: 811 or (888) 344-7233 (888-DIG-SAFE) . The CM shall notify Dig-Safe of contemplated excavation, demolition, or explosive work in public or private ways, and in any utility company right of way or easement, by certified mail, with a copy to Department of Environmental Protection (DEP). This notice shall be given at least 72 hours prior to the performance of the work, but not more than sixty days before the work is to be done. Such notice shall state the name of the street or the route number of the way and shall include an accurate description of the location and nature of the proposed work. Dig-Safe is required to respond to the notice within 72 hours of receipt by designating the location of pipes, mains, wires or conduits at the Site. The CM shall not commence work until Dig-Safe has responded. The work shall be performed in such manner and with reasonable precautions taken to avoid damage to utilities under the surface at the work location. The CM shall provide the Superintendent with current Dig-Safe regulations, and a copy of M.G.L. c. 82, § 40. Any costs related to the services performed by Dig-Safe shall be borne by the CM.

(4) The CM shall comply with M.G.L. c. 149, § 129A, c. 82A, and 520 CMR 14 relative to trench safety, including shoring and bracing of trenches, permit requirements for all trenches, and required protections when trenches are unattended.

H. Without limiting the CM's responsibilities described above, the CM shall take all reasonable precautions for the safety of, and the prevention of injury or damage to (1) all agents and employees and contractors on the Work and all other persons who may be affected thereby including the general public, (2) all the Work and all materials and equipment to be incorporated therein, whether in storage on or off the Site, under the care custody or control of the CM or any of its Subcontractors or any contractors directly or indirectly contracting through any of them, and (3) other property at the Site or adjacent thereto, including but not limited to trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of the Work. The CM shall promptly remedy all damage or loss to any such property caused in whole or in part by the CM, any Subcontractor, or anyone directly or indirectly contracted or employed by any of them or by anyone for whose acts any of them may be liable. Without limiting the foregoing, the CM shall:

(1) post and maintain adequate danger signs and other warnings against hazards;

(2) promulgate safety regulations and give appropriate notices to THE OWNER and users of adjacent utilities and property;

(3) insure the adequate strength and safety of all scaffolding, staging and hoisting equipment, temporary shoring, bracing and tying;

(4) protect adjoining private or public property;

(5) provide barricades, temporary fences, and covered walkways required by prudent construction practices, Laws and/or the Contract Documents;

(6) furnish approved hard hats and other personal protective equipment, furnish approved first aid supplies, furnish the name of the first aid attendant, and maintain a posted list of emergency facilities;

(7) provide proper means of access to property where the existing access is cut off by the CM;

(8) maintain from the beginning of any darkness or twilight through the whole of every night sufficient lights on or near any obstruction so as to guard to protect travelers from injury from such obstruction;

(9) maintain reasonable security at the Site so as not to expose the Work and surrounding property to vandalism or malicious mischief;

(10) provide adequate fire protection procedures during the use of cutting torches, welding equipment, plumbers' torches and other flame and spark producing apparatus;

(11) take prompt action to correct any dangerous or hazardous conditions.

I. The CM shall not use or store explosives in the performance of the Work unless the CM first obtains THE OWNER's prior written approval. If the OWNER approves the use or storage of explosives during the performance of the Work, the CM shall first comply with all Laws and obtain all permits, approvals, and certificates required in connection with the same and shall exercise best efforts, including but not limited to the employment and supervision of properly qualified personnel, to prevent damage, injuries, and accidents involving said explosives.

J. The CM shall not permit cutting or welding in or immediately adjacent to existing property of the Owner or of anyone else without THE OWNER's prior Approval in each instance.

K. The CM shall implement and promote a "no idling" provision in all vendor contracts for vehicles on site.

14. Debris and Chemical Waste.

A. The CM shall not permit the accumulation of interior or exterior debris. The CM shall keep the Work area clean at all times. Without limitation, garbage shall be removed daily.

B. The CM shall properly classify and remove debris and waste from the Site and transport and dispose of it, all in accordance with Laws, employing a qualified and properly licensed transporter, at any landfill, disposal or recycling facility licensed under applicable Laws, including without limitation, hazardous materials laws. The CM shall make all arrangements and give and obtain all notices, communications, documentation, permits, certificates, and approvals necessary for said disposal from the Owner or officials in charge of such landfills, disposal or recycling facilities. The CM shall bear all fees and costs in connection with such classification, removal, transportation, disposal and storage. The CM shall not permit any storage of debris or waste except in accordance with Laws.

C. The CM shall not permit any open fire on the Site.

D. Chemical Waste: Chemical waste shall be stored in corrosion resistant containers, removed from the Site, and disposed of not less frequently than monthly unless more frequently required by Laws, including without limitation hazardous materials laws, or by the Contract Documents. Disposal of chemical waste shall be performed in accordance with requirements of the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (DEP). Fueling and lubricating of vehicles and equipment shall be conducted in a manner that affords the maximum protection against spills and evaporation. Lubricants shall be disposed of in accordance with procedures meeting all applicable Laws. The CM shall immediately notify the Designer of any hazardous materials release large enough to require reporting under applicable Laws. The CM shall be responsible for immediately cleaning up in accordance with Laws any oil or hazardous materials releases resulting from its operations. Any costs incurred in cleaning up any such releases shall be borne by the CM.

15. Weather Protection (M.G.L. c. 149, § 44G. and 44F(1).

The CM shall provide "weather protection," which means temporary protection of that Work adversely affected by moisture, wind and cold. Weather protection shall be achieved by covering, enclosing and/or heating working areas such that a minimum temperature of 40 degrees Fahrenheit is maintained at the working surface during the months of November through March in order to permit construction to be carried on during such period in accordance with the Progress Schedule. After the building or portion thereof is completely enclosed by either permanent construction or substantial temporary materials having a resistance comparable to the specified permanent construction, the CM shall provide heat therein of not less than 55 degrees F. nor more than 75 degrees F. The foregoing provisions do not supersede any specific requirements for methods of construction, curing of materials and the like. Such weather protection shall be consistent with the Progress Schedule, shall permit the continuous progress of the Work necessary to

maintain an orderly and efficient sequence of construction operations, shall include one digital thermometer for every 2,000 square feet of floor space or fraction thereof, shall be subject to the Approval of THE OWNER, and shall meet such additional requirements as may be specified by THE OWNER and by the Contract Documents. Weather Protection costs shall be considered a Cost of the Work unless the parties have specifically included those costs under General Conditions.

16. Furnishings and Equipment.

When, in the opinion of the Designer, any portion of the Work is in a reasonable condition to receive fittings, furniture, or other property of the Owner not covered by this Contract, the CM shall allow THE OWNER to bring such fittings, furniture, and/or other property into such portions of the Work and shall provide all reasonable facilities and protection thereof. No such occupancy shall be construed as interfering with the provisions relating to time of completion, or as constituting an acceptance of the whole or any part of the Work. Any furniture or fittings so installed shall be placed in the Work at the risk of THE OWNER except that the CM shall be liable for damages or losses to such furniture or fittings to the extent such damages or losses arise in whole or in part from the negligence or intentional misconduct of CM, Subcontractors, their agents and/or employees, or anyone for whose acts CM is responsible. The CM shall provide for debris removal facilities at a central location on the Project, in order to provide for the disposal of debris associated with the delivery of furnishings and equipment and technology equipment that will be delivered and installed by others.

17. Sales Tax Exemption and Other Taxes.

All building materials and supplies as well as the rental charges for construction vehicles, equipment and machinery rented exclusively for use on the Site, or while being used exclusively for the transportation of materials for the Work are entitled to an exemption from sales taxes under M.G.L. c. 64H, § 6(f). The CM shall take all action required to obtain the benefit of such sales tax exemption. The CM shall bear the cost of any sales taxes that CM incurs in connection with the Work and THE OWNER shall not reimburse the CM for any such taxes. The exemption number assigned to the CM as an exempt purchaser shall be provided to the CM by THE OWNER upon the written request of the CM. If the CM incurs any costs for taxes, such costs shall be considered Costs of the Work.

18. Final Cleaning.

At the completion of the Work or any portion or Phase thereof, in preparation for turnover to the Owner, the CM shall remove all waste materials, rubbish, tools, equipment, electrical panels, machinery and surplus materials, and professionally clean all sight-exposed surfaces so that the Work is clean and ready for occupancy. Subsequent to installation of Owner furniture, equipment, technology equipment, and telephones, the CM shall provide such additional cleaning as may be necessary to remove any soil resulting from installation of such furniture, telephones and equipment. See Division 1 Specification Sections for additional cleaning requirements.

19. Maintenance Data.

Subject to such additional requirements as may be provided in the Contract Documents, the CM shall compile four complete and identical binders and one digital copy of operating and maintenance data for the entire Work. The CM shall submit record maintenance data to the Designer for approval, shall submit approved maintenance data to THE OWNER, and shall instruct and train the User Agency's personnel in proper inspection and maintenance procedures. CM shall professionally videotape the instruction and provide a DVD of the instruction as part of the Closeout Documents.

20. Closeout Procedures.

The CM shall take all actions and submit all items required for the issuance of the Certificate of Use and Occupancy and Final Acceptance as specified in Division 1 of the Contract Specifications.

21. Risk of Loss

The CM shall bear all risk of loss to the Work during the term of the Contract except for any portion of the Work as to which the certificate of use and occupancy has been issued pursuant to Article VI of these General Conditions of the Contract. Nothing herein shall limit the CM's responsibilities under Article IX or XV of the General Conditions of the Contract.

ARTICLE V: MATERIALS AND EQUIPMENT

1. Materials Generally.

A. Unless otherwise specifically provided in the Contract Documents, the CM shall provide and pay for materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

The CM shall obtain prior written approval from THE OWNER for permission to store materials or equipment at off-site locations, to be incorporated in the Work, for which progress payments may be requested. Any and all charges for storage, inspection and verification by the Designer and THE OWNER, including insurance, shall be borne solely by the CM. Before approval, THE OWNER may require, without limitation (i) evidence that the off-site location is properly secure, (ii) proper proof of insurance and proof of satisfactory contractual arrangements for transportation to the site, and (iii) a certificate from the CM stating:

1. The name of the CM, Subcontractor or Supplier that leases or owns the warehouse or other storage facility;
2. The location of such storage facility, including the storage space; i.e., the entire premises or certain areas of a warehouse giving the number of floors or portions thereof, and a certification that the CM has visited such location, verified the storage of such material or equipment therein or thereon (including confirmation that the materials or equipment are marked and segregated as provided below), and verified payment of all current storage charges;
3. The date(s) on which the material or equipment is first stored at such facility; and
4. A description of the materials or equipment stored, including quantities, types, manufacturers and other identification information, such as serial numbers.

The CM shall furnish to THE OWNER, not less often than once per month, a current inventory of all materials or equipment being stored at any off-site location.

The CM shall mark each sealed carton or other item with the name of the Project and THE OWNER, and all materials or equipment stored off-site shall be segregated to the extent required by the Project Manager or the Designer.

The Owner, OPM, and Designer Representative shall be given full unimpeded access to visit the location where the materials or equipment is being stored and be allowed to photograph and/or inventory such materials or Equipment independent of the CM's records.

Payment for materials or equipment stored off-site shall be at the reasonable discretion of THE OWNER, taking into account the schedule requirements of the Work. Title to materials or equipment stored off-site shall be transferred at the time at which THE OWNER pays for them, free of any lien or other interest of the Supplier or any other lien or encumbrance. Notwithstanding such transfer of title, the CM shall retain sole care, custody and control of, and shall have complete responsibility for the security and protection of, all materials or equipment included in any Application for Payment which are stored at locations other than the site, and the CM assumes all risk of loss or damage to such materials or equipment, and the CM shall hold harmless THE OWNER from and against all liabilities arising out of or resulting from loss or damage, from any cause, to such materials or equipment for which payment is requested, including liens, security interests or other claims of any kind by Suppliers or other third parties relating to such materials or equipment.

B. Materials and equipment to be installed as part of the Work (both or either of which are hereinafter referred to as "materials") shall be new, unused, of recent manufacture, assembled, and used in accordance with the best construction practices. The CM shall inform itself as to, and shall comply with, the provisions of M.G.L. c. 7, § 23A, as amended, and shall abide by the same and all applicable rules, regulations and orders made thereunder in relation to the purchase of supplies and materials in the execution of the Work, including the provisions of M.G.L. c.7, § 22, paragraph 17 which provides that there be *"a preference in the purchase of supplies and materials, other considerations being equal, in favor, first, of supplies and materials manufactured and sold within the Commonwealth, and, second, of supplies and materials manufactured and sold elsewhere within the United States."*

2. Shop Drawings, Product Data, and Samples.

A. The CM shall prepare and submit to the Designer, in accordance with the Designer's requirements for "Submittal Procedures", Shop Drawings, Product Data, Samples, and such other Submittals as may be required by the Contract Documents. The Designer will review and approve or take other appropriate action upon the Contractor's submittals, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Review and approval by the Designer of Shop Drawings, Product Data, Samples and other Submittals shall in no way relieve the CM from responsibility for proper fitting, coordinating, construction, and construction sequencing. The CM shall furnish to the Project Manager and the Designer such information and vouchers relative to the Work, the materials therefor, and the persons employed thereon, as the Designer shall from time to time request. CM will provide coordination drawings in Revit or Navisworks and Subcontractors will use same or compatible BIM software.

B. Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. The purpose of their submission is to demonstrate for those portions of the Work for which submittals are required the way the CM proposes to conform to the information given and the design concept expressed in the Contract Documents.

C. The CM shall review, and submit to the Designer, Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of THE OWNER or of separate contractors. Submittals made by the CM which are not required by the Contract Documents or which do not comply with the Contract Documents may be returned without action. The CM's attention is directed to the provisions of Section 4 of this Article V and to the Specifications.

D. The CM shall prepare and keep current for the Designer's approval a schedule of submittals which is coordinated with the Progress Schedule and allows the Designer reasonable time to review submittals.

E. The CM shall perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Designer. Such Work shall be in accordance with Approved submittals.

F. By submitting Shop Drawings, Product Data, Samples and similar submittals, the CM represents that the CM has determined and verified materials, field measurements, and field construction criteria related thereto and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

G. The CM shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Designer's approval of Shop Drawings, Product Data, Samples or similar submittals unless the CM has specifically informed the Designer in writing of such deviation at the time of submittal and the Designer has given explicit written approval to the specific deviation. The CM shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals as a result of the Designer's or THE OWNER's actions.

H. The CM shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Designer on previous submittals.

I. Informational submittals upon which the Designer is not expected to take responsive action may be so identified in the Contract Documents.

J. When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, such certification must be stamped by a registered Massachusetts professional in the discipline required. The Designer shall be entitled to rely upon the accuracy and completeness of such calculations and certifications.

K. Materials furnished or used or employed under the Contract must be equal in quality to the samples furnished and be satisfactory to the Designer.

3. Tests.

A. Any material to be used in the Work may be tested or inspected at any time by the Designer with an independent testing company with the prior Approval of THE OWNER and may be rejected if it fails to comply with specified tests. THE OWNER shall pay for all testing of specified material. If the CM requests permission to use a material that was not specified, then the CM shall pay for such testing. The cost of testing of any materials that fail the testing criteria shall be borne by the CM.

B. The CM shall notify the Designer and THE OWNER of the proposed sources of materials in time to permit all required testing and inspection before the material is needed for incorporation into the Work. The CM shall have no claim arising from CM's failure to designate the proposed source or to order the material in time for adequate testing and inspection. Necessary arrangements shall be made to permit the Designer to make factory, shop or other inspection of materials or equipment ordered for the Work in process of manufacture or fabrication, or in storage elsewhere than the Site.

4. "Or Equal" Submissions.

A. Where products or materials are prescribed by manufacturer name, trade name, or catalog reference, the words "or Approved equal" shall be understood to follow, except where the Owner has approved a proprietary specification as provided in G.L. c.30 section 39M(b). An item shall be considered equal to the item so named or described if in the opinion of the Designer (a) it is at least equal in quality, durability, appearance, strength and design, (b) it performs at least equally the function imposed in the general design for the Work, and (c) it conforms substantially, even with deviations, to the detailed requirements for the items as indicated by the Specifications. Any changes in the work made necessary to accommodate products or materials substituted as an "or equal" shall be at the expense of the CM. "Approved equal" shall mean an item with respect to which Designer shall have issued a written statement to the CM to the effect that the item is, in Designer's opinion, equal within the meaning of this paragraph to that prescribed in the Contract Documents.

B. The CM shall be responsible for providing the Designer with any information and test results that the Designer reasonably requires to determine whether or not a material is equal to a material named or described in the Contract Documents.

C. Whenever the CM submits a material for approval as a substitute for a material named or described in the Contract Documents, such submission shall be made at least sixty (60) days prior to the date the materials will be used in the Work. In no event shall the CM maintain a claim for delays based upon the Designer's review of such substituted materials if the CM has failed to comply with the sixty (60) day submission requirement.

D. Substitution requests that result in an increase in the Cost of the Work shall not be considered without the prior consent of the OWNER.

5. Delivery and Storage of Materials; Inspection.

A. Materials and equipment shall be progressively delivered to the Site so that there will be neither delay in the progress of the Work nor an undue accumulation of materials that are not to be used within a reasonable time and so that their security, quality, and fitness of the materials for the Work is preserved. CM shall prepare adequate storage and staging areas for materials and equipment delivered to the Site.

B. Materials stored off Site shall be insured and stored at the expense of the CM so as to guarantee the preservation of their security, quality and fitness for the Work. Without derogating from the CM's responsibilities in the previous sentence, when necessary to avoid deterioration or damage, material (on or off Site) shall be placed on wooden platforms or other hard clean surfaces and not on the ground and shall be properly protected.

C. Expenses for inspection of material by the Designer and/or the Project Manager personnel including travel, quarters, and subsistence shall be borne by the CM or Subcontractor requesting the inspection of material stored beyond fifty miles from the project site, as part of the Contract Price. If the CM requests an inspection of material stored outside the Commonwealth of Massachusetts, THE OWNER will initially pay for all expenses of inspecting the material incurred by the Designer and/or the Project Manager's personnel including travel, quarters, and subsistence. THE OWNER will then give CM an invoice for those costs and the CM shall submit a credit Change Order for the amount of those expenses.

D. Stored materials either at the Site or at some other location agreed upon in writing shall be so located as to facilitate prompt inspection and even though approved before storage, may again be inspected prior to their use in the Work.

E. All storage sites shall be restored to their original condition by the CM at the CM's expense.

F. The CM shall take charge of materials for its use delivered to or in the vicinity of the place where the Work is being done, whether furnished by the Owner or otherwise; the CM shall notify the Designer as soon as any such materials are so delivered, allow them to be examined by the Designer, and furnish workers to assist therewith.

6. Defective, Damaged, or Deteriorated Materials and Rejection Thereof.

The Designer may reject materials if the Designer reasonably determines that such materials do not conform to the Contract Documents in any manner, including but not limited to materials that have become damaged or deteriorated from improper storage whether or not such materials have previously been accepted. The CM at its own expense shall remove rejected materials from the Work. No rejected material, the defects of which have been subsequently corrected, shall be used except with the written permission of the Designer. Should the CM fail to remove rejected material within a reasonable time, THE OWNER may, in addition to any other available remedies, remove and/or replace the rejected material, and deduct the cost of such removal and/or replacement from any moneys due or to become due the CM by issuing a credit change order against the GMP. No extra time shall be allowed for completion of Work by reason of such rejection. The inspection of the Work shall not relieve the CM of any of its obligations herein prescribed, and any defective Work shall be corrected. Work not conforming to the Contract Documents may be rejected notwithstanding that such Work and materials have been previously overlooked or misjudged by the Designer and accepted for payment. If the Work or any part thereof shall be found defective at any time before Final Acceptance of the whole Work, the CM shall forthwith make good such defect in a manner satisfactory to the Designer. Nothing in the Contract shall be construed as vesting in the CM any property rights in the materials used after they have been attached or affixed to the Work or the Site; but all such materials shall upon being so attached or affixed become the property of the Owner.

ARTICLE VI: PROSECUTION AND PROGRESS

1. Beginning, Progress Schedule, and Completion of Work.

A. The Contract time shall commence upon the date specified and in accordance with any conditions in the Notice to Proceed.

B. Prior to the submission of the first progress payment, CM shall submit to the Designer and the Project Manager for approval a progress schedule which complies with the contract requirements. Upon Approval by THE OWNER, said schedule shall constitute the Progress Schedule.

C. Time is of the essence of this Contract. The Work shall be completed within the time specified in the Owner-CM Agreement. Should the CM require additional time to complete the Work, the CM shall document the reasons therefor and submit a written request for an extension of time within 20 days of the occurrence of the event alleged to be the cause of the delay, as provided in this Article and in Article VII of these General Conditions of the Contract. Failure to submit said written request within the time required by the preceding sentence shall preclude the CM from subsequently claiming any time extension due to said delay.

D. CM must use diligent efforts to mitigate any potential schedule impacts and must demonstrate actual impact on critical path activity to receive a Contract Time extension. CM acknowledges that managing day-to-day design changes, clarifications, RFIs and the like is part of CM's base scope of Work, and CM has contemplated such work in preparing its critical path schedule. CM agrees to meet with the Architect on a weekly basis to assist in prioritizing RFI responses in order to avoid potential delays or claims. CM agrees that neither the specification by CM of a "due date" or "return date" for any request for clarification, RFI or the like, nor the failure of Owner or Architect to meet any such required due date or return date, shall necessarily be grounds for a claim for adjustment of the Contract Time. Without limiting the foregoing, CM expressly agrees that due dates or return dates inserted by "default" by any computer software program shall not be binding upon Owner or Architect or be the basis for any claim for adjustment of the Contract Time.

E. If, in the opinion of THE OWNER, the CM fails to comply with the Progress Schedule, due to reasons that are within the reasonable ability of the CM to control, THE OWNER may but shall not be required to give the CM written notice of such failure and five days to cure the same. Unless the CM shall within that five days take all necessary steps to do so, including, if THE OWNER requires, increasing its forces, equipment and plant and continue to do so until, in the opinion of the Designer or Project Manager the failure is corrected, THE OWNER may at the CM's expense and without terminating this Contract employ and direct the labors of existing or such additional forces, equipment and plant as may in the Designer's or Project Manager's opinion be necessary to insure the completion of the Work or such part thereof within the time specified in the Contract Documents or at the earliest possible date thereafter. THE OWNER may exercise its rights under this Article at any time and from time to time without waiving any of its rights under this Contract, at law or in equity, including, without limitation, the right to deem this Contract terminated or to order the CM to discontinue the Work at any time thereafter. The CM shall continue to perform the remaining Work under this Contract even if THE OWNER elects to have another contractor perform a portion of the Work under this Article.

F. THE OWNER shall deduct the cost of any actions THE OWNER takes under this Article from any amount then due or which might have become due to the CM under this Contract had the CM performed as required. On demand, the CM shall pay THE OWNER any amount by which the cost of completing all or any portion of the Work exceeds the amount attributable to that Work under the Contract Documents. THE OWNER's sole goal will be to complete the Work that it elects to complete within the time limits stated in the Contract or at the earliest possible date thereafter. Consequently, THE OWNER shall have no obligation to obtain competitive bids or the lowest cost for completing the Work or any part thereof, except when it is required by law. THE OWNER's election to complete all or part of the Work shall not release the CM from any liability for failure to complete the Work as the Contract Documents require, and shall not entitle the CM to a claim for an increase in the Contract Price or an extension of the time for completing the Work. If the cost that OWNER incurs in completing all or any portion of the Work is less than the amount that the Contract Documents attribute to that Work, the OWNER will credit the difference to the CM, less any other costs and expenses that the OWNER incurs, including the cost of supervision, and the Designer's, the Project Manager's, and attorneys' fees and costs.

2. Failure to Complete Work on Time - Liquidated Damages.

A. If liquidated damages are specified in the Owner - CM Agreement, THE OWNER has determined that its damages as a result of CM's failure to complete the Work to the point at which it qualifies for the issuance of a Certificate of Substantial Completion will be difficult or impracticable to ascertain. Accordingly, if the Work is not substantially completed by the date specified in this Contract, including Phased Completion dates when specified, or by any extended date approved by the Owner, the CM shall pay to THE OWNER the sum designated as liquidated damages in the Contract. Such moneys shall be paid as liquidated damages, not as a penalty, to cover losses and expenses to THE OWNER and/or the User Agency resulting from the fact that the Work is not substantially completed on time.

B. THE OWNER may recover such liquidated damages by deducting the amount thereof from any moneys due or that might become due the CM, and if such moneys shall be insufficient to cover the liquidated damages, then the CM or the Surety shall pay to THE OWNER the amount due.

C. Permitting the CM to continue and finish the Work or any portion of it after the time fixed in the Contract for its completion shall not be deemed as a waiver of any of the Owner's rights hereunder, at law or in equity.

D. Liquidated damages or a portion thereof may be waived by THE OWNER at the Owner's sole discretion.

E. Failure by THE OWNER to specify a sum as liquidated damages in the Owner-CM Agreement, or the insertion of "N/A" or "none" in the space provided therein for liquidated damages, shall not be deemed a waiver of THE OWNER's right to recover actual damages arising from the CM's failure to complete the Work on time.

3. Delays; Time Extensions, No Damages for Delay Statutory Provisions (M.G.L. c. 30, § 39O).

A. Notwithstanding any provision of this Contract to the contrary, except as otherwise provided by law as set forth in paragraph B below, the CM shall not be entitled to an increase in the Contract Price or to receive damages on account of any hindrances or delays, avoidable or unavoidable; but if any delay occurs that is caused in the opinion of THE OWNER, by parties or events beyond the reasonable ability of the CM to control, the CM shall be entitled to an extension of time. Delays caused by suppliers, Subcontractors and sub-subcontractors shall be considered to be within the control of the CM. The length of the extension shall be sufficient in the opinion of THE OWNER for the CM to complete the Work.

B. The CM may be entitled to an extension of time if the CM can demonstrate to the reasonable satisfaction of the Owner, upon the recommendation of the Designer and the Project Manager, that the critical path schedule for the Project has been adversely impacted by events of delay that are beyond the reasonable ability of the CM to control, and that the CM cannot revise its critical path schedule to eliminate the need for a time extension; provided however that the Owner and CM are entitled to share the "float" time in the CPM schedule if the utilization of such time avoids a time extension. Should the CM require additional time to complete the Work, it shall document its reasons therefor and request an extension of time at the time the alleged delay occurred, as provided in this Article. Failure to notify the Owner of any delay in writing within ten days from the date the event arose that caused such delay, shall preclude the CM from requesting and obtaining a time extension due to said delay. Requests for extensions of time shall be submitted as a Change Order request to the Owner.

C. No extension of time shall be granted because of seasonal variations in temperature, humidity or precipitation, which conditions shall be wholly at the risk of the CM, whether occurring within the time originally scheduled for

completion or within the period of any extension granted. There shall be no increase in the Contract Price on account of any additional costs of operations or conditions resulting therefrom.

D. (1) Extension of Time. Upon a timely and proper request, the CM shall be entitled to an appropriate extension of time to complete the Project should any hindrances, suspensions, interruptions or delays to the critical path schedule result from one or more of the following circumstances:

(i) failure of the Owner to provide the CM with a Notice to Proceed in a timely manner;

(ii) encountering unanticipated special wastes or historical or archaeological resources;

(iii) encountering unanticipated subsurface conditions differing from those anticipated from the information provided prior to construction;

(iv) inability of the CM to obtain the required permits and/or jurisdictional approvals despite the best efforts of the CM to obtain such permits and/or approvals;

(v) any other cause beyond the reasonable ability of the CM to control which the Owner determines justifies an extension of time.

E. The CM's estimates of the extension of time must be accompanied by a detailed analysis identifying each action(s) or additional work item(s) which caused the delay and also identifying exactly which items along the critical path were impacted or delayed. Accumulating the amount of time required to complete a series of additional work items or delays and adding this time to the original Contract Time will not be considered justification for an extension of time. In order to justify an extension of Contract Time, the CM must prove that the critical path for construction has been impacted by circumstances beyond the control of the CM.

F. If a suspension, delay, interruption or failure to act of THE OWNER increases the cost of performance to any Subcontractor, that Subcontractor shall have the same rights against the CM with respect to such increase as the CM shall have against THE OWNER by virtue of (a) and (b) of M.G.L. c. 30, § 39O set forth below, but nothing in provisions (a) and (b) shall alter any other rights which the CM or the Subcontractor may have against each other. As used in the statutory language of (a) and (b) below, "contract" means this Contract, "general contractor" means the CM and "Awarding Authority" means THE OWNER:

"(a) The Awarding Authority may order the general contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as it may determine to be appropriate for the convenience of the Awarding Authority; provided, however, that if there is a suspension, delay or interruption for fifteen days or more or due to a failure of the Awarding Authority to act within the time specified in this contract, the Awarding Authority shall make an adjustment in the contract price for any increase in the cost of performance of this contract but shall not include any profit to the general contractor on such increase; and provided further, that the Awarding Authority shall not make any adjustment in the contract price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.

(b) The general contractor must submit the amount of a claim under provision (a) to the Awarding Authority in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this contract and except for costs due to a suspension order, the Awarding Authority shall not approve any costs in the claim incurred more than twenty days before the general contractor notified the Awarding Authority in writing of the act or failure to act involved in the claim."

G. No Damages for Delay

Except as provided in Paragraph F, when the Owner issues a written order suspending the work, as provided in Paragraph F, the CM shall have no claim for damages of any kind against the Owner on account of any delay in the commencement or performance of any of the Work or any delay or suspension of any portion of the Work, whether such delay is caused by the Owner, the Designer, or otherwise.

4. Use and Occupancy Prior to Final Acceptance.

A. The CM agrees to the Owner's use and occupancy of the Project or any portion thereof before Final Acceptance of the Work by the OWNER.

B. THE OWNER and the User Agency will cooperate with the CM with respect to the completion of the Work by taking such reasonable steps as may be possible to avoid interference with the CM's Work provided that they do not interfere with the proper functioning of the facility.

C. The CM shall not be responsible for wear and tear or damage resulting solely from temporary occupancy.

D. Use and occupancy of any part of the Work prior to Final Acceptance by THE OWNER shall not relieve the CM from maintaining the required payment and performance bonds and insurance (to the extent that insurance is required to be maintained after Substantial Completion) required by this Contract.

5. Certificate of Substantial Completion, Final Completion.

A. When the Work, or portion thereof which THE OWNER agrees to accept separately, has reached the state of Substantial Completion, the CM shall develop and provide to the Owner, OPM and Designer a Preliminary Contractor Punch List. The CM shall complete all items on the Preliminary Punch List with its Subcontractors prior to the CM's request to have the Work inspected by the Owner, Project Manager and Designer. The CM shall participate with the Designer, Project Manager and THE OWNER, in the development of a Final Punch List identifying those items of unfinished or unacceptable Work that remain to be performed or corrected under the Contract.
Failure to include any incomplete or defective item on the Punch List shall not relieve the CM of the obligation to complete all Work in accordance with the Contract Documents.

B. Before the Work shall be deemed completed to the point where it is ready for the issuance of a Certificate of Substantial Completion and a Certificate of Final Completion, the CM shall comply with all the requirements designated in the Contract including but not limited to the requirements listed below in Paragraph C.

C. The CM shall provide a written request to the Designer for certification of Substantial Completion. This request shall provide written certification that:

a. Equipment systems have been tested in the presence of the Owner and the MSBA's Commissioning Agent and are fully operational for its intended use.

b. Owner's designated staff have been instructed on all equipment and systems and an Owner signed receipt has been furnished to the Designer, along with the video of the training.

c. Operational and Maintenance Manuals and record drawings have been submitted to and reviewed by the Designer and have been delivered to the Owner with required corrections prior the CM's request for Substantial Completion. Submit copies of receipts signed by Owner.

d. Owner has received the specified guarantees, spare parts and attic stock, and the Owner has signed a receipt of same.

e. The Work has been completed and is ready for final inspection and an appropriate Certificate of Occupancy has been issued.

f. "Final Completion" will not occur until all bills have been paid, all claims have been settled, and appropriate releases are provided to the Designer and THE OWNER for approval, and all requirements of the Contract Documents and Laws have been satisfied.

6. One-Year Warranty Repair List and Inspection.

Approximately 30 days prior to the expiration of the comprehensive one-year warranty period required by Article IX, the CM shall schedule an appointment with THE OWNER for a re-inspection of the Work with THE OWNER and User Agency, and shall thereafter inspect the work at the time scheduled. Based on this inspection and on prior inspections, THE OWNER and/or User Agency shall issue a "Warranty Repair List" of items to be corrected by the CM. The CM shall make the repairs and/or replacements listed within 30 days of the issuance of the Warranty Repair List unless otherwise agreed by THE OWNER in writing.

ARTICLE VII: CHANGES IN THE WORK

1. Change Orders Generally.

A. No changes in the Work, the Contract Price, the Substantial and Final Completion dates, or any other provision of an Approval by THE OWNER of the Contract Documents shall be made in absence of a Change Order as defined in Article I of these General Conditions of the Contract, directing the CM to perform such changes. Any request for a change in the provisions of this Contract submitted by the CM must be made in writing and in accordance with the provisions of this Contract. A Change Order Request shall be submitted to the Designer, and a copy shall simultaneously be submitted to the Project Manager.

B. A request for a change in the provisions of this Contract may originate with THE OWNER, the CM, or the Designer. The request must be made in writing and in accordance with the provisions of this Contract. When the CM believes that an event or circumstance gives rise to an adjustment in the Contract Price and/or the Contract Time it shall submit a request for a change order to the Designer and simultaneously to the Project Manager, in accordance with the Contract.

C. Prior to the approval of a Change Order, the Owner, through the Designer or the Project Manager, may issue a written directive to the CM (sometimes called a Notice to Proceed or a Proposed Change Order) instructing the CM to make changes in the Work within the scope of the Contract, including but not limited to, changes in: (1) the Plans and Specifications; (2) the method or manner of performance of the Work; (3) the Owner-furnished facilities, equipment, materials, services or Site; (4) the schedule for performance of the Work.

D. The CM shall immediately perform any changes in the work that are ordered by THE OWNER.

E. Whenever a Change Order or written directive issued under Paragraph C will cause a change in the CM's cost or the time required to perform the Work, the CM or THE OWNER may request an adjustment in the Contract Price. Such request shall be in writing and shall be submitted by the party making such claim to the other party before commencement of the pertinent work or as soon thereafter as possible.

F. THE OWNER and the CM shall negotiate in good faith an agreement on an equitable adjustment in the Contract Price, pursuant to the methods described in the following Paragraph 2, and/or time if appropriate, before commencement of the pertinent work or as soon thereafter as is possible. In the absence of an agreement for an equitable adjustment, THE OWNER shall determine the costs attributable to the change and provide the CM with a written notice to that effect, in which event the CM may follow the procedure described in Paragraph 3. Work Performed under Protest.

G. During the negotiation of an equitable adjustment in the Contract Price, the CM shall, if requested, provide THE OWNER with all cost, pricing data and any other information or documentation used by it in computing the amount of the equitable adjustment, and the CM shall certify that the pricing data used was accurate, complete, current and reasonable. If THE OWNER subsequently determines that the data submitted by the CM was incomplete, incorrect, not current, or unreasonable, THE OWNER may exclude such data from consideration under the equitable adjustment request.

H. Whenever the Construction Manager is entitled or believes it is entitled to a Change Order adjusting the Contract Price, the Construction Manager shall maintain separate accounts (by job order or other suitable accounting procedure) of all costs incurred and attributable to such work. The Construction Manager shall maintain a computerized accounting system, acceptable to THE OWNER, in which current information as to the status of all such work is maintained. The Construction Manager shall maintain such contemporaneous records as are necessary to provide a clear distinction between the costs of all Change Order Work and proposed Change Order Work, and the costs of other Work.

I. Notwithstanding any provisions in the Contract Documents to the contrary, no additional General Conditions Cost shall be due for any Change Order or portion of a Change Order resulting from or attributable to:

(1) Increases in the cost of Allowance items;

(2) Substitutions of equipment or materials which are functionally similar to equipment or materials specified in the Contract Documents.

2. <u>Methods of Computing Equitable Adjustments.</u>

A. Equitable adjustments in the Contract Price shall be determined according to one of the following methods, or a combination thereof, as determined by THE OWNER:

(1) fixed price basis, provided that the fixed price shall be inclusive of items listed in (3) (a) through (d) below and shall be computed in accordance with those provisions;

(2) estimated lump sum basis to be adjusted in accordance with Contract unit prices or other agreed upon unit prices, provided that the unit prices shall be inclusive of all costs related to such equitable adjustment;

(3) time and materials basis to be subsequently adjusted on the basis of actual costs (but subject to a predetermined "not to exceed limit") calculated as follows:

(a) the direct cost (or credit) for labor at the prevailing wage rates established for this Contract pursuant to M.G.L. c. 149, §§ 26-27H, and the direct cost for material and use of equipment;

(b) plus (or minus) the cost of Workmen's Compensation Insurance, Liability Insurance, Federal Social Security and Massachusetts Unemployment Compensation, or as an alternative the CM may elect to use a flat 30% of the total labor rate computed in accordance with subparagraph (a) above;

(c) plus an allowance equal to 10% of the amount of (a) above for General Conditions, overhead, superintendence, fee, and profit. For that portion of the change order costs in paragraph (a) that the CM self performs, the CM shall retain the 10% allowance. For that portion of the change order costs that a Subcontractor performs, the CM shall pay the Subcontractor 5% of the allowance to cover the subcontractor's overhead, superintendence, fee and profit and the CM shall retain the remaining 5%.

(d) plus the actual direct premium cost of payment and performance bonds required of CM and Trade Subcontractors for this Contract.

B. If the net change is an addition to the Contract Price, it shall include the CM's overhead, superintendence and profit. For any change that does not include labor performed or materials installed in the project, there will be no markup for the CM's or Subcontractor's overhead, superintendence, and profit, even though there may be a net increase in the Contract Price. Charges for small tools known as "tools of the trade" are not to be computed in the amount of any change in the Contract Price.

C. Adjustment to the amounts of Subcontracts made under the provisions of the Procedure for Award of Subcontracts shall not be considered Change Orders and shall not entitle the CM to any adjustments for overhead, profit, and superintendence, although THE OWNER may require that such Contract adjustments be processed on standard Change Order and equitable adjustment forms.

3. Work Performed Under Protest.

The CM agrees to perform all Work as directed by THE OWNER, and if THE OWNER determines that certain Work that the CM believes to be or to warrant a Change Order under this Article does not represent a change in the Work, the CM shall perform said Work. The CM shall be deemed to have concurred with THE OWNER's determination as aforesaid unless the CM shall perform Work under protest in compliance with the following sub-paragraphs (1) and (2) below:

(1) If the CM claims compensation for a change in the Work that is not deemed by THE OWNER to be a change or to warrant additional compensation as claimed by the CM, the CM shall on or before the first working day following the commencement of any such work or the sustaining of any such damage submit to THE OWNER a written statement of the nature of such work or claim. The CM shall not be entitled to additional compensation for any work performed or damage sustained for which written notice is not given within the time limit specified in the preceding sentence, even though similar in character to work or damage with respect to which notice is timely given.

(2) On or before the second working day after the commencement of such work or the sustaining of such damage, and daily thereafter, the CM shall file with the Clerk of Works, the Designer, and the Project Manager, itemized statements of the details and costs of such work performed or damage sustained. The CM shall submit Daily Time and Materials Reports to record all labor and material used. If the CM fails to submit such statements, then the CM shall not be entitled to later pursue a claim against Owner for additional compensation for any such work or damages.

4. False Claims, Statutory Provisions Regarding Changes.

A. Criminal Penalties: The CM's attention is directed to M.G.L. c. 30, § 39I which provides criminal penalties for unauthorized deviations from the Plans and Specifications, and to M.G.L. c. 30, § 39J and M.G.L. c. 7, § 42E-42I. The CM's attention is also directed to M.G.L. 266, § 67B which provides criminal penalties for false claims by Contractor under this Contract:

"Whoever makes or presents to any employee, department, agency or public instrumentality of the commonwealth, or of any political subdivision thereof, any claim upon or against any department, agency, or public instrumentality of the commonwealth, or any political subdivision thereof, knowing such claim to be false, fictitious, or fraudulent, shall be punished by a fine of not more than ten thousand dollars or by imprisonment in the state prison for not more than five years, or in the house of correction for not more than two and one-half years, or both."

B. Differing Site Conditions (M.G.L. c. 30, § 39N): "*If, during the progress of the work, the contractor or the Awarding Authority discovers that the actual subsurface or latent physical conditions encountered at the Site differ substantially or materially from those shown on the plans or indicated in the contract documents either the contractor or the contracting authority may request an equitable adjustment in the contract price of the contract applying to work affected by the differing Site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions are discovered. Upon receipt of such a claim from a contractor, or upon its own initiative, the contracting authority shall make an investigation of such physical conditions, and, if they differ substantially or materially from those shown on the plans or indicated in the contract documents or from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the plans and contract documents and are of such a nature as to cause an increase or decrease in the cost of performance of the work or a change in the construction methods required for the performance of the work which results in an increase or decrease in the cost of the work, the contracting authority shall make an equitable adjustment in the contract price and the contract shall be modified in writing accordingly.*"

C. Timely Decision By THE OWNER(M.G.L. c. 30, § 39P): "*Every contract subject to section thirty-nine M of this chapter or section forty-four A of chapter one hundred forty-nine which requires the Awarding Authority, any official, its architect or engineer to make a decision on interpretation of the specifications, approval of equipment, material or any other approval, or progress of the work, shall require that the decision be made promptly and, in any event, no later than thirty days after the written submission for decision; but if such decision requires extended investigation and study, the Awarding Authority, the official, architect or engineer shall, within thirty days after the receipt of the submission, give the party making the submission written notice of the reasons why the decision cannot be made within the thirty day period and the date by which the decision will be made.*"

ARTICLE VIII: PAYMENT PROVISIONS

1. Schedule of Values.

Before submission of the first request for payment under this Contract, the CM shall submit to THE OWNER a schedule of values for its approval, which shall include all preconstruction activities as well as all construction activities and shall be in sufficient detail to reflect the various preconstruction activities and the major components of each construction trade (with relevant Subcontractors as well as MBE/WBEs noted), including quantities when requested, aggregating the GMP with detail for the Contingency and divided so as to facilitate payments for work under each section of the Specifications. The schedule of values shall be formatted so as to conform with the Massachusetts School Building Authority's "ProPay" cost code system. The schedule shall be prepared in such form and supported by such data to substantiate its accuracy as THE OWNER may require. When Approved by THE OWNER, it shall constitute the Schedule of Values and shall be used only as a basis for the CM's requests for payments and credits, the first of which payments shall not be made until such Schedule of Values is approved by THE OWNER. If the MSBA requires any revisions to the format of the Schedule of Values, the CM and the Owner shall make the revisions.

2. Payment Liabilities of CM.

A. The CM shall pay to THE OWNER all expenses, losses and damages, as determined by THE OWNER, incurred in consequence of any default, defect, omission or mistake of the CM or his employees or Subcontractors or the making good thereof.

B. If the Work (or a portion thereof) is not substantially completed and the CM has not satisfied the requirements for the issuance of a Certificate of Substantial Completion by the date specified in the Contract, the CM shall pay to the Owner liquidated damages as provided in the Contract.

3. Retention of Moneys by THE OWNER.

A. THE OWNER may keep any moneys which would otherwise be payable at any time hereunder, and apply the same, or so much as may be necessary therefor, to (1) THE OWNER 's expenditures for the CM's account, (2) to secure THE OWNER's remedies against the CM for the CM's breach of its obligations under this Contract or the breach of any person performing any part of the Work and (3) the payment of any expenses, losses or damages incurred by THE OWNER as a result of the failure of the CM to perform its obligations hereunder. THE OWNER may retain, until all claims are

settled, such moneys as THE OWNER estimates to be the fair value of THE OWNER's claims against the CM, and of all claims for labor performed or furnished and for materials used or employed in or in connection with the Work and for the rental of vehicles, appliances and equipment employed and for the employment of substitute contractors and labor in connection with the Work filed in accordance with M.G.L. c. 30, § 39A and § 39F. THE OWNER may make such settlements and apply thereto any moneys retained under this Contract.

4. Applications for Payment.

A. The CM shall, once in each month submit to THE OWNER an application for payment for its periodic payment estimate, showing the total amount of Work done to the time of such estimate and the value thereof as approved by THE OWNER. It shall be the sole responsibility of the CM to deliver or cause to be delivered to the Designer said periodic estimate, in proper form, approved as provided above and arithmetically correct, and signed by the Designer and the Project Manager, if requested by the Owner. All periodic estimates shall contain such certifications and other evidence supporting the CM's right to payment as THE OWNER may require, including without limitation, forms THE OWNER may require, establishing that title to the equipment or materials is unencumbered and has been transferred to THE OWNER. Within the periodic estimates the CM shall include a detailed log along with supporting invoices for all General Requirements costs incurred. The CM shall include in such periodic estimate only such materials as are incorporated in the Work, except as provided in paragraph C below. THE OWNER shall retain five percent of such estimated value as part security for the completion of the Work and shall pay to the CM while carrying on the Work the balance not retained as aforesaid, subject to the Approval of THE OWNER after deducting therefrom all previous payments and all sums to be kept under the provisions of this Contract, provided that the Owner shall not assess retainage against applications for payment for the CM's Preconstruction Services Fee.

B. Each periodic payment estimate shall constitute the CM's representation that (1) the payment then requested to be disbursed has been incurred by the CM on account of the Work and is justly due to Subcontractors or, to the CM in the case of other Work performed by the CM on account thereof, (2) the materials, supplies and equipment for which Application for Payment is being submitted have been installed or incorporated into the Work or have been stored at the Site or at such off Site storage locations as THE OWNER shall have Approved, (3) the materials, supplies and equipment are insured in accordance with the provisions of this Contract, (4) the materials, supplies and equipment are owned by the Owner and are not subject to any liens or encumbrances, (5) the Work which is the subject of such periodic estimate has been performed in accordance with the Contract Documents and (6) that all due and payable bills with respect to the Work have been paid to date and shall be paid from the proceeds of such periodic estimate. The CM's attention is directed to the criminal penalties for false claims.

C. The CM may include in a periodic payment estimate the value of materials or equipment delivered at the Site (or at some location agreed to in writing by THE OWNER) only upon delivery to THE OWNER of: (1) an acceptable transfer of title on the form provided by THE OWNER; (2) written certification by the CM (or applicable subcontractor) on the form provided by THE OWNER that the CM (or the Subcontractor which executed the transfer of title) is the lawful owner and that the materials or equipment are free from all encumbrances, accompanied by receipted invoices or other acceptable proof of encumbrance-free ownership if such proof is deemed necessary by THE OWNER; (3) a stored materials insurance binder that covers the materials for which payment is requested, that names the Owner as an insured party should the stored materials be subjected to any casualty, loss, or theft prior to their inclusion in the Work. The material(s) or equipment must, in the judgment of the Designer (1) meet the requirements of the Contract, including prior drawing, product data, and sample approval, (2) be ready for use, and (3) be properly stored by the CM and be adequately protected until incorporated into the Work. Off site materials shall be made available to the Owner for inspection with seven days prior notice provided to the Owner,

D. THE OWNER may make changes in any periodic payment estimate submitted by the CM and the payment due shall be computed in accordance with the changes so made.

E. No certificate for payment and no progress payment shall constitute acceptance of Work that is not in accordance with the Contract Documents.

F. The CM and all Subcontractors furnishing labor on this Contract agree to furnish certified payroll reports, at no additional expense to THE OWNER on a monthly basis. THE OWNER may at all reasonable times audit such reports.

5. Periodic Payments

THE OWNER shall make payment to the CM in accordance with M.G.L. c. 30 sect. 39K, which provides in pertinent part as follows:

"Within fifteen days after receipt from the CM at the place designated by the Owner, if such a place is so designated, of a periodic estimate requesting payment of the amount due for the preceding month, the Owner shall make a periodic payment to the CM for the work performed during the preceding month and for the materials not incorporated in the work but delivered and suitably stored at the site (or at some location agreed upon in writing) to which the CM has title or to which a trade contractor has title and has authorized the CM to transfer title to the Owner less (1) a retention based on its estimate of the fair value of its claims against the CM and less (2) a retention not exceeding five percent of the approved amount of the periodic payment. After the receipt of a periodic estimate requesting final payment and within sixty-five days after (a) the contractor fully completes the work or substantially completes the work so that the value of the work remaining to be done is, in the estimate of the Owner, less than one percent of the adjusted contract price, or (b) the CM substantially completes the work and the Owner takes possession for occupancy, whichever occurs first, the Owner shall pay the CM the entire balance due on the Contract less a retention based on its estimate of the fair value of its claims against the CM and the cost of completing the incomplete and unsatisfactory work."

THE OWNER may make changes in any periodic payment estimate submitted by the CM and the payment due on said periodic payment estimate shall be computed in accordance with the change so made, but such changes or any requirement for a corrected periodic payment estimate shall not affect the due date for the periodic payment or the date for the commencement of interest charges on the amount of the periodic payment computed in accordance with the changes made, as provided herein; provided, that THE OWNER may, within seven days after receipt, return to the CM for correction, any periodic estimate which is not in the required form or which contains computations not arithmetically correct and, in that event, the date of receipt of such periodic payment estimate shall be the date of receipt of the corrected periodic estimate in proper form and with arithmetically correct computations. The date of receipt of a periodic payment estimate received on a Saturday shall be the first working day thereafter.

All periodic payment estimates shall be submitted to THE OWNER as provided herein, and the date of receipt by THE OWNER or its designee shall be marked on the payment estimate. All periodic estimates shall be based on the Schedule of Values and shall be submitted in form satisfactory to the Designer and the Project Manager.

6. Termination for Failure to Complete Punchlist

Notwithstanding the provisions of this section, at any time after the value of the work remaining to be done is, in the estimation of THE OWNER, less than 1 per cent of the adjusted contract price, or THE OWNER has determined that the CM has substantially completed the work and THE OWNER has taken possession for occupancy, THE OWNER may send to the CM by certified mail, return receipt requested, a complete and final punchlist of all incomplete and unsatisfactory work items, including, for each item on the punchlist, a good faith estimate of the fair and reasonable cost of completing such item. The CM shall then complete all such work items within 30 days of receipt of such list or before the contract completion date, whichever is later. If the CM fails to complete all incomplete and unsatisfactory work items within 45 days after receipt of such items furnished by THE OWNER or before the contract completion date, whichever is later, subsequent to an additional 14 days' written notice to the CM by certified mail, return receipt requested, THE OWNER may terminate the contract and complete the incomplete and unsatisfactory work items and charge the cost of same to the CM and such termination shall be without prejudice to any other rights or remedies THE OWNER may have under the contract. THE OWNER shall note any such termination in the evaluation form to be filed by THE OWNER pursuant to the provisions of section 44D of chapter 149.

7. Payment of Subcontractors (M.G.L. c. 30, § 39F).

The CM shall make payments to Subcontractors in accordance with M.G.L c.30, § 39F which is quoted in this section below. For the purposes of this Contract, the word "forthwith" appearing in paragraph (1)(a) of the quoted provision shall be deemed to mean "within five (5) business days."

"1(a) Forthwith after the general contractor receives payment on account of a periodic estimate, the general Contractor shall pay to each subcontractor the amount paid for the labor performed and the materials furnished by that subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

(b) Not later than the sixty-fifth day after each subcontractor substantially completes his work in accordance with the Plans and Specifications, the entire balance due under the subcontract less amounts retained by THE OWNER as the estimated cost of completing the incomplete and unsatisfactory items of work, shall be due the subcontractor; and the Awarding Authority shall pay that amount to the general contractor. The general contractor shall forthwith pay to the

subcontractor the full amount received from the Awarding Authority less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

(c) Each payment made by the Awarding Authority to the general contractor pursuant to subparagraphs (a) and (b) of this paragraph for the labor performed and the materials furnished by a subcontractor shall be made to the general contractor for the account of that subcontractor; and the Awarding Authority shall take reasonable steps to compel the general contractor to make each such payment to each such subcontractor. If the Awarding Authority has received a demand for direct payment from a subcontractor for any amount which has already been included in a payment to the general contractor or which is to be included in a payment to the general contractor for payment to the subcontractor as provided in subparagraphs (1) and (2) the Awarding Authority shall act upon the demand as provided in this section.

(d) If, within seventy days after the subcontractor has substantially completed the subcontract work, the subcontractor has not received from the general contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount retained by the Awarding Authority as the estimated cost of completing the incomplete and unsatisfactory items of work, the subcontractor may demand direct payment of that balance from the Awarding Authority. The demand shall be by a sworn statement delivered to or sent by certified mail to the Awarding Authority, and a copy shall be delivered to or sent by certified mail to the general contractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of the subcontract work. Any demand made after substantial completion of the subcontract work shall be valid even if delivered or mailed prior to the seventieth day after the subcontractor has substantially completed the subcontract work. Within ten days after the subcontractor has delivered or so mailed the demand to the Awarding Authority and delivered or so mailed a copy to the general contractor, the general contractor may reply to the demand. The reply shall be by a sworn statement to or sent by certified mail to the Awarding Authority and a copy shall be delivered to or sent by certified mail to the subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor and of the amount due for each claim made by the general contractor against the subcontractor.

(e) Within fifteen days after receipt of the demand by the Awarding Authority, but in no event prior to the seventieth day after substantial completion of the subcontract work, the Awarding Authority shall make direct payment to the subcontractor of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount (i) retained by the Awarding Authority as the estimated cost of completing the incomplete or unsatisfactory items of work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the general contractor in the sworn reply; provided that the Awarding Authority shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by subparagraph (d). The Awarding Authority shall make further direct payments to the subcontractor forthwith after the removal of the basis for deduction from direct payments made as provided in parts (i) and (ii) of this subparagraph.

(f) The Awarding Authority shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of subparagraph (5) in an interest-bearing joint account in the names of the general contractor and the subcontractor in a bank in Massachusetts selected by the Awarding Authority or agreed upon by the general contractor and the subcontractor and shall notify the general contractor and the subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the general contractor and the subcontractor or as determined by decree of a court of competent jurisdiction.

(g) All direct payments and all deductions from demands for direct payments deposited in an interest bearing account or accounts in a bank pursuant to subparagraph (6) shall be made out of amounts payable to the general contractor at the time of receipt of a demand for direct payment from a subcontractor and out of amounts which later become payable to the General contractor and in the order of receipt of such demands from subcontractors. All direct payments shall discharge the obligation of the Awarding Authority to the general contractor to the extent of such payment.

(h) The Awarding Authority shall deduct from payments to a General contractor amounts which, together with the deposits in interest bearing accounts pursuant to subparagraph (6) are sufficient to satisfy all unpaid balances of demands for direct payment received from subcontractors. All such amounts shall be earmarked for such direct payments, and the subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the general contractor.

(i) If the subcontractor does not receive payment as provided in subparagraph (1) or if the general contractor does not submit a periodic estimate for the value of the labor or materials performed or furnished by the subcontractor and the subcontractor does not receive payment for same when due less the deductions provided for in subparagraph (1), the subcontractor may demand direct payment by following the procedure in subparagraph (4) and the general contractor may file a sworn reply as provided in that same subparagraph. A demand made after the first day of the month following that for which the subcontractor performed or furnished the labor and materials for which the subcontractor seeks payment shall be

valid even if delivered or mailed prior to the time payment was due on a periodic estimate from the general contractor. Thereafter the Awarding Authority shall proceed as provided in subparagraph (e), (f), (g) and (h)."

(2) Any assignment by a subcontractor of the rights under this section to a surety company furnishing a bond under the provisions of section twenty-nine of chapter one hundred forty-nine shall be invalid. The assignment and subrogation rights of the surety to amounts included in a demand for direct payment which are in the possession of the Awarding Authority or which are on deposit pursuant to subparagraph (6) shall be subordinate to the rights of all subcontractors who are entitled to be paid under this section and who have not been paid in full.

(3) "subcontractor" as used in this section (I) for contracts awarded as provided in sections forty-four A to forty-four L, inclusive, of chapter one hundred forty-nine shall mean a person who files a sub-bid and received a subcontract as a result of that filed sub-bid or who is approved by the Awarding Authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the general contractor, (ii) for contracts awarded as provided in paragraph (1) of section thirty-nine M of chapter thirty shall mean a person approved by the Awarding Authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the general contractor, and (iii) for contracts with the commonwealth not awarded as provided in sections forty-four A to forty-four L, inclusive, of chapter one hundred forty-nine shall also mean a person contracting with the general contractor to supply materials used or employed in a public works project for a price in excess of five thousand dollars.

(4) A general contractor or a subcontractor shall enforce a claim to any portion of the amount of a demand for direct payment deposit as provided in subparagraph (6) by a petition in equity in the superior court against the other and the bank shall not be a necessary party. A subcontractor shall enforce a claim for direct payment or a right to require a deposit as provided in subparagraph (6) by a petition in equity in the superior court against the Awarding Authority and the general contractor shall not be a necessary party. Upon motion of any party the court shall advance for speedy trial any petition filed as provided in this paragraph. Sections fifty-nine and fifty-nine B of chapter two hundred thirty-one shall apply to such petitions. The court shall enter an interlocutory decree upon which execution shall issue for any part of a claim found due pursuant to sections fifty-nine and fifty-nine B and, upon motion of any party, shall advance for speedy trial the petition to collect the remainder of the claim. Any party aggrieved by such interlocutory decree shall have the right to appeal therefrom as from a final decree. The court shall not consolidate for trial the petition of any subcontractor with the petition of one or more subcontractors or the same general Contract unless the court finds that a substantial portion of the evidence of the same events during the course of construction (other than the fact that the claims sought to be consolidated arise under the same general contract) is applicable to the petitions sought to be consolidated and that such consolidation will prevent unnecessary duplication of evidence. A decree in any such proceeding shall not include interest on the disputed amount deposited in excess of the interest earned for the period of any such deposit. No person except a subcontractor filing a demand for direct payment for which no funds due the general contractor are available for direct payment shall have a right to file a petition in court of equity against the Awarding Authority claiming a demand for direct payment is premature and such subcontractor must file the petition before the Awarding Authority has made a direct payment to the subcontractor and has made a deposit of the disputed portion as provided in part (iii) of subparagraph (5) and in subparagraph (6).

(5) In any petition to collect any claim for which a subcontractor has filed a demand for direct payment the court shall, upon motion of the general contractor, reduce by the amount of any deposit of a disputed amount by the Awarding Authority as provided in part (iii) of subparagraph (5) and in subparagraph (6) any amount held under a trustee writ or pursuant to a restraining order or injunction."

8. Final Payment; Release of Claims by CM.

Upon Final Acceptance of the Work the CM shall be entitled to payment of the balance of the Contract Price. Final payment shall be as provided in this Article above and in accordance with any process set forth in the Contract Documents. The CM agrees to execute a Certificate of Final Inspection, Release and Acceptance as a condition precedent to Final Payment. The acceptance by the CM of the Final Payment made as aforesaid, or the execution of the Certificate of Final Acceptance by the CM, shall constitute a release of the Owner, the Designer, the Project Manager and every member and agent of any of them, from all claims of and liability to the CM for anything done or furnished for or relating to the Work, or for any act or neglect of the Owner, the Designer, the Project Manager, or of any person relating to or affecting the Work. Final Acceptance shall not relieve CM of the requirements of any of the provisions of this Contract, to the extent that the same are intended to survive Final Acceptance.

ARTICLE IX. GUARANTEES AND WARRANTIES

1. General Warranty.

If at any time during the period of one (1) year from the date of Final Acceptance of the Work, any part of such Work from any Phase, shall in the reasonable opinion of THE OWNER, be defective or require replacing or repairing, or damage to other property of the Owner is caused by any defect in the Work, THE OWNER shall notify the CM in writing to make the required repairs or replacements and repair such damage. If the CM shall neglect to commence such repairs or replacements to the satisfaction of THE OWNER within ten (10) days from the date of the giving of such notice, then THE OWNER may employ other persons to make the same. In the case of an emergency, the Owner may direct the CM to perform guaranty work in a shorter period of time and the Owner may undertake any immediate actions and incur reasonable costs to preserve the safety of the building or its occupants. The CM agrees, upon demand, to pay to THE OWNER all amounts which it expends for such repairs, replacements, and/or damages. During this one-year guarantee period any corrective work shall be performed under all the applicable terms of this Contract. This one-year guarantee shall not limit any express guaranty or warranty provided elsewhere in the Contract.

2. Special Guarantees and Warranties.

A. The CM's obligation to correct Work as set forth in paragraph 1 above is in addition to, and not in substitution of, such guarantees or warranties as may be required in the various sections of the Specifications.

B. Guarantees and warranties required in the various sections of the Specifications must be delivered to the Designer before final payment to the CM may be made, or in the case of guarantees and warranties which originate with a subcontractor's section of the Work, before final payment for the amount of that subtrade or for the phase of Work to which the guarantee or warranty relates.

C. The failure to deliver a required guarantee or warranty shall constitute a failure to fully complete the Work in accordance with the Contract Documents.

ARTICLE X: MISCELLANEOUS LEGAL REQUIREMENTS.

1. CM to be Informed.

The CM shall inform itself of all existing and future Laws in any manner affecting those engaged or employed in the Work, or the materials used or employed in the Work, or in a anyway affecting the conduct of the Work, and of all orders and decrees of bodies or tribunals having any applicable jurisdiction or authority over the Work.

2. Compliance with all Laws.

The CM shall cause all persons employed in the performance of the Work to comply with, all existing and future Laws, including but not limited to those set forth below:

A. Corporate Disclosures. The CM, if a foreign corporation, shall comply with M.G.L. c. 181, s.3 and § 5, and M.G.L. c. 30, s.39L.

A ½. Workforce Certification: Certification of Compliance with Workforce Related Legal Requirements. The CM shall comply with the following legal requirements for any and all employees to be employed in the Project who are required to be listed in the certified payroll reports for the Project: 1) Federal Department of Homeland Security Requirements in hiring such employees including, but not limited to, the faithful completion of the Federal Department of Homeland Security Form I-9; 2) proper classification of individuals employed on the project; 3) all laws concerning workers' compensation insurance coverage, unemployment insurance, social security taxes, and income taxes; and 4) all laws concerning hospitalization and medical benefits that meet the minimum requirements of the connector board established in chapter 176Q of the General Laws. The CM shall execute a Workforce Certification Form with the execution of its contract. The CM shall require each of its subcontractors and sub-subcontractors to execute and provide to CM such Workforce Certification form with the execution of each subcontract, and CM shall immediately provide a copy to OWNER. CM acknowledges that with the weekly workforce reports that must be submitted on a weekly basis, in the form and format required by the OWNER, including but not limited to electronic reporting, CM and all its subcontractors are required to certify that the Form I-9 process was faithfully completed and that all other legal requirements related to its workforce referenced above were followed for all employees listed on each certified payroll report when submitted. The CM and all of its subcontractors must comply with the legal requirements of this section, must not knowingly use undocumented workers in connection with the performance of this contract, must verify the immigration status of all workers assigned to the contract without engaging in unlawful discrimination pursuant to federal requirements, and must not knowingly or recklessly alter, falsify, or accepted altered or falsified documents from any such worker. Breach of any of the terms of the Workforce Certification legal requirements during the period of the Contract may be regarded as a material

breach, subjecting the CM and its subcontractors to sanctions, including but not limited to monetary penalties, withholding of payment, contract suspension or termination.

B. Veterans Preference. In the employment of mechanics and apprentices, teamsters, chauffeurs, and laborers in the performance of Work in the Commonwealth, preference shall first be given to citizens of the Commonwealth who have been residents of the Commonwealth for at least six months at the commencement of their employment and who are veterans as defined M.G.L. c.4, s.7 (34), and who are qualified to perform the work to which the employment relates; and secondly, to citizens of the Commonwealth generally who have been residents of the Commonwealth for at least six months at the commencement of their employment, and if they cannot be obtained in sufficient numbers, then to citizens of the United States.

C. Prevailing Wages. The CM shall comply with M.G.L. c. 149, § 26-27H. The prevailing wage schedule is found in Exhibit 3 to the Owner-CM Agreement, listing the prevailing minimum wage rates that must be paid to all workers employed in the Work. THE OWNER is not responsible for any errors, omissions, or misprints in the said schedule. Such Schedule shall continue to be the minimum rate wages payable to workers employed in the Work throughout the term of this Contract, subject to the exceptions provided in M.G.L c.149, § 26-27H. The CM shall not have any claim for extra compensation from the Owner if the actual wages paid to workers employed in the Work exceeds the rates listed on the schedule or as otherwise provided by law. The CM shall cause a copy of said Schedule to be kept in a conspicuous place at the Site during the term of the Contract. If reserve police officers are employed by the CM, they shall be paid the prevailing wage of regular police officers. (See M.G.L c.149, s.34B). *Mass General Laws c. 149 section 27 as amended on August 9, 2008 requires annual updates to prevailing wage schedules for all public construction projects lasting longer than one year. The CM is required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The CM and all Subcontractors are required to anticipate such annual updated prevailing wage schedules and neither the CM nor any Subcontractors shall be entitled to claim additional compensation for base contract work due to updated prevailing wage schedules.*

D. Payroll Records and Statement of Compliance. The CM shall comply and shall cause its Subcontractors to comply with Massachusetts General Law c. 149, § 27B, which requires that a true and accurate record be kept of all persons employed on a project for which the prevailing wage rates have been provided. The CM and all Subcontractors shall keep these records and preserve them for a period of three years from the date of completion of the Contract. Such records shall be open to inspection by any authorized representative of the Owner at any reasonable time, and as often as may be necessary. The CM shall, and shall cause its Subcontractors to, submit weekly copies of their weekly payroll records to THE OWNER. In addition, the CM and each Subcontractor shall furnish to the Department of Labor and Workforce Development within fifteen days after completion of its portion of the Work a signed statement in the form required by THE OWNER or as follows:

STATEMENT OF COMPLIANCE

I, _____ (Name of Signatory Party), _____ (Title), do hereby state that I pay or supervise the payment of the persons employed by _____ (Contractor or Subcontractor) on the _____ (Building or Project) and that all mechanics and apprentices, teamsters, chauffeurs, and laborers employed on said project have been paid in accordance with wages determined under the provisions of G.L. c. 149, §26 and 27.

Signature: _____

Title: _____

The above-mentioned copies of payroll records and statement of compliance shall be available for inspection by any interested party filing a written request to the Contractor for such inspections (G.L. c. 149, §27B).

E. Vehicle operators. If the Director of the Department of Labor and Workforce Development has established a Schedule of wage rates to be paid to the operators of trucks, vehicles or equipment for the Work, the CM shall be obligated to pay such operators at least the minimum wage rate contained on such Schedule. (See M.G.L. c.149, s.26-27H).

F. Eight Hour Day. The CM shall comply with M.G.L. c. 149, § 30, 34 and 34A which provide that no laborer, workman, mechanic, foreman or inspector working within the Commonwealth in the employ of the CM, subcontractor or other person doing or contracting to do the whole or part of the Work shall be required or permitted to work more than eight hours in any one day or more than forty-eight hours in any one week, or more than six days in any one week, except in cases of extraordinary emergency.

G. Timely Payment of Wages. The CM shall comply with, and shall cause its Subcontractors to comply with M.G.L. c. 149, § 148 which requires the weekly or biweekly payment of employees within six days of the end of the pay period during which wages were earned if employed for five or six days of a calendar week, and within other periods of time under certain circumstances as set forth therein.

H. Lodging, etc. The CM shall comply with, and shall cause its Subcontractors to comply with, M.G.L. c. 149, § 25 which provides that every employee under this Contract shall lodge, board and trade where and with whom he elects, and neither the CM nor his agents or employees shall, either directly or indirectly, require as a condition of the employment of any person that the employee shall lodge, board or trade at a particular place or with a particular person.

I. Truck Rates. The use by the CM of trucks or other motor vehicles hired from either common or contract motor carriers in the course of performance of this Contract is subject to such minimum rates and charges, and rules and regulations as may from time to time be promulgated by the Department of Public Utilities of the Commonwealth of Massachusetts or other agency of the State of Federal government which may be authorized by law to set rates or otherwise regulate the use of such vehicles. The CM expressly assumes the risk of any additional expense that may arise by reason of any change in such minimum rates and charges, and rules and regulations, and shall be entitled to no additional compensation or reimbursement by reason thereof.

J. Anti-Boycott Covenant (Executive Order #130). The CM warrants, represents and agrees that during the time his Contract is in effect, neither it or any affiliated company, as hereafter defined, participates in or cooperates with an international boycott, as defined in Section 999(b) (3) and (4) of the Internal Revenue Code of 1954, as amended, or engages in conduct declared to be unlawful by M.G.L. c. 151E, §2. If there shall be a breach in the warranty, representation or agreement contained in this paragraph, then without limiting such other rights as it may have the Awarding Authority shall be entitled to rescind this contract. As used herein, an affiliated company shall be any business entity of which at least 51% of the ownership interests are directly or indirectly owned by the CM or by a person or persons or business entity or entities directly or indirectly owning at least 51% of the Ownership interests of the CM; or which directly or indirectly owns at least 51% of the Ownership interests of the CM.

K. CM's Agreements with Supplies—Anti-Boycott Provisions. (1) The CM shall not purchase or rent any materials, equipment, machinery, vehicles, or supplies for or in connection with the Work from any person or entity who does not sign, under pains and penalties of perjury, a certificate that recites: "The undersigned warrants, represents and agrees that during the time its agreement with {insert CM's name} is in effect for materials, supplies or equipment to be used in connection with the {insert the name of the Awarding Authority} Project No. {insert project number}, neither the undersigned or any affiliated company, as hereafter defined, participates in or cooperates with an international boycott, as defined in Section 999(b)(3) and (4) of the Internal Revenue Code of 1954, as amended, or engages in conduct declared to be unlawful by Section 2 of Chapter 151E of the Massachusetts General Laws. As used herein, an affiliated company shall be any business entity of which at least 51% of the ownership interests are directly or indirectly owned by the undersigned or by a person or persons or business entity or entities directly or indirectly owning at least 51% of the ownership interests of the undersigned; or which directly or indirectly owns at least 51% of the ownership interests of the undersigned."

(2) The Awarding Authority shall not be obligated to pay the CM for the cost of any materials, supplies, or equipment purchased or rented from any individual or entity from whom the CM has not previously obtained and delivered to the Awarding Authority the certificate that the subparagraph (1) of this section requires. The CM will immediately terminate its contract with any supplier who breaches the warranty, representation and agreement contained in subparagraph (1).

(3) The CM shall include in the CM's agreement with any person or entity from whom the CM intends to purchase or rent any materials, equipment, machinery, vehicles or supplies for or in connection with the Work, (a) a notice that this Contract obligates the CM to terminate the supply contract upon discovery of such breach of the sworn certificate delivered under subparagraph (1) and such termination shall be without liability to the CM or the Awarding Authority and (b) a provision which states: "The Governor or his designee, the secretary of administration and finance, the state auditor or his designee, the Massachusetts School Building Authority or its designee, or the City of Framingham or its designee shall have the right at reasonable times and upon reasonable notice to examine the books, records and other compilations of the undersigned vendor which pertain to the performance and requirements of this agreement to provide materials of any nature to the undersigned Contractor [CM} in connection with Project No. (Insert project number).

L. Access to CM's Records (Executive Order #195). The Governor or his designee, the secretary of administration and finance, and the state auditor or his designee shall have the right at reasonable times and upon reasonable

notice to examine the books, records and other compilations of data of the CM which pertain to the performance and requirements of this Contract.

ARTICLE XI: CM'S ACCOUNTING METHOD REQUIREMENTS (M.G.L. c. 30, § 39R)

1. Definitions.

The words defined herein shall have the meaning stated below whenever they appear in this Article XI:

- "Contractor" means the CM.
- "Contract" means any Contract awarded, which is for an amount or estimated amount greater than one hundred thousand dollars.
- "Independent Certified Public Account" means a person duly registered in good standing and entitled to practice as a certified public accountant under the laws of the place of his/her residence or principal office and who is in fact independent. In determining whether an accountant is independent with aspect to a particular person, appropriate consideration should be given to all relationships between the accountant and that person or any affiliate thereof. Determination of an accountant's independence shall not be confined to the relationships existing in connection with the filing of reports with THE OWNER.
- "Records" means books of original entry, accounts, checks, bank statements and all other banking documents, correspondence, memoranda, invoices, computer printouts, tapes, discs, papers and other documents or transcribed information of any type, whether expressed in ordinary or machine language.
- "Audit", when used in regard to financial statements, means an examination of records by an independent certified public accountant in accordance with generally accepted accounting principles and auditing standards for the purpose of expressing a certified opinion thereon, or, in the alternative, a qualified opinion or a declination to express an opinion for stated reasons, or other person or persons primarily responsible for the financial and operational policies and practices of the Contractor.

Accounting terms, unless otherwise defined herein, shall have a meaning in accordance with generally accepted accounting principles and auditing standards.

2. Record Keeping.

A. The Contractor shall make, and keep for at least six years after final payment, books, records, and accounts that in reasonable detail accurately and fairly reflect the transactions and dispositions of the Contractor.

B. Until the expiration of six years after final payment, the Inspector General, THE OWNER, and THE OWNER shall have the right to examine any books, documents, papers or records of the Contractor and Subcontractors that directly pertain to, and involve transactions relating to the Contractor and Subcontractors. Any request for a change in the provisions of this Contract submitted by the CM must be made in writing and in accordance with the provisions of this Contract.

C. The Contractor shall describe any change in the method of maintaining records or recording transactions which materially affects any statements filed with THE OWNER including the date of the change and reasons therefor, and shall accompany said description with a letter from the Contractor's independent certified public accountant approving or otherwise commenting on the changes.

D. The Contractor represents that it has, prior to the execution of the Contract, filed a statement of management on internal accounting controls as set forth in Section 3 below.

E. The Contractor represents that it has, prior to the execution of the Contract, filed an audited financial statement for the most recent completed fiscal year as set forth in section 4 below and will continue to file such statement annually during the term of the Contract.

3. Statement of Management Controls.

A. The Contractor shall file with THE OWNER a statement of management as to whether the system of internal accounting controls of the Contractor and its subsidiaries reasonably assures that:

(1) transactions are executed in accordance with management's general and specific authorization;

(2) transactions are recorded as necessary to: (a) to permit preparation of financial statements in conformity with generally accepted accounting principles, and (b) to maintain accountability for assets;

(3) access to assets is permitted only in accordance with management's general or specific authorization; and

(4) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action was taken with respect to any difference.

B. The Contractor shall file with THE OWNER a statement prepared and signed by an independent certified public accountant, stating that the accountant has examined the statement of management on internal accounting controls, and expressing an opinion as to:

(1) whether the representations of management in response to subparagraph 3 above are consistent with the results of management's evaluation of the system of internal accounting controls; and

(2) whether such representations of management are reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statement.

4. Annual Financial Statement.

A. Every Contractor awarded a contract shall annually file with THE OWNER during the term of the Contract a financial statement prepared by an independent certified public accountant on the basis of an audit by such accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report.

B. The office of Inspector General and THE OWNER shall have the right to enforce the provisions of this Article. A Contractor's failure to satisfy any of the requirements of this section may be grounds for debarment pursuant to M.G.L. c. 149, § 44C.

5. Bid Pricing Materials.

The Contractor shall save the written calculations, pricing information, and other data that the Contractor used to calculate the bid or other cost quotations that are presented by the Contractor to THE OWNER to enter into this Contract (the "Bid Pricing Materials") and to establish the Guaranteed Maximum Price for the Project.

ARTICLE XII: EQUAL EMPLOYMENT OPPORTUNITY, NON-DISCRIMINATION AND AFFIRMATIVE ACTION PROGRAM

This Contract includes all provisions of the "Equal Employment Opportunity, Non-Discrimination, and Affirmative Action Program" appearing in Appendix A to these General Conditions of the Contract attached hereto and incorporated herein by reference.

ARTICLE XIII: GOALS FOR PARTICIPATION BY MINORITY BUSINESS ENTERPRISES AND WOMEN BUSINESS ENTERPRISES

This Contract includes all provisions of THE OWNER's program relating to Goals for Participation by Minority Business Enterprises and Women Business Enterprises attached appearing in Appendix A, Appendix B, Appendix C and Appendix D to these General Conditions of the Contract attached hereto and incorporated herein by reference.

ARTICLE XIV: INSURANCE REQUIREMENTS

1. Insurance Generally.

A. The CM shall purchase and maintain the insurance of the type and limits listed in this Article, and in accordance with any additional requirements of the Massachusetts School Building Authority (MSBA), including those in the Project Funding Agreement between the Authority and the Owner, with respect to the operations as well as the completed operations of this Contract. This insurance shall be provided at the CM's expense and shall be in full force and effect for the full term of the Contract or for such longer period as this Article requires.

B. All policies shall be written on an occurrence basis and be issued by companies lawfully authorized to write that type of insurance under the laws of the Commonwealth with a financial strength rating of A- or better assigned by AM Best Company, or equivalent rating assigned by a similar rating agency acceptable to the Owner or as otherwise acceptable to the Owner.

C. CM shall submit three originals of each certificate of insurance, acceptable to the Owner, simultaneously with the execution of this Contract. Certificates shall show each type of insurance, insurance company, policy number, amount of insurance, deductibles and/or self insured retentions, and policy effective and expiration dates. Certificates shall show the Massachusetts School Building Authority (hereinafter "Authority"), the Owner and anyone else that the Owner may request as additional insureds as to all policies of liability insurance. Certificates shall specifically note the following:

a. That the General Liability policy includes contractual liability;

b. That the General Liability policy includes the Owner and the Authority as additional insureds for ongoing operations (CG 20 10) and for completed operations (CG 20 37) or equivalent endorsements

c. that the automobile liability, umbrella liability and pollution liability policies include the Owner and the Authority as additional insureds;

d. That the General Liability policy includes endorsement CG 24 04 or equivalent, a Waiver of Subrogation in favor of the Owner and the Authority

e. That the Builders' Risk or Installation Floater is on all risk basis including earthquake and flood, and includes the Owner, the Authority, the CM, subcontractors and suppliers of any tier as named insureds or loss payees as their interests may appear.

f. that none of the coverages shall be cancelled, terminated, or materially modified unless and until thirty (30) days prior notice is given in writing to the Owner and the Authority;

CM shall submit updated certificates prior to the expiration of any of the policies referenced in the certificates so that the Owner shall at all times possess certificates indicating current coverage.

D. The CM shall file one certified complete copy of all policies and endorsements with the Owner within fifteen (15) days after Contract award. If the Owner or the Authority is damaged by the CM's failure to maintain such insurance and to comply with the terms of this Article, then the CM shall be responsible for all costs and damages to the Owner and the Authority attributable thereto.

E. Termination, cancellation, or material modification of any insurance required by this Contract, whether by the insurer or the insured, shall not be valid unless written notice thereof is given to Owner, and the Authority to the extent that the Authority is an additional insured, at least thirty (30) days prior to the effective date thereof, which shall be expressed in said notice.

F. The CM is responsible for the payment of any and all deductibles under all of the insurance required below unless the Owner and the Authority specifically provide a written waiver to the CM.

2. CM's Commercial General Liability.

A. The CM shall purchase and maintain general liability coverage on the ISO form CG 00 01 or equivalent, including products and completed operations, on an occurrence basis. The form must be amended to state that the aggregate limit applies on a per location/per project basis. The policy shall provide the following minimum coverage to protect the CM from claims with respect to the operations performed by CM and any employee, subcontractor, or supplier, unless a higher coverage is specified in Section 8 below, in which case the CM shall provide the additional coverage:

Bodily Injury &	$1,000,000 each occurrence
Property Damage	$2,000,000 general aggregate, per project
Products & Completed Operations	$1,000,000 annual aggregate
Personal & Advertising Injury	$1,000,000 each occurrence
Medical Expenses	$5,000

B. This policy shall include coverage relating to explosion, collapse, and underground property damage.

C. This policy shall include contractual liability coverage.

D. The completed operations coverage shall be maintained for a period of three (3) years after Substantial Completion and acceptance by the Owner. The CM shall provide renewal certificates of insurance to the Owner as evidence that this coverage is being maintained.

E. If the Work includes work to be performed within fifty (50) feet of a railroad, any exclusion for liability assumed under contract for work within fifty (50) feet of a railroad shall be deleted.

F. This policy shall include the Owner, Authority, the Designer, the Owner's Project Managercommittee, and anyone else requested by the Owner as additional insureds via endorsements CG 20 10 for ongoing operations and CG 20 37 for completed operations. This policy shall be primary and non-contributory with respect to any other insurance available to additional insureds.

G. The policy shall include endorsement CG 24 04, a Waiver of Subrogation in favor of the Owner and the Authority.

3. Vehicle Liability.

A. The CM shall purchase and maintain the following minimum coverage with respect to the operations of any owned, non-owned, and hired vehicles including trailers used in the performance of the work, unless a higher coverage is specified in Section 8 below, in which case the CM shall provide the additional coverage:

Bodily Injury & Property Damage $1,000,000 combined single limit

B. The policy shall include a CA 99 48 Broadened Pollution Endorsement. If specified in Section 8 below, the CM, if hauling contaminants and/or pollutants, must adhere to Sections 29 and 30 of the Motor Carrier Act of 1980, which shall contain coverage Form MCS-90.

C. The policy shall name the Owner, the Designer, the Owner's Project Manager, [CB1]and the Authority as additional insureds.

D. The policy shall contain a Waiver of Subrogation in favor of the Owner, the Designer, the Owner's Project Manager, and the Authority.

4. Contractor's Pollution Liability.

The CM shall purchase and maintain coverage for bodily injury and property damage resulting from liability arising out of pollution related exposures such as asbestos abatement, lead paint abatement, tank removal, removal of contaminated soil, etc. The insurance policy shall cover the liability of the CM during the process of removal, storage, transport and disposal of hazardous waste and contaminated soil and/or asbestos abatement. The policy shall include coverage for on-Site and off-Site bodily injury and loss of, damage to, or loss of use of property, directly or indirectly arising out of the discharge, dispersal, release or escape of smoke, vapors, soot, fumes, acids, alkalis, toxic chemicals, liquids or gas, waste materials or other irritants, contaminants or pollutants into or upon the land, the atmosphere or any water course or body of water, whether it be gradual or sudden and accidental. The policy shall also include defense and clean-up costs. The Owner, the Designer, the Owner's Project Manager, and the Authority shall be named as additional insureds and coverage must be on an occurrence basis. The amount of coverage shall be as follows unless a higher amount is specified in Section 8 below, in which case the CM shall provide the additional coverage:

Limit of Liability	$1,000,000 per occurrence $3,000,000 aggregate

5. Worker's Compensation.

A. The CM shall provide the following coverage in accordance with M.G.L. c.149 §34A and c.152 as amended, unless a higher coverage is specified in Section 8 below, in which case the CM shall provide the higher coverage:

Workers' Compensation	Statutory limits
Employer's Liability	$ 1,000,000 each accident

$ 1,000,000 disease per employee
$ 1,000,000 disease policy aggregate

B. The policy shall contain a Waiver of Subrogation in favor of the Owner and the Authority.

6. Builder's Risk/ Installation Floater/Stored Materials.

A. The CM shall purchase and maintain coverage against loss or damage on all Work included in this Contract in an amount equal to the GMP. Such coverage shall be written on an all risks basis or equivalent form and shall include, without limitation, insurance against perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, terrorism ("certified" and "non-certified"), collapse, earthquake, flood (if the project is not in an "A" or a "V" flood Zone), windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's, Project Manager's and CM's services and expenses required as a result of such insured loss. Unless otherwise specified in this Contract, the limits for earthquake and flood shall each be the lesser of the Contract Price or $10,000,000. This policy and/or installation floater shall include transportation and Stored Materials coverage in an amount equal to the value of the stored materials as required in **C.** below.

B. When Work will be completed on existing buildings owned by the Owner, the CM shall provide an installation floater, in the full amount of the Contract Price. Such coverage shall be written on an all risks basis or equivalent form and shall include, without limitation, insurance against perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood (if the project is not in an "A" or a "V" flood Zone), windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's, Project Manager's and CM's services and expenses required as a result of such insured loss. Unless otherwise specified in this Contract, the limits for earthquake and flood shall each be the lesser of the Contract Price or $10,000,000. This policy and/or installation floater shall include transportation and Stored Materials coverage in an amount equal to the value of the stored materials as required in **C.** below.

C. The CM shall maintain insurance on delivered and/or stored material designated to be incorporated in the Work against fire, theft or other hazards. Any loss or damage of whatever nature to such material while stored at some approved off Site location shall be forthwith replaced by the CM at no expense to the Owner or the Authority.

D. The policy or policies shall specifically state they are for the benefit of and payable to the Authority, the Owner, the CM, subcontractors and all persons furnishing labor or labor and materials for the Contract Work, as their interests may appear. The policy or policies shall list the Authority, the Owner, the CM, and Subcontractors of any tier as named insureds.

E. Coverage shall include any costs for work performed by the Designer or any consultant as the result of a loss experienced during the term of this Contract.

F. Coverage shall include permission for temporary occupancy and a Waiver of Subrogation in favor of the Owner and the Authority.

G. Coverage shall be maintained until final acceptance by Owner of the Work and final payment has been made.

H. A loss under the property insurance shall be adjusted by CM as fiduciary and made payable to the Contractor as fiduciary for the insureds. CM shall pay the subcontractors their just shares of insurance proceeds received by the CM and shall require subcontractors to make payments to their sub-subcontractors in similar manner.

7. Umbrella Coverage.

The Contractor shall provide Umbrella Coverage in a form at least as broad as primary coverages required by Sections 2, 3 and 5 of this Article in the following amount unless a higher amount is specified in Section 8 below in which case the Contractor shall provide the higher amount:

Contract Price	Limit of Liability
Under $ 1,000,000	$ 2,000,000 per occurrence
$1,000,001 to $5,000,000	$ 5,000,000 per occurrence
$5,000,001 to $10,000,000	$10,000,000 per occurrence

$10,000,001 and over	$25,000,000 per occurrence

8. Additional Insurance Requirements

The CM shall provide such other and/or additional types and/or amounts of insurance as may be set forth below:

A. Contractor's Professional Liability
The CM shall purchase and maintain insurance errors and omissions liability insurance appropriate to the contractor's profession, including without limitation CM at Risk services performed under M.G.L. c. 149A whether performed by a Design Professional that the Insured is legally responsible for, or by the Insured in their capacity as a Design Professional, or other professional services that the Insured performs for others in their capacity as a Construction Manager. Coverage as required in this paragraph shall apply to liability for a professional error, act, or omission arising out of the scope of the CM's services as defined in this contract. Coverage shall be written subject to limits of not less than $1,000,000 per loss. If coverage as required above is written on a claims-made basis, the CM warrants that any retroactive date is no later than the effective date of this contract; and that continuous coverage will be maintained or an extended coverage period will be exercised for a period of 6 (six) years beginning from the time of substantial completion of the Work.

ARTICLE XV: INDEMNIFICATION

1. Generally.

To the fullest extent permitted by law, the CM shall indemnify, defend (with counsel acceptable to Owner) and hold harmless, the Owner, the Designer, the Owner's Project Manager, and their officers and agents from and against all claims, damages, losses and expenses arising out of or resulting from the performance of the work, including, but not limited to labor performed or furnished and materials used or employed for the work; to inventions, patents and patent rights used in and in doing the work, unless such patent infringement is due to a product or process specified by the Owner; to injuries to any person or damage to any property in connection with the work or in consequence of any improper materials, implements or labor used or employed therein; and to any act, omission or neglect of the CM and its employees and its Subcontractors and employees, regardless of whether such claims are caused in part by a party indemnified hereunder. To the extent legally permissible, the CM shall ensure that all Subcontractors are similarly bound to the Owner as provided for in this Article. The indemnification obligations are notwithstanding any insurance requirements and no insurance provision shall excuse any indemnification requirement. The CM shall be obligated as provided above, regardless of whether or not such claims, damages, losses and/or expenses, are caused in whole or in part by the actions or inactions of a party indemnified hereunder. In any and all claims by CM's Personnel against parties indemnified hereunder, the CM's indemnification obligation set forth above shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the CM or any subcontractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this Article XV.

2. CM's Indemnification of The MSBA

To the fullest extent permitted by law, the CM and its contractors and Subcontractors hereby agree to indemnify, defend and hold harmless, the Massachusetts School Building Authority ("Authority") and its officers and employees from and against all claims, damages, liabilities, injuries, costs, fees, expenses, or losses, including, without limitation, reasonable attorney's fees and costs of investigation and litigation, whatsoever which may be incurred by the Authority arising out of or resulting from the performance or nonperformance of the Work performed by the CM, or its contractors and Subcontractors, provided that such claims, damages, liabilities, injuries, costs, fees, expenses, or losses are alleged to be caused in whole, or in part, by an act or omission of any of the CM, its contractors, or Subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

3. Asbestos Abatement Subcontractor Indemnification

The CM shall obtain an indemnification agreement from the Asbestos Abatement Subcontractor that provides as follows: The Asbestos Abatement Subcontractor shall assume full responsibility and liability for the compliance with all applicable Federal, State and local regulations pertaining to work practices, hauling and disposal of asbestos-containing material and protection of workers and visitors to the Site, and persons occupying areas adjacent to the Site. The CM shall hold the

Owner, Owner's Project Manager and the Architect harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on the part of himself, his employees or his subcontractors.

4. Designer's Actions.

The obligations of the CM under Section 1 above shall not extend to the liability of the Designer, its agents or employees, arising out of (i) the preparation or approval of maps, Drawings, opinions, reports, surveys Change Orders, designs or Specifications, or (ii) the giving of or the failure to give directions or instructions by the Designer, its agents to employees provided such giving or failure to give is the primary cause of the injury or damage.

5. Survival.

The provisions of this Article XV are intended to survive Final Acceptance and/or any termination of this Contract.

ARTICLE XVI: PERFORMANCE AND PAYMENT BONDS

1. CM Bonds.

A. The CM shall provide performance and payment (labor and materials) bonds in the form attached, executed by a surety licensed by the Commonwealth of Massachusetts Division of Insurance. Each such bond shall be in the amount of the GMP.

B. If at any time prior to final payment to the CM, the Surety:

- is adjudged bankrupt or has made a general assignment for the benefit of its creditors;
- has liquidated all assets and/or has made a general assignment for the benefit of its creditors;
- is placed in receivership;
- otherwise petitions a state or federal court for protection from its creditors; or
- allows its license to do business in Massachusetts to lapse or be revoked;

then the CM shall, within 7 days of any such action listed above, provide THE OWNER with new performance and payment bonds as described in Paragraph A above. Such bonds shall be provided solely at the CM's expense. No Work shall proceed until such new bonds have been provided.

2. Subcontractor Bonds.

A. Trade Contractors shall provide payment and performance bonds to the CM and the Subcontractors shall include the premiums for those bonds in their Sub-Trade Bids.

B. If the CM requires subcontractors other than Trade Contractors to provide the CM with payment and performance bonds for the full amount of their respective Subcontracts, then the costs for said bonds shall be the responsibility of the CM.

C. Irrespective of whether the CM requests payment and performance bonds from its respective Subcontractors, the CM understands that if the Subcontractor defaults or is terminated, the CM shall have full responsibility for all costs and expenses related to said default or termination.

3. Cost of Bond Premiums.

The costs of bond premiums for bonds provided by the Trade Contractors and Subcontractors shall be considered Costs of the Work.

ARTICLE XVII: TERMINATION OF CONTRACT

1. Termination for Cause.

A. THE OWNER may without prejudice to any other right or remedy terminate this Contract for cause if any of the following defaults shall occur and not be cured within seven (7) days after the giving of written notice thereof by the Owner to the CM:

(1) The CM has filed a petition, or a petition has been filed against the CM with its consent, under any federal or state law concerning bankruptcy, reorganization, insolvency or relief from creditors, or if such a petition is filed against the CM without its consent and is not dismissed within sixty (60) days; or if the CM is generally not paying its debts as they become due; or if the CM becomes insolvent; or if the CM consents to the appointment of a receiver, trustee, liquidator, custodian or the like of the CM or of all or any substantial portion of its assets and such appointment or possession is not terminated within sixty (60) days; or if the CM makes an assignment for the benefit of creditors;

(2) The CM refuses or fails, except in cases for which extension of time is provided under this Contract, to supply enough properly skilled workers or proper materials to perform its obligations under this Contract, or the Owner has determined that the rate of progress required for the timely completion of the Work is not being met;

(3) The CM fails to make prompt payment to Subcontractors or for materials, equipment, or labor;

(4) All or a part of the Work has been abandoned;

(5) The CM has sublet or assigned all or any portion of the Work, the Contract, or claims thereunder, without the prior written consent of the Owner, except as expressly permitted in this Contract;

(6) The CM has failed to comply with Laws;

(7) The CM fails to maintain, or provide to the Owner evidence of the insurance or bonds required by this Contract, or

(8) The CM has failed to perform the Work or any portion thereof as required by this Contract or has otherwise breached any material provision of this Contract.

B. THE OWNER shall give the CM, and may give any surety, written notice of such termination for cause, but the giving of notice of such termination shall not be a condition precedent or subsequent to the termination's effectiveness. In the event of such termination, and without limiting any other available remedies, THE OWNER may, at its option:

(1) hold the CM and its sureties liable in damages for a breach of Contract;

(2) notify the CM to discontinue all work, or any part thereof, and the CM shall discontinue all work, or any part thereof, as the Owner may designate;

(3) complete the Work, or any part thereof, and charge the expense of completing the Work or part thereof, to the CM;

(4) require the surety or sureties to complete the Work and perform all of the CM's obligations under this Contract.

(5) take such other lawful action as is deemed by THE OWNER to be in its best interest.

If THE OWNER elects to complete all or any portion of the Work as specified in (3) above, it may take possession of all materials, equipment, tools, machinery, implements at or near the Site owned by the CM and finish the Work at the CM's expense by whatever means THE OWNER may deem expedient; and the CM shall cooperate at its expense in the orderly transfer of the same to a new contractor or to THE OWNER as directed by THE OWNER. In such case THE OWNER shall not make any further payments to the CM until the Work is completely finished. The Owner shall not be liable for any depreciation, loss or damage to said materials, machinery, implements or tools during said use and the CM shall be solely responsible for their removal from the Site after the Owner has no further use for them. Unless so removed within fifteen days after notice to the CM to do so, they may be sold at public auction, after publication of notice thereof at least twice in any newspaper published in the county where the Work is being performed, and the proceeds credited to the CM's account; or they may, at the option of THE OWNER, be stored at the CM's expense subject to a lien for the storage charges.

C. Damages and expenses incurred under paragraph B above shall include, but not be limited to, costs for the Designer's and Project Manager's extra services required, as reasonably determined by THE OWNER, to successfully inspect and administer the construction through final completion of the Work.

D. Expenses charged under paragraph B above may be deducted and paid by THE OWNER out of any moneys then due or to become due the CM under this Contract.

E. All sums, damages, and expenses incurred by the Owner to complete the Work shall be charged to the CM. In case the damages and expenses charged are less than the sum that would have been payable under this Contract if the same had been

completed by the CM, the CM shall be entitled to receive the difference. In case such expenses shall exceed the said sum, the CM shall pay the amount of the excess to the Owner.

2. Termination For Convenience.

A. THE OWNER may terminate this Contract for convenience even though the CM is not in default by giving notice to the CM specifying in said notice the date of termination.

B. In case of such termination without cause, the CM shall be paid:

(1) all sums due and owing under this Contract through the date of termination, including any retainage withheld to the date of termination, less any amount which THE OWNER determines is necessary to correct or complete the Work performed to the date of termination; plus (2) a reasonable sum to cover the expenses which CM would not have incurred but for the early termination of the Contract, such as demobilization of the work force, and restocking charges.

C. Lost profits shall not be payable. The payment provided in paragraph B above shall be considered to fully compensate the CM for all claims and expenses and those of any consultants, Subcontractors, and suppliers, directly or indirectly attributable to the termination.

3. CM's Duties Upon Termination For Convenience.

Upon termination of this Contract for convenience as provided in Section 2 of this Article, the CM shall: (1) stop the Work; (2) stop placing orders and Subcontracts in connection with this Contract; (3) cancel all existing orders and Subcontracts; (4) surrender the Site to THE OWNER in a safe condition; (5) transfer to THE OWNER all materials, supplies, work in process, appliances, facilities, equipment and machinery of this Contract, and all plans, Drawings, Specifications and other information and documents used in connection with this Contract.

ARTICLE XVIII: MISCELLANEOUS PROVISIONS

1. Written Approval of Assignment by CM.

The CM shall not assign by power of attorney or otherwise, or sublet or subcontract, the Work or any part thereof, without the previous written consent of THE OWNER and shall not, either legally or equitably, assign any of the moneys payable under this Contract, or CM's claims hereunder, except with the written consent of THE OWNER, whether said assignment is made before, at the time of, or after the execution of the Contract. The CM shall remain responsible for satisfactory performance of all Work sublet or assigned complying with all applicable requirements of the Contract.

2. Certificate of Appropriation.

This paragraph applies to contracts for construction, reconstruction, alteration, remodeling, repair or demolition of any public building or public work by any city, town or District costing more than the amoutn set forth in M.G.L. c.44, § 31C.

This Contract shall not be deemed to have been made until the Owner's accountant or other officer of the Owner having similar duties has certified thereon that an appropriation in the amount of this Contract is available therefor and than an officer or agent of the Owner has been authorized to execute said Contract and approve all requisitions and change orders. No order to the Contractor for a change in or addition to the work, whether in the form of a drawing, plan, detail, or any other written instruction, unless it is an order which the Contractor is willing to perform without any increase in the Contract price, shall be deemed to be given until the Owner's accountant, or other officer of the awarding authority having similar duties, has certified thereon that an appropriation in the amount of such order is available therefore; but such certificate shall not be construed as an admission by the Owner of its liability to pay for such work. The certificate of the accountant or other officer of the Owner having similar duties, that an appropriation in the amount of this Contract, or in the amount of such order, is available shall bar any defense by the Owner on the grounds of insufficient appropriation.

3. Claims by Others Not Valid.

No person other than the CM and the surety on any bond given pursuant to the terms of this Contract shall acquire any interest in this Contract or any claim against THE OWNER hereunder, and no claim by any other person against Owner shall be valid except as provided in M.G.L. c. 30, § 39F of the General Laws.

4. No Personal Liability of Public Officials.

No public official, employee, or agent of THE OWNER shall have any personal liability for the obligations of THE OWNER set forth in this Contract.

5. Severability.

The provisions of this Contract are severable, and if any of these provisions shall be held unconstitutional or unenforceable by any court of competent jurisdiction, the decision of such court shall not affect or impair any of the other provisions of this Contract.

6. Choice of Laws.

This Contract shall be governed by the laws of the Commonwealth of Massachusetts for all purposes, regardless of choice of law principles. All proceedings under this Contract or related to the Project shall be brought in the courts of the Commonwealth of Massachusetts in the County in which the project lies.

7. No Waiver of Subsequent Breach.

No waiver of any breach or obligation of this Contract shall constitute a waiver of any other or subsequent breach or obligation.

8. Remedies Cumulative.

All remedies of THE OWNER provided in this Contract shall be construed as cumulative and may be exercised simultaneously or in any order as determined by THE OWNER in its sole discretion. THE OWNER shall also be entitled as of right to specific performance and equitable relief including the right to an injunction against any breach of any of the provisions of this Contract

9. Notices.

Notices to the CM shall be deemed given when hand delivered, attached to an email to CM's Project Manager, or faxed to the CM's temporary field office at or near the Site, or when deposited in the U.S. mail addressed to the CM at the CM's address specified in the Owner-CM Agreement, or when delivered by courier to either location. Unless otherwise specified in writing by THE OWNER, notices and deliveries to THE OWNER shall be effective only when delivered to THE OWNER at the address specified in the Owner-CM Agreement and date-stamped at the reception desk or for which a receipt has been signed by the agent or employee designated by THE OWNER to receive official notices.

10. Interpretation of Contract – Cost of Work.

A. Wherever these General Conditions or the Agreement for Construction Manager at Risk Services uses words to the effect that the CM shall be responsible for incurring costs on the Project, it is understood that, except where the language used otherwise indicates, such costs shall be considered a Cost of Work under Paragraph 7.1 of the Agreement for Construction Manager at Risk Services, unless they fall within Non-Compensable Costs described in Paragraph 7.3 of said Agreement.

B. Likewise, wherever the General Conditions or the Agreement for Construction Manager at Risk Services uses words to the effect that the Owner may assess costs against the CM, it is understood that such assessment shall ordinarily take the form of a credit change order that reduces the GMP, except where the language used otherwise indicates.

APPENDIX A: EQUAL EMPLOYMENT OPPORTUNITY, NON-DISCRIMINATION AND AFFIRMATIVE ACTION

Since this contract is considered a state-assisted construction contract, the provisions of Appendix A shall apply:

(Statutory reference: M.G.L. c.151B; Executive Order No. 526 and ANF Bulletin #14).

I. Definitions

For purposes of this contract,

"Minority" means a person who meets one or more of the following definitions:

(a) American Indian or Native American means: all persons having origins in any of the original peoples of North America and who are recognized as an Indian by a tribe or tribal organization.
(b) Asian means: All persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian sub-continent, or the Pacific Islands, including, but not limited to China, Japan, Korea, Samoa, India, and the Philippine Islands.
(c) Black means: All persons having origins in any of the Black racial groups of Africa, including, but not limited to, African-Americans, and all persons having origins in any of the original peoples of the Cape Verdean Islands.
(d) Eskimo or Aleut means: All persons having origins in any of the peoples of Northern Canada, Greenland, Alaska, and Eastern Siberia.
(e) Hispanic means: All persons having their origins in any of the Spanish-speaking peoples of Mexico, Puerto Rico, Cuba, Central or South America, or the Caribbean Islands.

"State construction contract" means a contract for the construction, reconstruction, installation, demolition, maintenance or repair of a building or capital facility, or a contract for the construction, reconstruction, alteration, remodeling or repair of a public work undertaken by a department, agency, board, or commission of the commonwealth.

"State assisted construction contract" means a contract for the construction, reconstruction, installation, demolition, maintenance or repair of a building or capital facility undertaken by a political subdivision of the commonwealth, or two or more political subdivisions thereof, an authority, or other instrumentality and whose costs of the contract are paid for, reimbursed, grant funded, or otherwise supported, in whole or in part, by the commonwealth.

II. Equal Opportunity, Non-Discrimination and Affirmative Action

During the performance of this Contract, the Contractor and all subcontractors (hereinafter collectively referred to as "the Contractor") for a state construction contract or a state assisted construction contract, for him/herself, his/her assignees and successors in interest, agree to comply with all applicable equal employment opportunity, non-discrimination and affirmative action requirements, including but not limited to the following:

In connection with the performance of work under this contract, the Contractor shall not discriminate against any employee or applicant for employment because of race, color, religious creed, national origin, sex, sexual orientation, genetic information, military service, age, ancestry or disability, shall not discriminate in the selection or retention of subcontractors, and shall not discriminate in the procurement of materials and rentals of equipment.

The aforesaid provision shall include, but not be limited to, the following: employment upgrading, demotion, or transfer; recruitment advertising, layoff or termination; rates of pay or other forms of compensation; conditions or privileges of employment; and selection for apprenticeship or on-the-job training opportunity. The Contractor shall comply with the provisions of chapter 151B of the Massachusetts General Laws, as amended, and all other applicable anti-discrimination and equal opportunity laws, all of which are herein incorporated by reference and made a part of this Contract.

The Contractor shall post hereafter in conspicuous places, available for employees and applicants for employment, notices to be provided by the Massachusetts Commission Against Discrimination setting forth the provisions of the Fair Employment Practices Law of the Commonwealth (Massachusetts General Laws Chapter 151B).

In connection with the performance of work under this contract, the Contractor shall undertake, in good faith, affirmative action measures to eliminate any discriminatory barriers in the terms and conditions of employment on the grounds of race, color, religious creed, national origin, sex, gender identity, sexual orientation (which shall not include persons whose sexual orientation involves minor children as the sex object), age, genetic information, ancestry, children, marital status, veteran status or membership in the armed services, the receiving of public assistance, and handicap. Such affirmative action measures shall entail positive and aggressive measures to ensure non-discrimination and to promote equal opportunity in the areas of hiring, upgrading, demotion or transfer, recruitment, layoff or termination, rate of compensation, apprenticeship and on-the-job training programs. A list of positive and aggressive measures shall include, but not be limited to, advertising employment opportunities in minority and other community news media; notifying minority, women and other community-based organizations of employment opportunities; validating all job specifications, selection requirements, and tests; maintaining a file of names and addresses of each worker referred to the Contractor and what action was taken concerning such worker; and notifying the administering agency in writing when a union with whom the Contractor has a collective bargaining agreement has failed to refer a minority or woman worker. These and other affirmative action measures shall include all actions required to guarantee equal employment opportunity for all persons, regardless of race, color, religious creed, national origin, sex, gender identity, sexual orientation (which shall not include persons whose sexual orientation involves minor children as the sex object), age, genetic information, ancestry, children, marital status, veteran status or membership in the armed services, the receiving of public assistance, and handicap. One purpose of this provision is to ensure to the fullest extent possible an adequate supply of skilled tradesmen for this and future Commonwealth public construction projects.

III. Minority and Women Workforce Participation

Pursuant to his/her obligations under the preceding section, the Contractor shall strive to achieve on this project the labor participation goals contained herein. Said participation goals shall apply in each job category on this project including but not limited to bricklayers, carpenters, cement masons, electricians, ironworkers, operating engineers and those classes of work enumerated in Section 44F of Chapter 149 of the Massachusetts General Laws. The participation goals for this project shall be 15.3% for minorities and 6.9% for women. The participation goals, as set forth herein, shall not be construed as quotas or set-asides; rather, such participation goals will be used to measure the progress of the Commonwealth's equal opportunity, non-discrimination and affirmative action program. Additionally, the participation goals contained herein should not be seen or treated as a floor or as a ceiling for the employment of particular individuals or group of individuals.

IV. Liaison Committee

At the discretion of the agency that administers the contract for the construction project there may be established for the life of the contract a body to be known as the Liaison Committee. The Liaison Committee shall be composed of one representative each from the agency or agencies administering the contract for the construction project, hereinafter called the administering agency, a representative from the Office of Affirmative action, and such other representatives as may be designated by the administering agency.

The Contractor (or his/her agent, if any, designated by him/her as the on-site equal employment opportunity officer) shall recognize the Liaison Committee as an affirmative action body, and shall establish a continuing working relationship with the Liaison Committee, consulting with the Liaison Committee on all matters related to minority recruitment, referral, employment and training.

V. Reports and Records

The Contractor shall prepare projected workforce tables on a quarterly basis when required by the administering agency. These shall be broken down into projections, by week, of workers required in each trade. Copies shall be furnished one week in advance of the commencement of the period covered, and also, when updated, to the administering agency and the Liaison Committee when required.

The Contractor shall prepare weekly reports in a form approved by the administering agency, unless information required is required to be reported electronically by the administering agency, the number of hours worked in each trade by each employee, identified as woman, minority, or non-minority. Copies of these shall be provided at the end of each such week to the administering agency and the Liaison Committee.

Records of employment referral orders, prepared by the Contractor, shall be made available to the administering agency on request.

The Contractor will provide all information and reports required by the administering agency on instructions issued by the administering agency and will permit access to its facilities and any books, records, accounts and other sources of information which may be determined by the administering agency to effect the employment of personnel. This provision shall apply only to information pertinent to the Commonwealth's supplementary non-discrimination, equal opportunity and access and opportunity contract requirements. Where information required is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the administering agency and shall set forth what efforts he has made to obtain the information.

VI. Access to Work Site

A designee of the administering agency and a designee of the Liaison Committee shall each have a right to access the work site.

VII. Solicitations for Subcontracts, and for the Procurement of Materials and Equipment

In all solicitations either by competitive bidding or negotiation made by the Contractor either for work to be performed under a subcontract or for the procurement of materials or equipment, each potential subcontractor or supplier shall be notified in writing by the Contractor of the Contractor's obligations under this contract relative to non-discrimination and equal opportunity.

VIII. Sanctions

Whenever the administering agency believes the General or Prime Contractor or any subcontractor may not be operating in compliance with the provisions of the Fair Employment Practices Law of the Commonwealth (Massachusetts General Laws Chapter 151B), the administering agency may refer the matter to the Massachusetts Commission Against Discrimination ("Commission") for investigation.

Following the referral of a matter by the administering agency to the Massachusetts Commission Against Discrimination, and while the matter is pending before the MCAD, the administering agency may withhold payments from contractors and subcontractors when it has documentation that the contractor or subcontractor has violated the Fair Employment Practices Law with respect to its activities on the Project, or if the administering agency determines that the contractor has materially failed to comply with its obligations and the requirements of this Section. The amount withheld shall not exceed a withhold of payment to the General or Prime Contractor of 1/100 or 1% of the contract award price or $5,000, whichever sum is greater, or, if a subcontractor is in non-compliance, a withhold by the administering agency from the General Contractor, to be assessed by the General Contractor as a charge against the subcontractor, of 1/100 or 1% of the subcontractor price, or $1,000 whichever sum is greater, for each violation of the applicable law or contract requirements. The total withheld from any one General or Prime Contractor or subcontractor on a Project shall not exceed $20,000 overall. No withhold of payments or investigation by the Commission or its agent shall be initiated without the administering agency providing prior notice to the Contractor.

If, after investigation, the Massachusetts Commission Against Discrimination finds that a General or Prime Contractor or subcontractor, in commission of a state construction contract or state-assisted construction contract, violated the provisions of the Fair Employment Practices Law, the administering agency may convert the amount withheld as set forth above into a permanent sanction, as a permanent deduct from payments to the General or Prime Contractor or subcontractor, which sanction will be in addition to any such sanctions, fines or penalties imposed by the Massachusetts Commission Against Discrimination:

No sanction enumerated under this Section shall be imposed by the administering agency except after notice to the General or Prime Contractor or subcontractor and an adjudicatory proceeding, as that term is used, under Massachusetts General Laws Chapter 30A, has been conducted.

IX. Severability

The provisions of this section are severable, and if any of these provisions shall be held unconstitutional by any court of competent jurisdiction, the decision of such court shall not affect or impair any of the remaining provisions.

X. Contractor's Certification

A bidder for a state construction contract or state assisted construction contract will not be eligible for award of the contract unless such bidder has submitted to the administering agency the following certification, which will be incorporated into the resulting contract:

CONTRACTOR'S CERTIFICATION

_____ certifies that they:

(Contractor Name)

1. Will not discriminate in their employment practices;
2. Intend to use the following listed construction trades in the work under the contract

_____

_____; and

3. Will make good faith efforts to comply with the minority employee and women employee workforce participation ratio goals and specific affirmative action steps contained herein; and
4. Are in compliance with all applicable federal and state laws, rules, and regulations governing fair labor and employment practices; and
5. Will provide the provisions of the "Supplemental Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program" to each and every subcontractor employed on the Project and will incorporate the terms of this Section into all subcontracts and work orders entered into on the Project.
6. Agree to comply with all provisions contained herein.

_____

(Signature of authorized representative of Contractor) Date

_____

(Printed name of authorized representative of Contractor)

XI. Subcontractor Requirements

Prior to the award of any subcontract for a state construction contract or a state assisted construction contract, regardless of tier, the Prime or General Contractor shall provide all prospective subcontractors with a complete copy of this Section entitled "Supplemental Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program" and will incorporate the provisions of this Section by reference into any and all contracts or work orders for all subcontractors providing work on the Project. In order to ensure that the said subcontractor's certification becomes a part of all subcontracts under the prime contract, the Prime or General Contractor shall certify in writing to the administering agency that it has complied with the requirements as set forth in the preceding paragraph.

APPENDIX B – PROCEDURE FOR PRE-BID REDUCTION/WAIVER OF MBE/WBE PARTICIPATION GOALS

PROCEDURE FOR PRE-BID REDUCTION/WAIVER OF MBE/WBE PARTICIPATION GOALS

I. Pre-Bid Reduction/Waiver Procedures

A. Affirmative Marketing Participation Goals

Each Municipality (Awarding Authority) must enforce the current Affirmative Marketing Goals developed by the Division of Capital Asset Management and Maintenance (DCAMM) in consultation with SDO as follows:

Construction Participation: **Combined MBE/WBE goal of (10.4%)**

The combined goals require a reasonable representation of both MBE and WBE firm participation on the project as further set forth in Appendix C, Section A, Paragraph 2.

B. Criteria for Reduction/Waiver of Goals

The Construction Manager (CM) may request a reduction or waiver of goals before the GMP is submitted. The Awarding Authority reserves the right to accept and review written requests but does not have the authority to grant such requests made by the CM to reduce or waive the MBE or WBE construction participation goals established for this contract. In accordance with Section 7 of Chapter 193 of the Acts of 2004, such written requests must demonstrate to the satisfaction of the Awarding Authority that there is no feasible way for the CM to meet the goals established for this contract and that a **"Diligent Good Faith Effort"** was made to comply. If this criteria is met the Awarding Authority must submit the CM's request to the Executive Director of the Supplier Diversity Office (SDO) for final determination. Factors that may be considered in granting a reduction or waiver of the contract goals include any or all of the following:

- Actual availability of certified Minority- and/or Women-Owned Business Enterprises (MBE/WBEs);
- The geographic location of the project;
- The scope of work and opportunities for subcontracting the work;
- Other relevant factors including documented inability by the CM to obtain commitments from MBE/WBE subcontractors sufficient to meet the MBE/WBE goals after having made a diligent, good faith effort to do so.

C. Supporting Documentation Required from the Construction Manager

1. A list of all items of work under the Contract that the CM made available for subcontracting to MBE/WBEs. The CM shall identify all items of work, other than work to be performed by filed sub-Bidders, that the CM did not make so available and shall state the reasons for not making such work available for subcontracting to MBE/WBEs. The CM shall also demonstrate that, where commercially reasonable, subcontracts were divided into scopes or tasks capable of being performed by MBE/WBEs.

2. Documentation that the CM sent written notices soliciting Bids or proposals to perform the items of work made available by the CM for subcontracting to MBE/WBEs to all MBE/WBEs qualified to perform such work. The CM shall identify (i) each MBE/WBE solicited, and (ii) each MBE/WBE listed in the SDO directory under the applicable trade category that was not solicited and reasons therefore. The CM shall also state the date that notices were mailed and provide a copy of the written notice(s) sent.

   Documentation that the CM made reasonable efforts to follow up the written notices sent to MBE/WBEs with telephone calls or personal visits in order to determine with certainty whether the MBE/WBEs were interested in performing the work. Phone logs or other documentation must be submitted.

3. A statement of the response received from each MBE/WBE solicited, including the reason for rejecting any MBE/WBE who submitted a bid or proposal.

4. Documentation of reasonable efforts, if any, made to assist MBE/WBEs that needed assistance in obtaining bonding or insurance, or lines of credit with suppliers if the inability of MBE/WBEs to obtain bonding, insurance, or lines of credit is the reason given for the CM's inability to meet the MBE/WBE goals.

5. The CM may also submit any other information supporting its request for a waiver or reduction in the MBE/WBE participation goals, including without limitation evidence that the CM placed advertisements in appropriate media and trade association publications announcing the CM's interest in obtaining bids or proposals from MBE/WBEs, and/or sent written notification to MBE/WBE economic development assistance agencies, trade groups and other organizations notifying them of the Contract and the work to be subcontracted by the CM to MBE/WBEs. The CM shall also submit any other information reasonably requested by the Awarding Authority to show that the CM has taken all actions that could reasonably be expected to achieve the MBE/WBE participation goals.

D. Process for Requesting Waiver/Reduction of Construction Goals

1. Requests from the CM to reduce or waive the MBE/WBE participation goals for the Contract must be received by the Awarding Authority no later than ten (10) working days before the GMP is due.

2. The Awarding Authority shall not consider any request to reduce or waive the MBE/WBE Participation goals for the Contract that is received after the aforementioned deadlines. Any reduction or waiver of the MBE/WBE participation goals for the Contract will be made in writing.

3. Procedures and Timelines for the Waiver/Reduction of Construction Goals can be found in the attached Bidding Instructions.

APPENDIX C to the BIDDING INSTRUCTIONS

GOALS FOR PARTICIPATION BY MINORITY BUSINESS ENTERPRISES (MBE) AND WOMEN BUSINESS ENTERPRISES (WBE) (EXECUTIVE ORDER 390, M.G.L. c. 7, § 4)

Construction Participation: **Combined MBE/WBE goal of (10.4%)**

The combined goals require a reasonable representation of both MBE and WBE firm participation on the project as further set forth in Appendix C, Section A, Paragraph 2.

A. MBE AND WBE PARTICIPATION

1. The CM's compliance with the requirements of this Section is a pre-requisite for receiving the Award of the Contract.

2. The CM must utilize a mix of both MBE and WBE firms whose participation, when added together, meets or exceeds the overall combined goal set for the Contract. It is important that both MBE and WBE firms have an opportunity to work on public projects with a combined MBE/WBE goal. Therefore, projects with a combined goal must include a reasonable representation of both MBE and WBE firms to meet or exceed the combined goal. Proposed MBE/WBE participation plans that include solely MBE or solely WBE participation, or have only nominal participation by one or the other to meet the combined goal, will not be considered responsive. CMs that are themselves MBE or WBE certified will be required to bring a reasonable amount of participation by a firm(s) that holds the certification which is not held by the CM to the project. Although the Contract contains a combined goal, participation by MBE and WBE firms must be reported and tracked separately.

3. The MBE and WBE participation goals for this Contract are as set forth above. The Awarding Authority reserves the right to accept and review written requests but does not have the authority to grant such requests made by the CM within the time frame set forth in paragraph 9 below to reduce or waive the MBE or WBE participation goals established for this contract. If such written requests demonstrate to the satisfaction of the Awarding Authority that it is not feasible for a non- MBE or non-WBE CM to meet the goals established for this contract based upon all of the following: (i) actual MBE/WBE availability, (ii) the geographic location of the project to the extent related to MBE/WBE availability, (iii) the scope of the work, (iv) the percentage of work available for subcontracting to MBE/WBEs and/or (v) other relevant factors, including a documented inability by the CM to obtain commitments from MBE/WBE subcontractors sufficient to meet the MBE/WBE goals after having made a Diligent, Good Faith Effort to do so. If these criteria are met the Awarding Authority must submit the CM's request along with all the foregoing documentation to the Executive Director of the Supplier Diversity Office (SDO) for final determination. Such documentation shall include, at a minimum, the following:

4. A list of all items of work under the Contract that the CM made available for subcontracting to MBE/WBEs. The CM shall identify all items of work, other than work to be performed by filed sub-Bidders, that the CM did not make so available and shall state the reasons for not making such work available for subcontracting to MBE/WBEs. The CM shall also demonstrate that, where commercially reasonable, subcontracts were divided into scopes or tasks capable of being performed by MBE/WBEs.

5. Evidence that the CM sent written notices soliciting Bids or proposals to perform the items of work made available by the CM for subcontracting to all MBE/WBEs qualified to perform such work. The CM shall identify (i) each MBE/WBE solicited, and (ii) each MBE/WBE listed in the SDO directory under the applicable trade category that was not solicited and reasons therefore. The CM shall also state the date that notices were mailed and provide a copy of the written notice(s) sent.

6. Evidence that the CM made reasonable efforts to follow up the written notices sent to MBE/WBEs with telephone calls or personal visits in order to determine with certainty whether the MBE/WBEs were interested in performing the work. Phone logs or other documentation must be submitted.

7. A statement of the response received from each MBE/WBE solicited, including the reason for rejecting any MBE/WBE who submitted a bid or proposal.

8. Evidence of reasonable efforts made, if any, to assist MBE/WBEs that needed assistance in obtaining bonding or insurance, or lines of credit with suppliers if the inability of MBE/WBEs to obtain bonding, insurance, or lines of credit is the reason given for the CM's inability to meet the MBE/WBE goals.

9. The CM may also submit any other information supporting its request for a waiver or reduction in the MBE/WBE participation goals, including without limitation evidence that the CM placed advertisements in appropriate media and trade association publications announcing the CM's interest in obtaining bids or proposals from MBE/WBEs, and/or sent written notification to MBE/WBE economic development assistance agencies, trade groups and other organizations notifying them of the Contract and the work to be subcontracted by the CM to MBE/WBEs. The CM shall also submit any other information reasonably requested by the Awarding Authority to show that the CM has taken all actions that could reasonably be expected to achieve the MBE/WBE participation goals.

10. If filed Sub-Bids are solicited for this Contract, requests from CM to reduce or waive the MBE/WBE participation goals for this Contract must be received by the Awarding Authority no later than five (5) working days after the list of filed sub-Bidders is mailed by the Awarding Authority to the CM. If there are no filed sub- Bids solicited for this Contract, requests to reduce or waive the MBE/WBE participation goals for this Contract must be received by the Awarding Authority no later than ten (10) working days before the date set for the receipt of the GMP. THE AWARDING AUTHORITY WILL NOT CONSIDER ANY REQUEST TO REDUCE OR WAIVE THE MBE/WBE PARTICIPATION GOALS FOR THIS CONTRACT THAT IS RECEIVED AFTER THESE DEADLINES. Any reduction or waiver of the MBE/WBE participation goals for this Contract will be made in writing by the CM.

11. No later than five (5) working days after the submission of the GMP, the CM shall submit the following documents to the Awarding Authority's Affirmative Marketing Construction Officer (AMCO): (i) a completed Schedule for Participation by MBE/WBE ("Schedule for Participation") in the form provided by the Awarding Authority showing MBE/WBE participation in amounts equal to or exceeding the MBE/WBE participation goals for this Contract, (ii) a completed Letter of Intent in the form provided by the Awarding Authority for each MBE/WBE listed in the Schedule for Participation, and (iii) a SDO most recent certification letter for each MBE/WBE listed in the Schedule of MBE/WBE Participation showing that the MBE/WBE is certified in the area of work for which it is listed on the Letter of Intent.

12. Each Letter of Intent shall identify and describe the work to be performed by the named MBE/WBE (the "MBE/WBE Work") with enough specificity to permit the Awarding Authority to identify the particular items of contract work that the MBE/WBE will perform for MBE/WBE participation credit. The Awarding Authority reserves the right to reject any Letter of Intent if the price to be paid for the MBE/WBE Work does not bear a reasonable relationship to the value of such work under the Contract as determined by the Awarding Authority.

13. Within five (5) working days after receipt of the Schedule for MBE/WBE Participation, Letters of Intent, and SDO most recent certification letter, the Awarding Authority shall review and either approve or disapprove the CM's submissions. If the CM has not submitted an appropriate Schedule for MBE/WBE Participation and appropriate Letters of Intent and SDO most recent certification letter establishing that the MBE/WBE participation goal for the project will be met, the CM will be considered ineligible for Award of the Contract.

14. The Bidder's attention is called to the General Conditions of the Contract which requires the CM to submit, within thirty (30) days of the Contract Date, signed subcontracts with all subcontractors or a purchase order or invoice from each material supplier and/or manufacturer listed on the Schedule for MBE/WBE Participation.

15. A filed sub-Bidder is not required to submit a Schedule of MBE/WBE Participation with its Bid. A filed sub-Bidder may, at its option, submit a Letter of Intent with its Bid if it is a SDO certified MBE/ WBE. If a filed sub-Bidder intends to sub-subcontract work to a SDO certified MBE/WBE, and the awarding authority permits limited sub-sub-contracting for purposes of MBE/WBE participation, and the filed sub-Bidder wishes that sub-subcontract to be credited toward the participation goals for this Contract, the filed sub-Bidder should submit a Letter of Intent from that MBE/WBE with its Bid.

APPENDIX D to the General Conditions of the Contract

GOALS FOR PARTICIPATION BY MINORITY BUSINESS ENTERPRISES (MBE) AND WOMEN BUSINESS ENTERPRISES (WBE) (EXECUTIVE ORDER 390, M.G.L. c. 7, § 4)

Construction Participation: Combined MBE/WBE goal of (10.4%)

The combined goals require a reasonable representation of both MBE and WBE firm participation on the project as further set forth in Attachment C, Section A, Paragraph 2.

1. Goals

The goals for minority business enterprise (MBE) and woman business enterprise (WBE) participation established for this Contract are as set forth above and in the Owner - Contractor Agreement.

2. MBE/WBE Participation Credit

A. If the CM is itself an MBE or a WBE, MBE/WBE participation credit shall be given in an amount equal to the entire Contract Price. If the CM is not an MBE or WBE, then MBE/WBE participation credit will be given for the value of the Work that is actually performed by each MBE or WBE subcontractor or sub-subcontractor.

B. If the CM is a joint venture with one or more MBE/WBE joint ventures, MBE/WBE participation credit shall be given to the joint venture as follows:

(1) If the joint venture is certified by SDO as an MBE or WBE, MBE/WBE Participation credit shall be given in an amount equal to the entire Contract Price.

(2) If the joint venture is not certified as an MBE or WBE by SDO, MBE/WBE participation credit shall be given to the joint venture for the value of the Work that is performed by the MBE/WBE joint venture(s), and for the value of the Work that is actually performed by each MBE or WBE subcontractor or sub-subcontractor.

C. If an MBE/WBE supplies, but does not install equipment or materials, MBE/WBE participation credit shall be given only if the MBE/WBE supplier is regularly engaged in sales of equipment or supplies to the construction industry from an established place of business. MBE/WBE participation credit shall be given the full amount of the purchase order only if the MBE/WBE supplier manufactures the goods or substantially alters them before resale. Otherwise, the CM may count toward its MBE/WBE goal 60 percent of the total bid price for its expenditures of its materials and supplies required under a contract and obtained from a MBE/WBE regular supplier.

D. MBE participation credit shall be given for the work performed by MBEs only, and WBE participation credit shall be given for the work performed by WBEs only. MBE participation may not be substituted for WBE participation, nor may WBE participation be substituted for MBE participation.

3. Establishing MBE/WBE Status.

A. A minority owned business shall be considered as an MBE only if it has been certified as a minority business enterprise by the Supplier Diversity Office ("SDO").

B. A woman owned business shall be considered as a WBE only if it has been certified as a woman business enterprise by SDO.

C. Certification as a disadvantaged business enterprise ("DBE"), certification as MBE/WBE by any agency other than SDO, or submission of an application to SDO for certification as an MBE/WBE shall not confer MBE/WBE status on a firm for the purposes of this Contract.

4. **Subcontracts with MBE/WBEs**

Within thirty (30) days after the award of this Contract, the CM shall (i) execute a subcontract with each MBE/WBE Subcontractor which has executed a Letter of Intent Approved by the Awarding Authority, (ii) cause its Subcontractors to execute a sub-subcontract with each MBE/WBE sub-subcontractor, and (iii) furnish the Awarding Authority with a signed copy of each such subcontract and sub-subcontract.

5. **Performance of Contract Work by MBE/WBEs**

A. The CM shall not perform with its own organization or subcontract or assign to any other firm work designated to be performed by any MBE/WBE in the Letters of Intent or Schedule of MBE/WBE Participation without the prior Approval of the Awarding Authority, nor shall any MBE/WBE assign or subcontract to any other firm, or permit any other firm to perform any of its MBE/WBE Work without the prior Approval of the Awarding Authority. Any such unapproved assignment, subcontracting, sub- subcontracting, or performances of MBE/WBE Work by others shall be a change in the MBE/WBE Work for the purposes of this Contract. THE AWARDING AUTHORITY WILL NOT APPLY TO THE MBE/WBE PARTICIPATION GOAL(S) ANY SUMS ATTRIBUTABLE TO SUCH UNAPPROVED ASSIGNMENTS, SUB- CONTRACTS, SUB-SUBCONTRACTS, OR PERFORMANCE OF MBE/WBE WORK BY OTHERS.

B. The CM shall be responsible for monitoring the performance of MBE/WBE Work to ensure that each scheduled MBE/WBE performs its own MBE/WBE Work with its own workforce.

C. The CM and each MBE/WBE shall provide the Awarding Authority with all information and documentation that the Awarding Authority determines is necessary to ascertain whether or not an MBE/WBE has performed its own MBE/WBE Work. At the discretion of the Awarding Authority, failure to submit such documentation to the Awarding Authority shall establish conclusively for the purpose of giving MBE/WBE participation credit under this Contract that such MBE/WBE did not perform such work.

D. With each progress payment request submitted by the CM to the Awarding Authority, the CM must provide the Contractor Progress Payment Report indicating the value of payments for each MBE and WBE firms for that period.

6. **Notification of Changes in MBE/WBE Work**

A. If at any time during the performance of the Contract the Contractor determines or has reason to believe that a scheduled MBE/WBE is unable or unwilling to perform its MBE/WBE Work, or that there has been or will be a change in any MBE/WBE Work, or that the CM will be unable to meet the MBE/WBE participation goal(s) for this Contract for any reason, the CM shall immediately notify the Awarding Authority Contract Compliance Office in writing of such circumstances.

B. Any notice of a change in MBE/WBE Work pursuant to subparagraph "A" above shall include a revised Schedule of MBE/WBE Participation, and additional or amended Letters of Intent and subcontracts, as the case may be.

7. **Actions required if there is a Reduction in MBE/WBE Participation**

A. In the event there is a change or reduction in any MBE/WBE Work which will result in the CM failing to meet the MBE/WBE participation goal(s) for this Contract, other than a reduction in MBE/WBE Work resulting from a Change Order initiated by the Awarding Authority, then the CM shall immediately undertake a diligent, good faith effort to make up the shortfall in MBE/WBE participation as follows:

(1) The CM shall identify all items of the Work remaining to be performed under the Contract that may be made available for subcontracting to MBE/WBEs. The CM shall send a list of such items of work to the Awarding Authority, together with a list of the remaining items of the Work that was not made available to MBE/WBEs and the reason for not making such work available for subcontracting to MBE/WBEs.

(2) The CM shall send written notices soliciting proposals to perform the items of the Work that may be made available for subcontracting to MBE/WBEs to all MBE/WBEs qualified to perform such work. The CM shall advise the Awarding Authority of (i) each MBE/WBE solicited, and (ii) each MBE/WBE listed in

the SDO directory under the applicable trade category that was not solicited and the reasons therefore. The CM shall also advise the Awarding Authority of the dates notices were mailed and provide a copy of the written notice(s) sent.

(3) The CM shall make reasonable efforts to follow up the written notices sent to MBE/WBEs with telephone calls or personal visits in order to determine with certainty whether the MBE/WBEs were interested in performing the work. Phone logs or other documentation must be submitted to the Awarding Authority evidencing this effort.

(4) The CM shall make reasonable efforts to assist MBE/WBEs that need assistance in obtaining insurance, bonds, or lines of credit in order to perform work under the Contract, and shall provide the Awarding Authority with evidence that such efforts were made.

(5) The CM shall provide the Awarding Authority with a statement of the response received from each MBE/WBE solicited, including the reason for rejecting any MBE/WBE who submitted a proposal.

(6) The CM shall take any additional measures reasonably requested by the Awarding Authority to meet the MBE/WBE participation goal(s) established for this Contract, including, without limitation, placing advertisements in appropriate media and trade association publications announcing the CM 's interest in obtaining proposals from MBE/WBEs, and/or sending written notification to MBE/WBE economic development assistance agencies, trade groups and other organizations notifying them of the project and of the work available to be subcontracted by the CM to MBE/WBEs.

B. If the CM is unable to meet the MBE/WBE participation goals for this Contract after complying fully with each of the requirements of paragraph "A" above, and the CM is otherwise in full compliance with the terms of this Article, the Awarding Authority may reduce the MBE/WBE participation goals for this Contract to the extent that such goals cannot be achieved.

8. Suspension of Payment and/or Performance for Noncompliance.

A. If at any time during the performance of this Contract, the Awarding Authority determines or has reason to believe that (1) there has been a change or reduction in any MBE/WBE Work which will result in the CM failing to meet the MBE/WBE participation goal(s) for this Contract, other than a reduction in MBE/WBE Work resulting from a change in the Contract work ordered by the Awarding Authority, and (2) the CM has failed to comply fully with all of the terms and conditions of paragraphs 1 through 7 above, the Awarding Authority may:

(1) Suspend payment to the CM of an amount equal to the value of the work which was to have been performed by an MBE/WBE pursuant to the CM's Schedule of MBE/WBE Participation but which was not so performed, in order to ensure that sufficient Contract funds will be available if liquidated damages are assessed pursuant to paragraph 9, and/or

(2) Suspend the CM's performance of this Contract in whole or in part.

B. The Awarding Authority shall give the CM prompt written notice of any action taken pursuant to paragraph A above and shall give the CM and any other interested party, including any MBE/WBEs, an opportunity to present evidence to the Awarding Authority that the CM is in compliance with the requirements of this Article, or that there is some justifiable reason for waiving the requirements of this Article in whole or in part. The Awarding Authority may invite SOMWBA to participate in any proceedings undertaken pursuant to this paragraph.

C. Upon a showing that the CM is in full compliance with the requirements of this Article, or that the CM has met or will meet the MBE/WBE participation goals for this Contract, the Awarding Authority shall release any funds withheld pursuant to clause A (1) above, and lift any suspension of the CM's performance under clause A (2) above.

9. Liquidated Damages; Termination

A. If payment by the Awarding Authority or performance by the CM is suspended by the Awarding Authority as provided in paragraph 8 above, the Awarding Authority shall have the following rights and remedies if the CM thereafter fails to take all action necessary to bring the CM into full compliance with the requirements of this Article, or if full compliance is no longer possible because the default of the CM is no longer susceptible to cure, if

the CM fails to take such other action as may be required by the Awarding Authority to meet the MBE/WBE participation goals set forth in this Contract:

(1) The Awarding Authority may terminate this Contract, and/or
(2) The Awarding Authority may retain from final payment to the CM, as liquidated damages, an amount equal to the difference between:

(a) The total of the MBE/WBE participation goals set forth in this Contract, and;
(b) The amount of MBE/WBE participation credit earned by the CM for MBE/WBE Work performed under this Contract as determined by the Awarding Authority, the parties agreeing that the damages for failure to meet the MBE/WBE participation goals are difficult to determine and that the foregoing amount to be retained by the Awarding Authority represents the parties' best estimate of such damages. Any liquidated damages will be assessed separately for MBE and WBE participation.

B. Before exercising its rights and remedies hereunder, the Awarding Authority may give the CM and any other interested party another opportunity to present evidence to the Awarding Authority that the CM is in compliance with the requirements of this Article or that there is some justifiable reason for waiving the requirements of this Article in whole or in part. The Awarding Authority may invite SDO to participate in any proceedings undertaken hereunder.

10. Reporting Requirements

The CM shall submit to the Awarding Authority all information or documentation that is necessary in the judgment of the Awarding Authority to ascertain whether or not the CM has complied with any of the provisions of this Article.

11. Awarding Authority's Right to Waive Provisions of this Article in Whole or In Part

The Awarding Authority reserves the right to waive any provision or requirement of this Article if the Awarding Authority determines that such waiver is justified and in the public interest. No such waiver shall be effective unless in writing and signed by the Executive Director of the Supplier Diversity Office (SDO). No other action or inaction by the Awarding Authority shall be construed as a waiver of any provision of this Article.

EXHIBIT A - SCHEDULE FOR PARTICIPATION BY MINORITY/WOMEN BUSINESS ENTERPRISE

Project Number _____

Project Location _____

Project Name _____

A. Filed Sub-bidders utilizing MBE/WBE firms, and MBE/WBE Sub-bidders - attach to Filed Sub-bid.
B. The Construction Manager must submit to the Awarding Authority within five (5) working days of the submission of the GMP.

BIDDER CERTIFICATION:

The CM agrees that if awarded the contract it will expend at least the amount of the contract set forth below for MBE/WBE participation. For purposes of this commitment, the MBE and WBE designation means that a business has been certified by SDO as either a MBE, WBE or MBE/WBE. The CM must indicate the MBE/WBE firms it intends to utilize on the project as follows (attach additional sheets if necessary):

Company Name & Address	MBE or WBE	Describe MBE/WBE Scopes of Work (clarify "Labor Only", "Material Only" or "Labor and Material")	If Supplier, Indicate Total Value of Supplies (60% of Total Counts toward Participation)	Total Dollar Value of Participation
1.				
2.				
3.				
4.				
5.				

MBE Goal $_____ Total Dollar Value of MBE Commitment: $_____

WBE Goal $_____ Total Dollar Value of WBE Commitment: $_____

The undersigned hereby certifies that he/she has read the terms and conditions of the contract with regard to MBE/WBE participation and is authorized to bind the Bidder to the commitment set forth above.

Name of Firm_____

Business Address_____

Print Name_____

Authorized Signature _____

Title_____

Telephone No. _____ Fax No._____

Date _____

EXHIBIT B - LETTER OF INTENT - MINORITY/WOMEN BUSINESS ENTERPRISE PARTICIPATION

(To be completed by MBE/WBE, and submitted by the Construction Manager to the Municipal Affirmative Marketing Construction Officer (AMCO) within five (5) working days of the submission of the GMP or by Filed Sub-bidder with its bid.)

Project Number_____
Project Name _____
Project Location_____
To_____
Name of CM/Sub-bidder_____

Indicate SDO Certification:
_____MBE
_____WBE
_____M/WBE

1. This firm intends to perform work in connection with the above project.
2. This firm is currently certified by SDO to perform the work identified below, and has not changed its minority/women ownership, control, or management without notifying SDO within thirty (30) days of such a change.
3. This firm understands that if the CM/Sub-bidder referenced above is awarded the contract, the Bidder intends to enter into an agreement with this firm to perform the activity described below for the prices indicated. This firm also understands that the above-referenced firm, as General Bidder/Sub-Bidder, will make substitutions only as allowed by the terms of the Contract.
4. This firm understands that under the terms of the contract, only work actually performed by an MBE/WBE will be credited toward MBE/WBE participation goals, and this firm cannot assign or subcontract out any of its work without prior written approval of the Awarding Authority, and that any such assignment or subcontracting will not be credited toward MBE/WBE participation goals.

MBE/WBE PARTICIPATION

Section/Item Number (If Applicable)	Describe MBE/WBE Scopes of Work (Clarify "Labor Only", "Material Only" or "Labor and Material")	If Supplier, Indicate Total Value of Supplies (60% of Total Counts Toward Participation)	Dollar Value of Participation

Total Dollar Value: $_____
Name of MBE/WBE Firm_____
Business Address_____
Print Name_____
Authorized Signature _____
Title_____
Telephone No._____ **Fax No.**_____
Date:_____

EXHIBIT C – CONSTRUCTION MANAGER PROGRESS PAYMENT REPORT - MINORITY/WOMEN BUSINESS ENTERPRISES PARTICIPATION

Project Number: _____

Project Name: _____

Project Location: _____
Date: _____

Periodical Payment No.: _____

Construction Manager: _____

MBE and/or WBE: _____

One copy of this report is to be submitted for each Minority Business Enterprise (MBE) and/or Women Business Enterprise (WBE) at the time of submitting a request for payment. Copies of the report must be sent to the Minority Business Enterprise (MBE) and/or Women Business Enterprise (WBE) named above and to the municipalities Affirmative Marketing Construction Officer (AMCO). The AMCO will forward a copy of each Contractor Progress Payment Report to SDO on a quarterly basis.

1. The total price to be paid to the above-named Minority Business Enterprise _____ and/or Women Business Enterprise_____: $_____
2. The amount remitted to the Minority Business Enterprise and/or Women Business Enterprise as of the above date for work performed under this project:
   $_____
3. Balance due the Minority Business Enterprise and/or Women Business Enterprise as of the above date for work performed under the above-named project:
   $_____
4. Comments or explanation of amounts indicated under items 1 and 2 above: _____
   _____
   _____
   _____
   _____
   _____
   _____
5. **We hereby certify that the information supplied herein (including pages attached) is correct and complete.**

Construction Manager:	**Minority and/or Women Business Enterprise**
_____	_____
(Signed)	**(Signed)**
_____	_____
_____	_____
(Title)	**(Title)**
_____	_____
(Date)	**(Date)**

APPENDIX E – CONSTRUCTION MANAGER'S CERTIFICATION

FRAMINGHAM, MASSACHUSETTS

A. Construction Manager's Certification

A Construction Manager will not be eligible for award of a contract unless such Construction Manager has submitted the following certification.

CONSTRUCTION MANAGER'S CERTIFICATION

_____ certifies that:

1. It intends to use the following listed construction trades in the work under the contract.

_____; and

2. It will comply with the minority manpower ration and specific affirmative action steps contained herein; and

3. It will obtain from each of the Construction Manager's prior to the award of any contract under this contract the subcontractor certification required by these bid conditions.

(Signature of authorized representative of Construction Manager)

NOTE: To be submitted by the Construction Manager to the City

This form may be photocopied.

APPENDIX F – SUBCONTRACTOR'S CERTIFICATION

FRAMINGHAM, MASSACHUSETTS

A. Subcontractor's Certification

Prior to the award of any subcontract, regardless of tier, the prospective subcontractor must execute and submit to the Construction Manager the following certification, which will be deemed a part of the resulting subcontract:

SUBCONTRACTOR'S CERTIFICATION

_____ certifies that:

1. It intends to use the following listed construction trades in the work under the contract

_____; and

2. It will comply with the minority manpower ratio and specific affirmative action steps contained within; and

3. It will obtain from each of the subcontractors prior to the award of any subcontract under this subcontract the subcontractor certification required by these bid conditions.

(Signature of authorized representative of subcontractor)

In order to ensure that the said subcontractor's certifications becomes a part of all subcontracts tinder prime contract, no subcontract shall be executed until an authorized representative of the City agency (or agencies) administering this project has determined, in writing, that the said certification has been incorporated in such subcontract, regardless of tier. Any subcontract executed without such written approval shall be void.

NOTE: To be submitted by the Construction Manager to the City.

This form may be photocopied.

APPENDIX G – PROCEDURES FOR AWARD OF SUBCONTRACTS

PROCEDURES FOR AWARD OF SUBCONTRACTS

Pursuant to M.G.L. c.149 A, the Owner is required to develop a process consistent with legal requirements for the selection of subcontractors for construction manager at risk projects. This process is described in these Procedures for Award of Subcontracts (the "Procedures"). The Procedures are divided into three parts. The first part describes the prequalification and procurement of "Trade Contractors", which, for the purposes of the Procedures, shall mean the subcontractors performing work in trade categories covered by Section 44F of Chapter 149. The second part describes the prequalification and procurement of all subcontractors that are not Trade Contractors. The third part addresses additional procurement matters.

For the purposes of the Procedures, the term Project shall mean the specific construction project to which the Procedures are being applied; the term CM shall mean the construction manager at risk selected by the Owner to construct the Project; the term Designer shall mean the firm (and its subconsultants) selected by THE OWNER to design the Project; the term Project Manager shall refer to the firm serving as Project Manager on the project; and the term Applicant shall mean any firm that submits a response pursuant to the Procedures.

I. Trade Contractors

1. Applicability of Procedures

1.1 **Subcontracts Subject to Trade Contract Procedures.** The procedures set forth in Sections 2 and 3 below shall govern the award of subcontracts by the CM for the furnishing of labor, materials, and equipment in the performance of the categories of work listed below whenever the estimated construction cost of such category of work exceeds $25,000:

a. Roofing and Flashing;
b. Metal windows;
c. Waterproofing, Dampproofing and Caulking;
d. Miscellaneous and Ornamental Iron;
e. Lathing and Plastering;
f. Acoustical Tile;
g. Marble;
h. Tile;
i. Terrazzo;
j. Resilient Floors;
k. Glass and Glazing;
l. Painting;
m. Plumbing;
n. Heating, Ventilating, and Air-Conditioning;
o. Electrical work;
p. Elevators;
q. Masonry work; and
r. Any other categories of work for which the Awarding Authority deems if necessary or convenient to receive sub-bids.

The subcontractors performing these trades are referred to throughout the Contract Documents as "Trade Contractor(s)." Contracts for work in these categories of work where the estimated cost of such work exceeds $25,000 are referred to as "trade contracts."

2. Qualification of Trade Contractors

2.1 **Prequalification Committee.** Owner shall establish a prequalification committee ("the Prequalification Committee") consisting of four members. They shall include two representatives of THE OWNER, a representative of the Designer, and a representative of the CM. The Owner shall designate the Chairperson of the Prequalification

Committee. An alternative may be appointed for each member of the Prequalification Committee to serve on occasions when the regular member cannot be available. Both the representatives of the Designer and the CM serving on the Prequalification Committee, and the alternates representing the Designer and the CM, shall be subject to the approval of the Owner. The Prequalification Committee shall conduct the prequalification of trade contractors as set forth in Sections 2 and 3 of the Procedures. The CM will provide assistance to the Prequalification Committee in the exercise of its responsibilities under the Procedures, including assistance from CM staff. Three members of the Prequalification Committee shall constitute a quorum for the purposes of conducting the Prequalification Committee's official business. The Owner or its designee may join any meeting of the Prequalification Committee as a voting member in order to achieve a quorum, if in the Owner's judgment the action scheduled for such meeting cannot be postponed without adverse consequences for the Project.

If the CM proposes to perform Trade Subcontract work or other Subcontract Work with its own forces, the CM's representative on the Prequalification Committee shall abstain from participation in any review of the CM's own proposal.

2.2 Request for Qualifications. THE OWNER shall issue a request for qualifications ("RFQ") for each category of work listed in Section 1.1 if such work is required on the Project. The RFQ shall be placed on the Comm-BUYS web site; advertised in a newspaper of general circulation in the area of the Project and in the *Central Register* established under Massachusetts General Laws, Chapter 9, Section 20, and in such additional media as THE OWNER and the Prequalification Committee may deem appropriate at least fourteen (14) calendar days before the deadline for Applicants to submit a response to the RFQ by submission of a Statement of Qualifications ("SOQ"). All interested Trade Contractors shall be eligible to respond to the RFQ and participate in the prequalification process. The CM firm may submit its qualifications to bid on trade contract work provided that the CM customarily performs the work for which it submits its qualifications and does so with employees on its own payroll, and provided that the CM meets all the requirements of the selection process. The RFQ shall be prepared by THE OWNER in a form consistent with the requirements of M.G.L. c. 149A and in consultation with the Prequalification Committee and the CM. The RFQ shall contain a form or forms (individually or collectively, THE OWNER "Statement of Qualifications" or "SOQ") requiring the information necessary for the Prequalification Committee to determine if the Applicant is qualified to perform the category of work for which it seeks prequalification on the Project. The RFQ shall include, at a minimum:

a. the date, time, and place for submission;
b. relevant information about the project and the bidding process;
c. the specific criteria for trade contractor prequalification and selection;
d. a statement indicating that the RFQ will be used to prequalify trade contractors that will be invited to submit a bid; and
e. that the responders' names are to be posted, but that there shall be no public opening of responses.

2.3 Prequalification Criteria. The Prequalification Committee shall evaluate the information submitted by each Applicant on its Statement of Qualifications, the results of reference checks performed by the Prequalification Committee and/or the CM, and any other information required or obtained by the Prequalification Committee. The following subparagraphs enumerate the legally required categories to be used by the Prequalification Committee in evaluating the Applicants, the subcategories of information within each category, and the specific point allocation required for prequalification within each category. Applicants must achieve an overall score of 70 or greater and must also achieve the minimum required points within each category in order to be deemed prequalified. Applicants that do not achieve both the minimum scores within each category and do not achieve an overall score of 70 or above shall not be deemed prequalified.

a. Management Experience (50 points, minimum of 25 required for approval)

i) Business owners - The name, title, years with firm of the owner(s) of the business
ii) Management personnel - The names, title, education and construction experience, years with firm, and list of projects completed by all management personnel.
iii) Similar project experience - The project name(s), description, description of scope, original trade contract sum, final trade contract sum with explanation, and date completed of similar projects.

iv) Terminations – A list of any projects on which the trade contractor was terminated or failed to complete the work.

v) Lawsuits – A list of commercial lawsuits in which the trade contractor is a defendant or defendant-in-counterclaim with regard to construction contracts within the last 3 years. The lawsuits shall not include any actions that primarily involve personal injury or workers' compensation claims, or where the sole cause of action involves the trade contractor's exercise of its rights for direct payment under the law.

vi) Safety record – The three-year history of the trade contractor's workers' compensation experience modifier.

b. References (30 points; minimum of 15 required for approval)

i) Client references - for all projects listed in clause (iii) of Management experience above, including the project name, client's name, address, telephone and fax number, and contact person.

ii) Credit references - A minimum of five credit references, including telephone and fax number of contact person from key suppliers, vendors and banks.

iii) Public project record – A list of all completed public building construction projects as defined in section 44A of chapter 149 during the past three years with client's name, address, telephone and fax number and contact person.

c. Capacity to Complete Projects – (20 points; minimum of 10 required for approval)

i) Annual revenue for prior three fiscal years. There shall be no requirement for submission of financial statements.

ii) Revenue under contract for next three fiscal years.

d. Commitment Letter – (mandatory no points assigned)

Mandatory commitment letters from surety companies or authorized agents stating that payment and performance bonds at 110% of the estimated trade contract value will be provided to the applicant if it is the successful bidder. The surety company providing the commitment letter must be licensed to do business in the Commonwealth and appear on the United States Treasury Department Circular 570.

e. Certificate of Eligibility – (mandatory, no points assigned)

All SOQs submitted after January 1, 2006 must include a certificate of eligibility from DCAMM listing the Applicant as currently certified as a subcontractor in the scope of work for which the Applicant is submitting its SOQ.

f. Update Statement – (mandatory, no points assigned)

All SOQs submitted after January 1, 2006 must include a fully completed and current DCAMM Update Statement prepared by the Applicant.

Applicants that are certified by the Massachusetts Supplier Diversity Office ("SDO") as either a Minority Business Enterprise, a Women Business Enterprise or a Minority/Women Business Enterprise and provide documentation of current SDO certification with their SOQ will have an additional 5 points added to their overall score.

If the Applicant is a joint venture, the Applicant must submit a copy of the joint venture agreement, signed by each member, and the joint venture agreement must clearly identify, for each member of the joint venture, such member's proportionate share or interest in the financial or other benefits, risks or liabilities of the venture ("joint venture interest"). One member of the joint venture must have a joint venture interest greater than fifty (50) percent ("the Lead Venturer"). The requirements for prequalification in 2.3 a-f above shall be met by each member of the joint venture; and the bonding requirements of 2.3 d above shall be met by the Lead Venturer or by the joint venture as an entity. A joint venture prequalified by the Prequalification Committee must obtain a Certificate of Eligibility from THE OWNER prior to the time bids are filed and must submit the Joint Venture's Certificate of Eligibility with its bid.

Joint ventures must be submitted for consideration by the Prequalification Committee. Following the deadline for submission of SOQs for a specific category of work, joint ventures for that category of work which were not

submitted to the Prequalification Committee may not bid on that category of work, except that two firms both of whom were independently prequalified by the Prequalification Committee for that category of work, may form a joint venture to bid that category of work without further consideration by the Prequalification Committee provided the Joint Venture has been DCAMM Certified prior to submitting its bid and submits the Joint Venture's Certificate of Eligibility with its bid.

2.4 **Deliberations of the Prequalification Committee.** The Prequalification Committee shall consider each SOQ submitted based on the criteria set forth in Paragraph 2.3 above. The Prequalification Committee shall require that all mandatory submissions are submitted by the Applicant and apply a numerical scoring system, with both the minimum point scores for each category, and a score of 70 out of a possible 100 overall points, required to be prequalified. The Prequalification Committee shall prepare a written record of the evaluation of each Applicant.

The scoring system shall provide for the assigning of scores as follows. The Prequalification Committee shall first consider whether the Applicant has met the requirements of Subparagraphs d, e and f, bonding commitment letter, certificate of eligibility and update statement. If the Applicant has satisfied those criterion, it shall be awarded up to 100 points using the criteria listed above. Applicants that do not meet the requirements of Subparagraphs d, e and f shall not be presented to the Prequalification Committee for consideration.

Any Applicant that fails to achieve either an overall score of at least 70 or that fails to achieve the minimum required points within each category shall be deemed not to be prequalified for the category of work for which the Applicant sought prequalification. If it is determined at any time during the evaluation process, that an Applicant has willfully supplied materially false or misleading information in its application or otherwise, the Applicant may be eliminated from further consideration for prequalification for the Project and, in the discretion of the Owner, for any other projects requiring prequalification under these Procedures.

The decision of the Prequalification Committee shall be final and not subject to appeal except on the grounds of fraud or collusion. An Applicant firm's prequalification score shall be made available to that Applicant firm only and only upon request. An Applicant firm's score shall not be a public record as defined in M.G.L. c. 4, §7 and shall not be open to public inspection to the fullest extent possible under the law.

A list of the Applicants that have been determined by the Prequalification Committee to be prequalified and therefore eligible to bid shall be posted at the offices of THE OWNER listing the firms by trade categories. Applicants shall also be notified of the Prequalification Committee's determination on prequalification by mail at the address furnished by each Applicant.

The Prequalification Committee reserves the right to reopen the prequalification process for any category of work before it has completed its evaluation of firms that previously submitted SOQs and/or to hold multiple rounds of prequalification for any given category of work. In either case, any Applicant that has submitted a complete SOQ shall not be required to submit another one, although any Applicant not prequalified may elect to amend its SOQ prior to the latest deadline for submitting information for the trade contract for which the Applicant seeks to be prequalified.

No person or firm suspended or debarred pursuant to Massachusetts General Laws Chapter 29, Section 29F, or Chapter 149, Section 44C, or disqualified pursuant to Chapter 7, Section 38D, or which has been debarred by the Federal Government shall be determined to be qualified to compete for a trade contract or any other contract or subcontract to be issued on the Project. If any Applicant determined to be qualified to perform one or more trade contracts is subsequently suspended or debarred pursuant to such laws, the qualification of such Applicant shall be rescinded and such Applicant shall be notified of such action and eliminated from the list of prequalified bidders.

2.5 **Determinations to Remain in Effect.** The Prequalification Committee's determinations as to which Applicants are prequalified shall remain in effect, subject to the following provisions of this Section 2.5, for the duration of the Project. Upon receipt at any time of additional information deemed material and significant by the Prequalification Committee regarding a previously prequalified Applicant's qualifications or responsibility, including, but not limited to, compliance with any minimum prequalification requirements, the Prequalification Committee may determine, in consultation with the Owner and the CM, that the Applicant is not qualified to perform the applicable trade contract(s) for the Project. In such event, the Prequalification Committee shall notify the Applicant of its

determination, and inform the Applicant of any information on which the Prequalification Committee's determination is based that was not furnished by the Applicant.

3. Bidding

3.1 Requests for Bids. A request for bids ("RFB") will be issued for each trade contract subject to Sections 2 and 3 of these Procedures. The RFB will only be issued to the Trade Contractors appearing on the list of prequalified Applicants for the applicable trade contract determined pursuant to Section 2 above. The RFB shall include at least the following attachments:

a. the date, time and place for submission of responses to the request for bids. All Trade Contractor bids will be submitted and opened at the City's Purchasing Department Office or at such other location designated by the Owner in the RFB;

b. fully detailed drawings and specifications by class of work in accordance with paragraph (a) of Subsection 1 of Section 44F of Chapter 149 of the Massachusetts General Laws (i.e., separate specification sections for the trades listed in Paragraph 1.1 above) which shall provide for full competition for each item of material to be furnished under the contract as set forth under subsection (b) of M.G.L. c.30, §39M;

c. a detailed definition of the Trade Contractor's scope of work, including alternates and unit price items, if any, within that scope of work;

d. a project schedule indicating the planned sequence and duration of each trade contractor's work;

e. list of the Trade Contractors prequalified for the work covered by the RFB;

f. a Trade Contractor bid form, that shall require, without limitation, a listing of price, addenda, alternates and unit price items, if any, for the trade work; certification that the trade contractor will perform the complete trade work with employees on his own payroll, except for work customarily performed by sub-trade subcontractors within the trade; and the names of all sub-trade subcontractors to be used if awarded the trade contract and each sub-trade contract sum; to the extent applicable, an identification by the Trade Contractor that it is a MBE or WBE or a list of the MBEs and/or WBEs proposed to be used by the Trade Contractor;

g. an affidavit that must be executed by all bidders confirming that all sub-trade subcontractors named on the bid form have been prequalified by the Trade Contractor using criteria similar to the criteria for the prequalification of Trade Contractors;

h. an affidavit of tax compliance that must be executed by all bidders;

i. an affidavit of prevailing wage compliance pursuant to M.G.L. c. 149, §§ 26 and 27 that must be executed by all bidders;

j. a non-collusion affidavit that must be executed by all bidders;

k. a requirement that a bidder post a 5% bid bond from a surety company licensed to do business in the Commonwealth and whose names appears on U.S. Treasury Department Circular 570; but the bid bond shall be returned to the bidder if the bidder is not selected as the Trade Contractor;

l. a budget for the project, and the budget amount for the trade contract scope of work as provided in the project guaranteed maximum price, if available, or as provided in the most recent budget for the project;

m. a requirement that a bidder submit a current Certificate of Eligibility issued by DCAMM to the Trade Contractor showing that the Trade Contractor is certified for the trade category for which the bid is submitted.

n. a requirement that a bidder submit a completed Update Statement with its bid; and

o. a Trade Contractor agreement form as set forth in M.G.L. c. 149A, §8 (k).

The prequalified Trade Contractors shall submit bids in compliance with the requirements of the Request for Bids package.

3.2 **Bid Opening, Award, Rejection and Negotiation of Bids.** Bids shall be opened publicly by THE OWNER. Bids for each trade shall be: a) accepted only from firms appearing on the list of prequalified firms described in Paragraph 2.4 for such trade; b) submitted as set forth in the RFB, and c) opened publicly. Any bid which does not include the bid bond or affidavits required pursuant to law or any response in which the information requested is incomplete, conditional, or obscure or which contains any additions not required in the request for bids package shall be rejected. The trade contract for each trade shall be awarded to the lowest prequalified bidder except that THE OWNER reserves the right to reject the bids of any and all Trade Contractors if: a Trade Contractor is not eligible to submit a bid; if the bid does not represent the bid of a person competent to perform the work specified; or if less than three such bids were received and the prices are not reasonable for acceptance without further negotiation or competition. In addition if fewer than three responsive bids are received for any trade category and the lowest bid exceeds the estimated cost for the work, the CM shall attempt to negotiate an acceptable price with the lowest prequalified bidder. If the negotiations are unsuccessful, the construction manager shall terminate negotiations with the lowest prequalified bidder and shall initiate negotiations with the trade contractor who was the second lowest prequalified bidder. If the CM is unsuccessful in negotiating an acceptable price with the lowest prequalified bidder and second lowest prequalified bidder, the CM, on behalf of and with the consent of the public agency, shall solicit additional bids utilizing the procedures for selection of subcontractors who are not trade contractors, set out below and in M.G.L. c. 149A, § 8 (j).

3.3 **Trade Contract Execution.** Each trade contractor selected to perform work on the Project shall return an executed trade contract including the required performance and payment bonds and insurance certificate to the CM within 10 business days of receipt of the trade contract from the CM. The trade contract shall be the trade contract agreement required by law.

II. Other Subcontracts

1. Applicability of Procedures

Subcontracts Subject to Procedures For Other Subcontracts. The process set forth in these Sections 4 and 5 of the Procedures shall apply to the procurement of subcontracts and subcontractors that are not subject to the provisions of Sections 2 and 3 above, specifically subcontractors that are not Trade Contractors, and where the subcontract scope of work has an estimated value that is equal to or exceeds $25,000.

2. Prequalification and Procurement

2.1 **Subcontract Other than Trade Contracts in With An Estimate Cost equal to or greater than $25,000.** For Subcontracts that are not trade contracts with an estimated cost equal to or greater than $25,000, the CM shall submit to THE OWNER for its approval the qualifications which it believes a subcontractor must have to perform the work of the subcontract and a list of a minimum of three (3) subcontracting firms, and preferably at least five (5) subcontracting firms, which the CM believes meet the qualifications. The CM shall submit information in a form and content satisfactory to the Prequalification Committee concerning the qualifications and responsibility of the proposed subcontractors and, when relevant, how the selection will further the CM's compliance with its Project MBE and WBE participation goals. The CM firm may submit its qualifications to bid on subcontract work provided that the CM customarily performs the work for which it submits its qualifications and does so with employees on its own payroll, and provided that the CM meets all the requirements of the selection process. The Prequalification Committee may eliminate firms from the list of firms submitted by the CM, and the Prequalification Committee may add firms to the list submitted by the CM. The CM must add the firms requested by the Prequalification Committee to the list if the firms are acceptable to the CM. If the firms Prequalification Committee requested be added are not acceptable to the CM based upon qualifications, ability or for any other reason, the CM must advise the Prequalification Committee of its objections and the basis for the objections in writing. If the Prequalification Committee determines that the CM's objections to THE OWNER requested firm(s) are valid then the requested firms will not be added to the list, otherwise the firm(s) will be added.

The CM will invite all subcontractors on the approved list to submit bids for the subcontract work, using forms and procedures approved by THE OWNER. The bids shall be based on detailed bidding information developed by the CM for the subcontract work. The CM will submit to THE OWNER a list of bids submitted

for each subcontract and with the list will indicate the bidder it recommends be selected to be awarded a subcontract. The CM shall along with its submission provide a written explanation as to the reasons for its selection and recommendation. The CM's recommendation will be based on relevant factors including, but not limited to, price, quality of work, and MBE and/or WBE participation. THE OWNER approval is required before a subcontract can be awarded by the CM to a subcontractor, which approval shall not be unreasonably withheld provided the selection will not have an adverse effect on meeting project goals including, but not limited to, price, quality of work and/or MBE/WBE participation. In no event will the selection of a subcontractor affect the GMP agreed to by the CM.

The CM may, with the approval of THE OWNER, reject the proposals for a subcontract and either resolicit that scope of work or negotiate with one or more of the firms that submitted the rejected proposals. Such rejection may be based on the proposal being too high compared to the amount carried in the GMP for that scope of work or upon any other basis approved by THE OWNER.

2.2 **Subcontracts With An Estimated Cost Less Than $25,000.** Subcontracts with an estimated cost less than $25,000, and subcontracts for the supply of materials or equipment not including performance of labor in construction at the Project site, regardless of the estimated cost, may be awarded by the CM using any method selected by the CM with the approval of THE OWNER.

III. Other Procurement Provisions

1. Emergencies

1.1 In case of an emergency, THE OWNER or the CM, with the prior approval of DCAMM, may award a contract for such work as is necessary to preserve or protect the health or safety of persons or property on the basis of such competitive bids or proposals as it can reasonably obtain in time to respond to the emergency and without public advertisement or opening of bids or proposals; or the CM may perform such work with its own forces.

2. Termination of Contracts

2.1 **Termination of Trade Contracts and Other Subcontracts.** If a trade contract, or other subcontract, is terminated in whole or in part by the CM after the subcontractor commences work but prior to completion of the work covered by such trade contract or other subcontract on account of breach or default by the trade contractor or other subcontractor, or for other reasons in the public interest approved by THE OWNER, the CM may engage a replacement subcontractor using any method selected by the CM and approved by THE OWNER, or may perform the affected work with its own forces, as necessary to preserve, protect, or complete the work without following these procedures and without public advertisement or opening of bids or proposals. The termination of a trade or other subcontractor prior to completion of its work shall not be the basis for an increase in the GMP.

3. Miscellaneous Provisions

3.1 **Procurement Records.** The Prequalification Committee and the CM shall ensure that THE OWNER has a complete set of the following records:

a. All RFQs issued pursuant to Section 2 of these Procedures, including all addenda.

b. All SOQs and other information furnished to or otherwise obtained by the Prequalification Committee and the CM concerning qualification of each Applicant responding to an RFQ including any references or scoring obtained or generated in connection with the SOQs.

c. All RFBs issued by the CM to prequalified Trade Contractors pursuant to Section 3 of these Procedures.

d. All bids received from such Trade Contractors in response to such RFBs.

e. All solicitations for bids or proposals issued by the CM to firms other than Trade Contractors.

f. All bids and proposals received by the CM from such firms in response to such solicitations.

g. All contracts awarded pursuant to these procedures.

h. All other written documents required pursuant to the terms of these Procedures.

i. All other documents referring or relating to the evaluation of qualifications, proposals or bids, including but not limited to, all notes (to the extent included in Project files), memoranda, correspondence and meeting minutes, whether formal or informal, in either electronic media or hard copy.

THE OWNER shall retain copies of such records for a period of six (6) years from the date of final payment under the contract to which such records relate. The Secretary of Administration and Finance and the Inspector General of the Commonwealth shall have access to all such records at any time upon reasonable notice.

3.2 Severability. If any provision of these Procedures shall be determined to be invalid or unenforceable, the remaining provisions of the Procedures shall remain in full force and effect.

3.3 Time. The periods of time within which any party is required to act under the terms of these procedures when described in terms of "days" shall, unless otherwise specified, mean calendar days (and not business days), except that if the last day of any such time period falls on a Saturday, Sunday, or legal holiday in Massachusetts, the period of time during which the required action must be taken will be extended to the next following business day.

APPENDIX H – FORM FOR SUBCONTRACT BETWEEN CONSTRUCTION MANAGER AND TRADE CONTRACTOR

FORM FOR TRADE CONTRACT BETWEEN CONSTRUCTION MANAGER AND TRADE CONTRACTOR

THIS AGREEMENT made this _____ day of _____ 20____, by and between

_____

a corporation organized and existing under the law of _____
a partnership consisting of _____
an individual doing business as _____
hereinafter called the "Construction Manager or CM" and

_____

a corporation organized and existing under the laws of _____
a partnership consisting of _____
an individual doing business _____
hereinafter called the "Trade Contractor",

WITNESSETH that the CM and the Trade Contractor for the considerations hereafter named, agree as follows:

1. The Trade Contractor agrees to furnish all labor and materials required for the completion of all work specified in Section No. _____
of the Specifications for _____
(Name of Sub-trade)
and the Plans referred to therein and addenda No. _____, _____, _____and
_____ for the _____

_____
(complete title of project and project no. taken from the title page of the Specifications)
all as prepared by _____.
(Name of Designer or Engineer)

All work shall be in accordance with the (project) all as prepared by _____ designer. All work shall be in accordance with the contract documents listed on Exhibit A; and the detailed Scope of Work listed on Exhibit B. The CM agrees to pay the Trade Contractor as full payment for all the work in Exhibit B, the sum of $_____. This price includes the following alternates (and other items set forth in the sub-bid):

Alternate No(s) _____, _____, _____,
_____, _____, _____, _____.

(a) The Trade Contractor agrees to be bound to the CM by the terms of the hereinbefore described Plans, Specifications (including all general conditions stated therein) and addenda No. _____, and _____, and _____, and to assume to the CM all the obligations and responsibilities that the CM by those documents assumes to

the _____ hereinafter called

(Public Agency)

the "Public Agency", except to the extent that provisions contained therein are by their terms or by law applicable only to the CM.

(b) The CM agrees to be bound to the Trade Contractor by the terms of the hereinbefore described documents and to assume to the Trade Contractor all the obligations and responsibilities that the Public Agency by the terms of the hereinbefore described documents assumes to the CM, except to the extent that provisions contained therein are by their terms or by law applicable only to the Public Agency.

2. The CM agrees to begin, prosecute and complete the entire work specified by the Public Agency in an orderly manner so that the Trade Contractor will be able to begin, prosecute and complete the work described in this Trade Contract; and, in consideration thereof, upon notice from the CM, either oral or in writing, the Trade Contractor agrees to begin, prosecute and complete the work described in this Trade Contract in an orderly manner in accordance with the Project Schedule attached as Exhibit C as it may be reasonably modified from time to time by agreement of the CM and the Trade Contractor.

3. The Trade Contractor agrees to furnish to the CM on execution of this Trade Contractor Agreement and prior to commencing the work, evidence of workers' compensation insurance as required by law and evidence of public liability and property damage insurance of the type and in limits required to be furnished to the Public Agency by the CM.

4. The CM agrees that no claim for services rendered or materials furnished by the CM to the Trade Contractor shall be valid unless written notice thereof is given by the CM to the Trade Contractor during the first ten (10) days of the calendar month following that in which the claim originated.

5. The Trade Contractor Agreement is contingent upon the execution of an amendment to the contract between the CM and the Public Agency for the work of the Trade Contractor.

6. If the Trade Contractor should be adjudged a bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials, of if he should fail to make prompt payment to sub-trade subcontractors or for material or labor, or persistently disregard laws, ordinances or the instructions of the CM, or otherwise be guilty of a substantial violation of any provision of the contract, then the CM may, without prejudice to any other right or remedy and after giving the Trade Contractor and his surety seven days' written notice, terminate the employment of the Trade Contractor and take possession of the premises and of all materials, tools, and appliances thereon and finish the work by whatever method he may deem expedient. In such case the Trade Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the trade contract price shall exceed the expense of finishing the work including compensation for additional architectural, managerial and administrative services, such excess shall be paid to the Trade Contractor. If such expense shall exceed such unpaid balance, the Trade Contractor shall pay the difference to the CM. The CM and Trade Contractor shall have the right to seek damages for breach of this Trade Contract without terminating this Trade Contract or ceasing performance hereunder.

7. The following exhibits are incorporated into their subcontract:

Exhibit A: Contract Documents

Exhibit B: Detailed Scope of Work

Exhibit C: Project Schedule

IN WITNESS WHEREOF, the parties hereto have executed this agreement the day and year first above-written.

SEAL ATTEST

_____ _____

(Name of Trade Contractor)

By: _____

SEAL ATTEST

_____ _____

(Name of CM)

By: _____

APPENDIX I – PERFORMANCE BOND

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS
that_____
_____, as Principal, and
_____
_____,as Surety,
are held and firmly bound unto the Awarding Authority, in the sum of
_____

lawful money of the United States to be paid to the Awarding Authority, for which payments, well and truly to be made, we bind ourselves, our respective heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the said Principal has made a contract with the Awarding Authority bearing date of _____ 200_, for the construction of _____
_____(Project),
Now the condition of this obligation is such that if the Principal shall well and truly keep and perform all the undertakings, covenants, agreements, terms and conditions of said contract and any extensions thereof that may be granted by the Awarding Authority, with or without notice to the surety, and during the life of any guaranty required under the contract, and shall also well and truly keep and perform all the alterations, changes or additions to said contract that may hereafter be made, notice to the surety of such modifications, alterations, changes or additions being hereby waived, then this obligation shall become null and void; otherwise it shall remain in full force and effect.

In the event that the contract is abandoned by the Contractor, or is terminated by the Awarding Authority, said surety hereby further agrees that said surety shall, if requested in writing by the Awarding Authority, take such action as is necessary to complete said contract.

In witness whereof we hereunto set our hands and seals this ____ day of _____, 201_.

By Principal: _____ [Seal]

By Surety: _____ [Seal]

Address: _____

Surety Agent: _____ [Seal]
Address: _____

Telephone: _____

APPENDIX J – CERTIFICATE AS TO CORPORATE PRINCIPAL (PERFORMANCE BOND)

CERTIFICATE AS TO CORPORATE PRINCIPAL
(PERFORMANCE BOND)

I, _____, certify that I am the _____ of the corporation named a principal in the within bond; that _____who signed said Bond on behalf of the Principal was then _____ of said corporation and I know his signature and his signature thereon is genuine; and that said Bond was duly signed, sealed and attested for and on behalf of said corporation by authority of its governing body.

Signed: _____ [Seal]
Date: _____, 201_

END OF PERFORMANCE BOND

APPENDIX K – LABOR AND MATERIAL PAYMENT BOND

LABOR AND MATERIAL PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that _____

_____

_____as principal, and

_____

as surety, are held and firmly bound unto the Awarding Authority in the sum of _____

_____

lawful money of the United States of America, to be paid to the Awarding Authority, for which payment, well and truly to be made, we bind ourselves, our respective heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the said principal has made a contract with the Awarding Authority under date of _____, 200_,

for: _____

Now the condition of this obligation is such that if the principal shall promptly pay for all labor performed or furnished and for all materials used or employed in said contract and in any and all duly authorized modifications, alterations, extensions of time, changes or additions to said contract that may hereafter be made, notice to the surety of such modifications, alterations, extensions of time, changes or additions being hereby waived, the foregoing to include any other purposes of items set out in, and to be subject to, the provision of Massachusetts General Laws (Ter. Ed.), Chapter 30, Section 39A, and Chapter 149, Section 29 as amended, then this obligation shall become null and void; otherwise it shall remain in full force and effect.

In witness whereof we hereunto set our hands and seals this ____ day of _____, 201_.

By Principal: _____ [Seal]

By Surety: _____

Address:_____

Surety Agent: _____ [Seal]

Address:_____

Telephone: _____

APPENDIX L – CERTIFICATE AS TO CORPORATE PRINCIPAL (LABOR AND MATERIAL BOND)

CERTIFICATE AS TO CORPORATE PRINCIPAL (LABOR AND MATERIAL BOND)

I, _____, certify that I am the _____

of the corporation named as principal in the within bond; that _____ who signed said Bond on behalf of the Principal was then _____ of said corporation and I know his signature and his signature thereon is genuine; and that said Bond was duly signed, sealed and attested for and on behalf of said corporation by authority of its governing body.

Signed: _____ [Seal]

Date: _____, 201_

END OF LABOR AND MATERIAL PAYMENT BOND

Document 00 54 22

BID ATTACHMENT
UNIT PRICES SCHEDULE

A. Unit prices: Should certain additional work be required, or should the quantities of certain classes of work be increased or decreased from those upon which the Bid is based, as authorized by the Owner, the undersigned agrees that the following supplemental unit prices represent the exact net amount per unit to be paid the Contractor (in the case of additions or increases) or credited to the Owner (in the case of decrease), without further adjustment for overhead, profit, insurance, compensation insurance or other direct or indirect expenses of the Contractor.

B. Schedule of Unit Prices

	SCHEDULE OF UNIT PRICES	**Additions**	(unit)	**Deductions**	(unit)
1	**General excavation by machine.** Material left on site as directed.	_____	CY	_____	CY
2	**General excavation by machine.** Material removed from site as directed.	_____	CY	_____	CY
3	**Trench excavation by machine.** Material left on site as directed.	_____	CY	_____	CY
4	**Trench excavation by machine.** Material removed from site as directed.	_____	CY	_____	CY
5	**Hand excavation to a 6' depth.** Material left on site as directed.	_____	CY	_____	CY
6	**Hand excavation to a 6' depth.** Material removed from site as directed.	_____	CY	_____	CY
7	**Hand excavation per each foot of additional depth below 6'.** '(Add to items 5 and 6)	_____	CY	_____	CY
8	**Removal & disposal of buried asbestos containing pipe and fitting** insulation, including required hand excavation.	_____	LF	N/A	
9	**Liquid waste disposal in conjunction with removal of buried oil tank.** PLUS liquid waste transportation.	_____	GAL	N/A	
10	**Dense Graded crushed stone in place, compacted as specified.**	_____	CY	_____	CY

11	**Gravel in place, compacted as specified.**	_____	CY	_____	CY
12	**Structural Fill in place, compacted as specified.**	_____	CY	_____	CY
13	**Drainage Fill/ crushed stone in place, compacted.**	_____	CY	_____	CY
14	**Common Fill in place, compacted as specified.**	_____	CY	_____	CY
15	**Sand fill around pipes in trenches in place, as specified.**	_____	CY	_____	CY
16	**3,000 psi concrete, in place, not including forms and reinforcing.**	_____	CY	_____	CY
17	**4,000 psi concrete, in place, not including forms and reinforcing.**	_____	CY	_____	CY
18	**5,000 psi concrete, in place, not including forms and reinforcing.**		CY		CY
19	**Loading, Transportation and disposal of petroleum/ hazardous material Impacted soils.**				
a.	natural soil below RCS-1 PLUS one time approval fee.	_____	TN	_____	TN
b.	urban fill below RCS-1 PLUS one time approval fee.	_____	TN	_____	TN
c.	in-state lined landfill reuse PLUS one time approval fee.	_____	TN	_____	TN
d.	in-state/ out-of-state recycling, or thermal treatment PLUS one time approval fee.	_____	TN	_____	TN
e.	out-of-state RCRA Subtitle D	_____	TN	_____	TN
f.	out-of-state RCRA Subtitle C, hazardous waste treatment PLUS MA Tax.	_____	TN	_____	TN
g.	out-of-state RCRA Subtitle C, hazardous waste direct. PLUS MA Tax.	_____	TN	_____	TN
h.	solid waste	_____	TN	_____	TN

20	**Sump Dewatering System with Treatment of Water** (To Include: Mobilization, Demobilization, Consumables, Operation and Maintenance).	_____	MO	_____	MO
21	**Sump Dewatering System without Treatment of Water** (To Include: Mobilization, Demobilization, Consumables, Operation and Maintenance).	_____	MO	_____	MO
22	**1500 flowable fill**	_____	CY	_____	CY
23	**Crush stone for water contorl**	_____	CY	_____	CY
24	**Rip rap for water control**	_____	CY	_____	CY
25	**Rammed aggregrate piers**	_____	LF	_____	LF
26	**Rigid inclusions**	_____	LF	_____	LF
27	**Load Test**	_____	EA	_____	EA
28	**Excavation and removal of boulders (mass excavation) greater than 2CY:**	_____	CY		
29	**Excavation and removal of boulders (trench) greater than 1 CY.** *All other boulders less than 1 C, whether w/in open or trench excavations, all work and costs becomes the responsibility of the site contractor and would be part of their Base Bid.	_____	CY		
30	**Excavation and removal of soft organic silt and peat to El. 158**	_____	CY		
31	**Ordinary fill, in place, compacted as specified**	_____	CY		
32	**One mobilization, one modulus test per ground improvement type, preparation of RAP design plans and specifications, installation of RAP elements, quality assurance and demobilization,** Include 1 in base bid.	_____	LS		

33	**One mobilization, one modulus test per ground improvement type, preparation of RI design plans and specifications, installation of RI elements, quality assurance and demobilization,** Include 1 in base bid.	_____	LS
34	**Additional ungrouted RAP elements due to obstructions or Owner design changes**	_____	LF
35	**Additional RI elements due to obstructions or Owner design changes**	_____	LF
36	**Additional RAP modulus tests**	_____	EA
37	**Additional RI modulus tests**	_____	EA
38	**Additional mobilizations/demobilizations**	_____	EA
39	**Quality assurance of Load Transfer Platform/Footing Pad/Slab Pad**	_____	LS

End of Document

Document 00 54 22

BID ATTACHMENT
UNIT PRICES SCHEDULE
(BID PACKAGE 2)

A. Unit prices: Should certain additional work be required, or should the quantities of certain classes of work be increased or decreased from those upon which the Bid is based, as authorized by the Owner, the undersigned agrees that the following supplemental unit prices represent the exact net amount per unit to be paid the Contractor (in the case of additions or increases) or credited to the Owner (in the case of decrease), without further adjustment for overhead, profit, insurance, compensation insurance or other direct or indirect expenses of the Contractor.

B. Schedule of Unit Prices, steel penetrations

	SCHEDULE OF UNIT PRICES	**Additions** (unit)
1	Roof opening frames, shop fabricated. (Reference Drawing Detail 4/S304)	_____ EACH
2	Roof opening frames, field fabricated. (Reference Drawing Detail 4/S304)	_____ EACH
3	Round beam shop penetration.	_____ EACH
4	Round beam field penetration.	_____ EACH
5	Reinforced round beam shop penetration.	_____ EACH
6	Reinforced round beam field penetration.	_____ EACH
7	Reinforced rectangle beam shop penetration. (Reference Drawing Detail 2/S305)	_____ EACH
8	Reinforced rectangle beam field penetration. (Reference Drawing Detail 2/S305)	_____ EACH

End of Document

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Document 00 54 22

BID ATTACHMENT
UNIT PRICES SCHEDULE (BID PACKAGE 3)

A. Unit prices: Should certain additional work be required, or should the quantities of certain classes of work be increased or decreased from those upon which the Bid is based, as authorized by the Owner, the undersigned agrees that the following supplemental unit prices represent the exact net amount per unit to be paid the Contractor (in the case of additions or increases) or credited to the Owner (in the case of decrease), without further adjustment for overhead, profit, insurance, compensation insurance or other direct or indirect expenses of the Contractor.

Schedule of Unit Prices

	SCHEDULE OF UNIT PRICES	**Additions**	(unit)	**Deductions**	(unit)
1	Ceiling Type ACT-01: 24 by 24 inch.	_____	SF	_____	SF
2	Ceiling Type ACT-01: 24 by 48 inch	_____	SF	_____	SF
3	Ceiling Type: ACT-02: 24 by 24 inch	_____	SF	_____	SF
4	Ceiling Type: ACT-02: 24 by 48 inch	_____	SF	_____	SF
5	Ceiling Type ACT-03: 24 by 24 inch	_____	SF	_____	SF
6	Ceiling Type ACT-04: 24 by 24 inch	_____	SF	_____	SF
7	Ceiling Type ACT-04: 24 by 48 inch	_____	SF	_____	SF
8	Ceiling Type: ACT-05: 24 by 24 inch	_____	SF	_____	SF
9	Ceiling Type: ACT-05: 24 by 48 inch	_____	SF	_____	SF
10	Ceiling Type: ACT-05: 12 by 24 inch	_____	SF	_____	SF
11	Ceiling Type: ACT-05: 12 by 48 inch	_____	SF	_____	SF

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Document 00 63 13

REQUEST FOR INTERPRETATION (RFI) FORM

Date Submitted: _____

To the Architect: Jonathan Levi Architects, LLP
266 Beacon Street
Boston, Massachusetts 02116

Architect's Assigned RFI # _____

Submitted By: Company: _____

Address _____

References: Specification Section Number: _____

Article/ Paragraph / Subparagraph: _____

Drawing Number: _____

Detail Number: _____

Request:

☐ Refer to Attachment(s)

_____

_____

_____

_____

_____

Signed By: _____

Response:

_____

_____

_____

_____

_____

_____

☐ Refer to Attachment(s)

Response From: _____

Signed by: _____

Copies to: ☐Owner ☐Consultants ☐ _____
☐_____ ☐_____ ☐ _____
☐_____ ☐_____ ☐ File

Date Received at Architect _____

Date Returned by Architect _____

End of Document

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Document 00 63 25

SUBSTITUTION REQUEST FORM

Date Submitted: _____

To the Architect: Jonathan Levi Architects
266 Beacon Street
Boston, Massachusetts 02116

Submitted By: Company Name: _____

The General Contractor proposes the following substitution in accordance with Massachusetts General Laws, Chapter 30, Section 39M(b), and the requirements of the Contract Documents:

References:

Specification Section Number: --------- _____

Article / Paragraph / Subparagraph:--- _____

Drawing Number: ---------- _____

Detail Number: ---------- _____

Scope of Substitution: _____

_____

Impact on Project Schedule ☐ None ☐ Yes [Add] [Deduct] # of Calendar Days ____

Impact on Related Work: ☐ None ☐ Yes - explain:_____

_____

List all Deviations from specified requirements: _____

_____

_____

Attach Additional Sheets if necessary to describe deviations

Attachments: Attach supporting documentation sufficient for Architect to evaluate substitution. Substitution Request Forms submitted without adequate documentation will be returned without review.

Attachments: ☐ Drawings ☐ Product Data ☐ Reports ☐ _____
☐ Samples ☐ Warranties ☐ Tests ☐ _____

In addition to specific product information, attachments shall address the following issues:

- Manufacturer's Name, Address and Phone Number.
- Point by point comparative with specified product.
- Age of product availability in US marketplace
- List of 3 Similar installations, include Project Name, A/E and A/E phone number

Response Date: List date by which response by Architect is requested to maintain project schedule and allow sufficient time for inclusion of proposed substitution.

Requested Response Date *:_____
* shall be not less than 10 working days from date substitution request is received.

Contractor's Certification: The Contractor certifies substitution complies with the project requirements and with the General Conditions by initiating each line below:

Investigation: ---------- _____

Warranties and Guarantees: ---------- _____

Cost Data:---------- _____

Coordination of Substitute:---------- _____

Submitted by:
(company name & address) _____

_____

_____

Authorized Signature _____

Notations listed below shall have the same meaning as on Architect's review stamp. Clarifications to or changes in project schedule or time shall be processed using standard project forms.

Architect's Response:

_____ APPROVED
_____ REJECTED
_____ REVIEWED
_____ APPROVED AS NOTED
_____ REVISE AND RESUBMIT
_____ NOT REQUIRED FOR REVIEW

Remarks: _____

_____

_____

_____

_____

Date: _____

Signed: _____

End of Document

Section 00 73 43

PREVAILING WAGE RATES

PART 1 – MASSACHUSETTS PREVAILING WAGE RATES

1.1 PREVAILAING WAGE RATES

A. To comply with revisions to the MGL Chapter 149, Section 27, the Construction Manager shall request and obtain updated state wage rate schedules and submit updated state wage rates to the Owner's Project Manager (through the Architect) 45 days before the annual anniversary date of the execution of the construction contract. The Construction Manager and Trade Contractors shall use the updated state wage rate schedule for from the annual anniversary date until the next annual anniversary date, when another updated wage rate schedule will be available.

B. The Construction Manager and Trade Contractors shall pay prevailing wages as outlined in MGL Chapter 149, Sections 26 and 27 using the appropriate wage rate schedule. Increases in the state prevailing wage rates shall not be an acceptable basis for Construction Manager and Trade Contractors to request additional compensation.

C. It shall be the Construction Manager responsibility to request the updated wage rates each year and to ensure that they are provided to the Owner's Project Manager. As always, in areas where specific wage rates conflict, the higher wage rate shall govern.

D. Information can be found at http://www.mass.gov/lwd/labor-standards/prevailing-wage-program/

2.2 WAGE DETERMINATION

A. The wage determination applicable to this job immediately follows this section.

End of Section

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WEEKLY PAYROLL RECORDS REPORT
& STATEMENT OF COMPLIANCE

In accordance with Massachusetts General Law c. 149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided. A Payroll Form is available from the Department of Labor Standards (DLS) at www.mass.gov/dols/pw and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

On a weekly basis, every contractor and subcontractor is required to submit a certified copy of their weekly payroll records to the awarding authority; this includes the payroll forms and the Statement of Compliance form. The certified payroll records must be submitted either by regular mail or by e-mail to the awarding authority. Once collected, the awarding authority is required to preserve those records for three years from the date of completion of the project.

Each such contractor and subcontractor shall furnish weekly **and** within 15 days after completion of its portion of the work, to the awarding authority directly by first-class mail or e-mail, a statement, executed by the contractor, subcontractor or by any authorized officer thereof who supervised the payment of wages, this form, accompanied by their payroll:

STATEMENT OF COMPLIANCE

_____, 20_____

I,_____,_____
(Name of signatory party) (Title)

do hereby state:

That I pay or supervise the payment of the persons employed by _____ on the _____
(Contractor, subcontractor or public body) (Building or project)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty nine of the General Laws.

Signature _____

Title _____

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MASSACHUSETTS WEEKLY CERTIFIED PAYROLL REPORT FORM

Company's Name:	Address:	Phone No.:	Payroll No.:

Employer's Signature:	Title:	Contract No:	Tax Payer ID No.	Work Week Ending:

Awarding Authority's Name:	Public Works Project Name:	Public Works Project Location:	Min. Wage Rate Sheet No.

General / Prime Contractor's Name:	Subcontractor's Name:		"Employer" Hourly Fringe Benefit Contributions				
						(B+C+D+E)	(A x F)

Employee Name & Complete Address	Employee is OSHA 10 Certified (?)	Work Classification:	Appr. Rate (%)	Hours Worked Su.	Mo.	Tu.	We.	Th.	Fr.	Sa.	Project Hours (A) All Other Hours	Hourly Base Wage (B)	Health & Welfare Insurance (C')	ERISA Pension Plan (D)	Supp. Unemp. (E)	Total Hourly Prev. Wage (F)	Project Gross Wages (G) Total Gross Wages	Check No. (H)
	☐																	
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NOTE: Pursuant to MGL Ch. 149 s.27B, every contractor and subcontractor is required to submit a "true and accurate" copy of their weekly payroll records directly to the awarding authority. Failure to comply may result in the commencement of a criminal action or the issuance of a civil citation.

Date recieved by awarding authority
/ /

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THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

As determined by the Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

ROSALIN ACOSTA
Secretary

WILLIAM D MCKINNEY
Director

Awarding Authority: City of Framingham acting through its School Bu

Contract Number:

City/Town: FRAMINGHAM

Description of Work: New Fuller Middle School Construction - New 136,790 square foot middle school for 630 Grades 6-8 students

Job Location: 31 Flagg Street, Framingham, Massachusetts 01702

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule from the Department of Labor Standards ("DLS") if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- All apprentices working on the project are required to be registered with the Massachusetts Department of Labor Standards, Division of Apprentice Standards (DLS/DAS). Apprentice must keep his/her apprentice identification card on his/her person during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DLS/DAS regardless of whether or not they are registered with any other federal, state, local, or private agency must be paid the journeyworker's rate for the trade.**
- The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule. Awarding authorities are required to request these updates no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F "rental of equipment" contracts.
- Every contractor or subcontractor which performs construction work on the project is required to submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. A sample of a payroll reporting form may be obtained at http://www.mass.gov/dols/pw.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.
- Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2019	$34.25	$12.41	$12.70	$0.00	$59.36
	12/01/2019	$34.25	$12.41	$13.72	$0.00	$60.38
	06/01/2020	$35.15	$12.41	$13.72	$0.00	$61.28
	08/01/2020	$35.15	$12.91	$13.72	$0.00	$61.78
	12/01/2020	$35.15	$12.91	$14.82	$0.00	$62.88
	06/01/2021	$35.95	$12.91	$14.82	$0.00	$63.68
	08/01/2021	$35.95	$13.41	$14.82	$0.00	$64.18
	12/01/2021	$35.95	$13.41	$16.01	$0.00	$65.37
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2019	$34.32	$12.41	$12.70	$0.00	$59.43
	12/01/2019	$34.32	$12.41	$13.72	$0.00	$60.45
	06/01/2020	$35.22	$12.41	$13.72	$0.00	$61.35
	08/01/2020	$35.22	$12.91	$13.72	$0.00	$61.85
	12/01/2020	$35.22	$12.91	$14.82	$0.00	$62.95
	06/01/2021	$36.02	$12.91	$14.82	$0.00	$63.75
	08/01/2021	$36.02	$13.41	$14.82	$0.00	$64.25
	12/01/2021	$36.02	$13.41	$16.01	$0.00	$65.44
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2019	$34.44	$12.41	$12.70	$0.00	$59.55
	12/01/2019	$34.44	$12.41	$13.72	$0.00	$60.57
	06/01/2020	$35.34	$12.41	$13.72	$0.00	$61.47
	08/01/2020	$35.34	$12.91	$13.72	$0.00	$61.97
	12/01/2020	$35.34	$12.91	$14.82	$0.00	$63.07
	06/01/2021	$36.14	$12.91	$14.82	$0.00	$63.87
	08/01/2021	$36.14	$13.41	$14.82	$0.00	$64.37
	12/01/2021	$36.14	$13.41	$16.01	$0.00	$65.56
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2019	$102.78	$9.90	$21.15	$0.00	$133.83
AIR TRACK OPERATOR *LABORERS - ZONE 2*	06/01/2019	$34.70	$7.85	$14.88	$0.00	$57.43
	12/01/2019	$35.56	$7.85	$14.88	$0.00	$58.29
	06/01/2020	$36.45	$7.85	$14.88	$0.00	$59.18
	12/01/2020	$37.34	$7.85	$14.88	$0.00	$60.07
	06/01/2021	$38.26	$7.85	$14.88	$0.00	$60.99
	12/01/2021	$39.17	$7.85	$14.88	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER"						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	06/01/2019	$36.00	$12.50	$8.85	$0.00	$57.35
	12/01/2019	$37.00	$12.50	$8.85	$0.00	$58.35
	06/01/2020	$38.00	$12.50	$8.85	$0.00	$59.35
	12/01/2020	$39.00	$12.50	$8.85	$0.00	$60.35
ASPHALT RAKER *LABORERS - ZONE 2*	06/01/2019	$34.20	$7.85	$14.88	$0.00	$56.93
	12/01/2019	$35.06	$7.85	$14.88	$0.00	$57.79
	06/01/2020	$35.95	$7.85	$14.88	$0.00	$58.68
	12/01/2020	$36.84	$7.85	$14.88	$0.00	$59.57
	06/01/2021	$37.76	$7.85	$14.88	$0.00	$60.49
	12/01/2021	$38.67	$7.85	$14.88	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$48.18	$12.00	$15.60	$0.00	$75.78
	12/01/2019	$49.33	$12.00	$15.60	$0.00	$76.93
	06/01/2020	$50.43	$12.00	$15.60	$0.00	$78.03
	12/01/2020	$51.58	$12.00	$15.60	$0.00	$79.18
	06/01/2021	$52.68	$12.00	$15.60	$0.00	$80.28
	12/01/2021	$53.83	$12.00	$15.60	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$48.18	$12.00	$15.60	$0.00	$75.78
	12/01/2019	$49.33	$12.00	$15.60	$0.00	$76.93
	06/01/2020	$50.43	$12.00	$15.60	$0.00	$78.03
	12/01/2020	$51.58	$12.00	$15.60	$0.00	$79.18
	06/01/2021	$52.68	$12.00	$15.60	$0.00	$80.28
	12/01/2021	$53.83	$12.00	$15.60	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2*	06/01/2019	$34.20	$7.85	$14.88	$0.00	$56.93
	12/01/2019	$35.06	$7.85	$14.88	$0.00	$57.79
	06/01/2020	$35.95	$7.85	$14.88	$0.00	$58.68
	12/01/2020	$36.84	$7.85	$14.88	$0.00	$59.57
	06/01/2021	$37.76	$7.85	$14.88	$0.00	$60.49
	12/01/2021	$38.67	$7.85	$14.88	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2*	06/01/2019	$34.70	$7.85	$14.88	$0.00	$57.43
	12/01/2019	$35.56	$7.85	$14.88	$0.00	$58.29
	06/01/2020	$36.45	$7.85	$14.88	$0.00	$59.18
	12/01/2020	$37.34	$7.85	$14.88	$0.00	$60.07
	06/01/2021	$38.26	$7.85	$14.88	$0.00	$60.99
	12/01/2021	$39.17	$7.85	$14.88	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER"						
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2019	$44.71	$7.07	$17.72	$0.00	$69.50
	01/01/2020	$46.10	$7.07	$17.98	$0.00	$71.15

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$29.06	$7.07	$11.52	$0.00	$47.65
2	65	$29.06	$7.07	$11.52	$0.00	$47.65
3	70	$31.30	$7.07	$12.40	$0.00	$50.77
4	75	$33.53	$7.07	$13.30	$0.00	$53.90
5	80	$35.77	$7.07	$14.18	$0.00	$57.02
6	85	$38.00	$7.07	$15.07	$0.00	$60.14
7	90	$40.24	$7.07	$15.95	$0.00	$63.26
8	95	$42.47	$7.07	$16.84	$0.00	$66.38

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$29.97	$7.07	$11.69	$0.00	$48.73
2	65	$29.97	$7.07	$11.69	$0.00	$48.73
3	70	$32.27	$7.07	$12.59	$0.00	$51.93
4	75	$34.58	$7.07	$13.49	$0.00	$55.14
5	80	$36.88	$7.07	$14.38	$0.00	$58.33
6	85	$39.19	$7.07	$15.29	$0.00	$61.55
7	90	$41.49	$7.07	$16.18	$0.00	$64.74
8	95	$43.80	$7.07	$17.09	$0.00	$67.96

Notes:

Apprentice to Journeyworker Ratio:1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (LOWELL)*	08/01/2019	$52.26	$10.75	$20.70	$0.00	$83.71
	02/01/2020	$52.86	$10.75	$20.70	$0.00	$84.31
	08/01/2020	$54.21	$10.75	$20.85	$0.00	$85.81
	02/01/2021	$54.81	$10.75	$20.85	$0.00	$86.41
	08/01/2021	$56.21	$10.75	$21.01	$0.00	$87.97
	02/01/2022	$56.79	$10.75	$21.01	$0.00	$88.55

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 Lowell*

Effective Date - 08/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.13	$10.75	$20.70	$0.00	$57.58
2	60	$31.36	$10.75	$20.70	$0.00	$62.81
3	70	$36.58	$10.75	$20.70	$0.00	$68.03
4	80	$41.81	$10.75	$20.70	$0.00	$73.26
5	90	$47.03	$10.75	$20.70	$0.00	$78.48

Effective Date - 02/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.43	$10.75	$20.70	$0.00	$57.88
2	60	$31.72	$10.75	$20.70	$0.00	$63.17
3	70	$37.00	$10.75	$20.70	$0.00	$68.45
4	80	$42.29	$10.75	$20.70	$0.00	$73.74
5	90	$47.57	$10.75	$20.70	$0.00	$79.02

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$47.69	$12.00	$15.60	$0.00	$75.29
	12/01/2019	$48.83	$12.00	$15.60	$0.00	$76.43
	06/01/2020	$49.91	$12.00	$15.60	$0.00	$77.51
	12/01/2020	$51.05	$12.00	$15.60	$0.00	$78.65
	06/01/2021	$52.14	$12.00	$15.60	$0.00	$79.74
	12/01/2021	$53.28	$12.00	$15.60	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2019	$40.25	$7.85	$16.05	$0.00	$64.15
	12/01/2019	$41.25	$7.85	$16.05	$0.00	$65.15
	06/01/2020	$42.24	$7.85	$16.05	$0.00	$66.14
	12/01/2020	$43.22	$7.85	$16.05	$0.00	$67.12
	06/01/2021	$44.24	$7.85	$16.05	$0.00	$68.14
	12/01/2021	$45.25	$7.85	$16.05	$0.00	$69.15
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2019	$39.10	$7.85	$16.05	$0.00	$63.00
	12/01/2019	$40.10	$7.85	$16.05	$0.00	$64.00
	06/01/2020	$41.09	$7.85	$16.05	$0.00	$64.99
	12/01/2020	$42.07	$7.85	$16.05	$0.00	$65.97
	06/01/2021	$43.09	$7.85	$16.05	$0.00	$66.99
	12/01/2021	$44.10	$7.85	$16.05	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	06/01/2019	$39.10	$7.85	$16.05	$0.00	$63.00
	12/01/2019	$40.10	$7.85	$16.05	$0.00	$64.00
	06/01/2020	$41.09	$7.85	$16.05	$0.00	$64.99
	12/01/2020	$42.07	$7.85	$16.05	$0.00	$65.97
	06/01/2021	$43.09	$7.85	$16.05	$0.00	$66.99
	12/01/2021	$44.10	$7.85	$16.05	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 2*	06/01/2019	$34.20	$7.85	$14.88	$0.00	$56.93
	12/01/2019	$35.06	$7.85	$14.88	$0.00	$57.79
	06/01/2020	$35.95	$7.85	$14.88	$0.00	$58.68
	12/01/2020	$36.84	$7.85	$14.88	$0.00	$59.57
	06/01/2021	$37.76	$7.85	$14.88	$0.00	$60.49
	12/01/2021	$38.67	$7.85	$14.88	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 2 (Eastern Massachusetts)*	09/01/2019	$41.90	$9.40	$18.95	$0.00	$70.25
	03/01/2020	$42.50	$9.40	$18.95	$0.00	$70.85
	09/01/2020	$43.15	$9.40	$18.95	$0.00	$71.50
	03/01/2021	$43.75	$9.40	$18.95	$0.00	$72.10
	09/01/2021	$44.40	$9.40	$18.95	$0.00	$72.75
	03/01/2022	$45.00	$9.40	$18.95	$0.00	$73.35
	09/01/2022	$45.65	$9.40	$18.95	$0.00	$74.00
	03/01/2023	$46.25	$9.40	$18.95	$0.00	$74.60

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 09/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.95	$9.40	$1.73	$0.00	$32.08
2	60	$25.14	$9.40	$1.73	$0.00	$36.27
3	70	$29.33	$9.40	$13.76	$0.00	$52.49
4	75	$31.43	$9.40	$13.76	$0.00	$54.59
5	80	$33.52	$9.40	$15.49	$0.00	$58.41
6	80	$33.52	$9.40	$15.49	$0.00	$58.41
7	90	$37.71	$9.40	$17.22	$0.00	$64.33
8	90	$37.71	$9.40	$17.22	$0.00	$64.33

Effective Date - 03/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.25	$9.40	$1.73	$0.00	$32.38
2	60	$25.50	$9.40	$1.73	$0.00	$36.63
3	70	$29.75	$9.40	$13.76	$0.00	$52.91
4	75	$31.88	$9.40	$13.76	$0.00	$55.04
5	80	$34.00	$9.40	$15.49	$0.00	$58.89
6	80	$34.00	$9.40	$15.49	$0.00	$58.89
7	90	$38.25	$9.40	$17.22	$0.00	$64.87
8	90	$38.25	$9.40	$17.22	$0.00	$64.87

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $29.99/ 3&4 $35.85/ 5&6 $54.22/ 7&8 $60.14

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME *CARPENTERS -ZONE 2 (Wood Frame)*	10/01/2019	$27.95	$7.07	$7.86	$0.00	$42.88

All Aspects of New Wood Frame Work

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER (Wood Frame) - Zone 2*

Effective Date - 10/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$16.77	$7.07	$0.00	$0.00	$23.84
2	60	$16.77	$7.07	$0.00	$0.00	$23.84
3	65	$18.17	$7.07	$7.86	$0.00	$33.10
4	70	$19.57	$7.07	$7.86	$0.00	$34.50
5	75	$20.96	$7.07	$7.86	$0.00	$35.89
6	80	$22.36	$7.07	$7.86	$0.00	$37.29
7	85	$23.76	$7.07	$7.86	$0.00	$38.69
8	90	$25.16	$7.07	$7.86	$0.00	$40.09

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $19.65/ 3&4 $27.19/ 5&6 $34.50/ 7&8 $37.29

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (LOWELL)*	07/01/2019	$43.99	$12.75	$22.41	$0.62	$79.77
	01/01/2020	$45.23	$12.75	$22.41	$0.62	$81.01

Apprentice - *CEMENT MASONRY/PLASTERING - Lowell*

Effective Date - 07/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.00	$12.75	$15.41	$0.00	$50.16
2	60	$26.39	$12.75	$17.41	$0.62	$57.17
3	65	$28.59	$12.75	$18.41	$0.62	$60.37
4	70	$30.79	$12.75	$19.41	$0.62	$63.57
5	75	$32.99	$12.75	$20.41	$0.62	$66.77
6	80	$35.19	$12.75	$21.41	$0.62	$69.97
7	90	$39.59	$12.75	$22.41	$0.62	$75.37

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.62	$12.75	$15.41	$0.00	$50.78
2	60	$27.14	$12.75	$17.41	$0.62	$57.92
3	65	$29.40	$12.75	$18.41	$0.62	$61.18
4	70	$31.66	$12.75	$19.41	$0.62	$64.44
5	75	$33.92	$12.75	$20.41	$0.62	$67.70
6	80	$36.18	$12.75	$21.41	$0.62	$70.96
7	90	$40.71	$12.75	$22.41	$0.62	$76.49

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR *LABORERS - ZONE 2*	06/01/2019	$34.20	$7.85	$14.88	$0.00	$56.93
	12/01/2019	$35.06	$7.85	$14.88	$0.00	$57.79
	06/01/2020	$35.95	$7.85	$14.88	$0.00	$58.68
	12/01/2020	$36.84	$7.85	$14.88	$0.00	$59.57
	06/01/2021	$37.76	$7.85	$14.88	$0.00	$60.49
	12/01/2021	$38.67	$7.85	$14.88	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$49.18	$12.00	$15.60	$0.00	$76.78
	12/01/2019	$50.33	$12.00	$15.60	$0.00	$77.93
	06/01/2020	$51.43	$12.00	$15.60	$0.00	$79.03
	12/01/2020	$52.58	$12.00	$15.60	$0.00	$80.18
	06/01/2021	$53.68	$12.00	$15.60	$0.00	$81.28
	12/01/2021	$54.83	$12.00	$15.60	$0.00	$82.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$32.28	$12.00	$15.60	$0.00	$59.88
	12/01/2019	$33.07	$12.00	$15.60	$0.00	$60.67
	06/01/2020	$33.82	$12.00	$15.60	$0.00	$61.42
	12/01/2020	$34.60	$12.00	$15.60	$0.00	$62.20
	06/01/2021	$35.35	$12.00	$15.60	$0.00	$62.95
	12/01/2021	$36.14	$12.00	$15.60	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2019	$50.66	$8.20	$21.45	$0.00	$80.31
	01/01/2020	$50.96	$8.20	$22.10	$0.00	$81.26
	07/01/2020	$52.06	$8.20	$22.10	$0.00	$82.36
	01/01/2021	$53.16	$8.20	$22.10	$0.00	$83.46

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 07/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.33	$8.20	$0.00	$0.00	$33.53
2	55	$27.86	$8.20	$5.78	$0.00	$41.84
3	60	$30.40	$8.20	$6.30	$0.00	$44.90
4	65	$32.93	$8.20	$6.83	$0.00	$47.96
5	70	$35.46	$8.20	$18.30	$0.00	$61.96
6	75	$38.00	$8.20	$18.83	$0.00	$65.03
7	80	$40.53	$8.20	$19.35	$0.00	$68.08
8	90	$45.59	$8.20	$20.40	$0.00	$74.19

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.48	$8.20	$0.00	$0.00	$33.68
2	55	$28.03	$8.20	$5.94	$0.00	$42.17
3	60	$30.58	$8.20	$6.48	$0.00	$45.26
4	65	$33.12	$8.20	$7.02	$0.00	$48.34
5	70	$35.67	$8.20	$18.51	$0.00	$62.38
6	75	$38.22	$8.20	$19.05	$0.00	$65.47
7	80	$40.77	$8.20	$19.59	$0.00	$68.56
8	90	$45.86	$8.20	$20.67	$0.00	$74.73

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	06/01/2019	$39.30	$7.85	$15.85	$0.00	$63.00
	12/01/2019	$40.30	$7.85	$15.85	$0.00	$64.00
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	06/01/2019	$40.30	$7.85	$15.85	$0.00	$64.00
	12/01/2019	$41.30	$7.85	$15.85	$0.00	$65.00
DEMO: BURNERS *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	06/01/2019	$40.05	$7.85	$15.85	$0.00	$63.75
	12/01/2019	$41.05	$7.85	$15.85	$0.00	$64.75
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	06/01/2019	$40.30	$7.85	$15.85	$0.00	$64.00
	12/01/2019	$41.30	$7.85	$15.85	$0.00	$65.00
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	06/01/2019	$40.05	$7.85	$15.85	$0.00	$63.75
	12/01/2019	$41.05	$7.85	$15.85	$0.00	$64.75
DEMO: WRECKING LABORER *LABORERS - ZONE 2* For apprentice rates see "Apprentice- LABORER"	06/01/2019	$39.30	$7.85	$15.85	$0.00	$63.00
	12/01/2019	$40.30	$7.85	$15.85	$0.00	$64.00

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$47.69	$12.00	$15.60	$0.00	$75.29
	12/01/2019	$48.83	$12.00	$15.60	$0.00	$76.43
	06/01/2020	$49.91	$12.00	$15.60	$0.00	$77.51
	12/01/2020	$51.05	$12.00	$15.60	$0.00	$78.65
	06/01/2021	$52.14	$12.00	$15.60	$0.00	$79.74
	12/01/2021	$53.28	$12.00	$15.60	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2019	$68.52	$9.90	$21.15	$0.00	$99.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2019	$48.94	$9.90	$21.15	$0.00	$79.99
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2019	$73.41	$9.90	$21.15	$0.00	$104.46
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2019	$102.78	$9.90	$21.15	$0.00	$133.83
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) *ELECTRICIANS LOCAL 103*	03/01/2019	$51.10	$13.00	$18.88	$0.00	$82.98
For apprentice rates see "Apprentice- ELECTRICIAN"						
ELECTRICIAN *ELECTRICIANS LOCAL 103*	03/01/2019	$51.10	$13.00	$18.88	$0.00	$82.98

Apprentice - *ELECTRICIAN - Local 103*

Effective Date - 03/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$20.44	$13.00	$0.61	$0.00	$34.05
2	40	$20.44	$13.00	$0.61	$0.00	$34.05
3	45	$23.00	$13.00	$14.34	$0.00	$50.34
4	45	$23.00	$13.00	$14.34	$0.00	$50.34
5	50	$25.55	$13.00	$14.76	$0.00	$53.31
6	55	$28.11	$13.00	$15.17	$0.00	$56.28
7	60	$30.66	$13.00	$15.58	$0.00	$59.24
8	65	$33.22	$13.00	$16.00	$0.00	$62.22
9	70	$35.77	$13.00	$16.40	$0.00	$65.17
10	75	$38.33	$13.00	$16.82	$0.00	$68.15

Notes: :

App Prior 1/1/03; 30/35/40/45/50/55/65/70/75/80

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2019	$59.47	$15.58	$17.51	$0.00	$92.56
	01/01/2020	$61.42	$15.73	$18.41	$0.00	$95.56
	01/01/2021	$63.47	$15.88	$19.31	$0.00	$98.66
	01/01/2022	$65.62	$16.03	$20.21	$0.00	$101.86

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELEVATOR CONSTRUCTOR - Local 4*

Effective Date - 01/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$29.74	$15.58	$0.00	$0.00	$45.32
2	55	$32.71	$15.58	$17.51	$0.00	$65.80
3	65	$38.66	$15.58	$17.51	$0.00	$71.75
4	70	$41.63	$15.58	$17.51	$0.00	$74.72
5	80	$47.58	$15.58	$17.51	$0.00	$80.67

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$30.71	$15.73	$0.00	$0.00	$46.44
2	55	$33.78	$15.73	$18.41	$0.00	$67.92
3	65	$39.92	$15.73	$18.41	$0.00	$74.06
4	70	$42.99	$15.73	$18.41	$0.00	$77.13
5	80	$49.14	$15.73	$18.41	$0.00	$83.28

Notes:
Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 4*	01/01/2019	$41.63	$15.58	$17.51	$0.00	$74.72
	01/01/2020	$42.99	$15.73	$18.41	$0.00	$77.13
	01/01/2021	$44.43	$15.88	$19.31	$0.00	$79.62
	01/01/2022	$45.93	$16.03	$20.21	$0.00	$82.17
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & GUARD RAIL ERECTOR *LABORERS - ZONE 2*	06/01/2019	$34.20	$7.85	$14.88	$0.00	$56.93
	12/01/2019	$35.06	$7.85	$14.88	$0.00	$57.79
	06/01/2020	$35.95	$7.85	$14.88	$0.00	$58.68
	12/01/2020	$36.84	$7.85	$14.88	$0.00	$59.57
	06/01/2021	$37.76	$7.85	$14.88	$0.00	$60.49
	12/01/2021	$38.67	$7.85	$14.88	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER"						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2019	$44.18	$12.00	$15.60	$0.00	$71.78
	05/01/2020	$45.33	$12.00	$15.60	$0.00	$72.93
	11/01/2020	$46.33	$12.00	$15.60	$0.00	$73.93
	05/01/2021	$47.48	$12.00	$15.60	$0.00	$75.08
	11/01/2021	$48.48	$12.00	$15.60	$0.00	$76.08
	05/01/2022	$49.63	$12.00	$15.60	$0.00	$77.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2019	$45.68	$12.00	$15.60	$0.00	$73.28
	05/01/2020	$46.83	$12.00	$15.60	$0.00	$74.43
	11/01/2020	$47.84	$12.00	$15.60	$0.00	$75.44
	05/01/2021	$49.00	$12.00	$15.60	$0.00	$76.60
	11/01/2021	$50.01	$12.00	$15.60	$0.00	$77.61
	05/01/2022	$51.17	$12.00	$15.60	$0.00	$78.77
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2019	$22.57	$12.00	$15.60	$0.00	$50.17
	05/01/2020	$23.24	$12.00	$15.60	$0.00	$50.84
	11/01/2020	$23.83	$12.00	$15.60	$0.00	$51.43
	05/01/2021	$24.51	$12.00	$15.60	$0.00	$52.11
	11/01/2021	$25.11	$12.00	$15.60	$0.00	$52.71
	05/01/2022	$25.78	$12.00	$15.60	$0.00	$53.38
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 103*	03/01/2019	$51.10	$13.00	$18.88	$0.00	$82.98
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING*ELECTRICIANS LOCAL 103*	03/01/2019	$38.33	$13.00	$16.82	$0.00	$68.15
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$39.54	$12.00	$15.60	$0.00	$67.14
	12/01/2019	$40.49	$12.00	$15.60	$0.00	$68.09
	06/01/2020	$41.40	$12.00	$15.60	$0.00	$69.00
	12/01/2020	$42.35	$12.00	$15.60	$0.00	$69.95
	06/01/2021	$43.26	$12.00	$15.60	$0.00	$70.86
	12/01/2021	$44.21	$12.00	$15.60	$0.00	$71.81
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER *LABORERS - ZONE 2*	06/01/2019	$22.50	$7.85	$14.88	$0.00	$45.23
	12/01/2019	$23.50	$7.85	$14.88	$0.00	$46.23
	06/01/2020	$23.50	$7.85	$14.88	$0.00	$46.23
	12/01/2020	$24.50	$7.85	$14.88	$0.00	$47.23
	06/01/2021	$24.50	$7.85	$14.88	$0.00	$47.23
	12/01/2021	$24.50	$7.85	$14.88	$0.00	$47.23
For apprentice rates see "Apprentice- LABORER"						
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE I*	09/01/2019	$46.25	$9.40	$19.25	$0.00	$74.90
	03/01/2020	$47.05	$9.40	$19.25	$0.00	$75.70
	09/01/2020	$47.85	$9.40	$19.25	$0.00	$76.50
	03/01/2021	$48.65	$9.40	$19.25	$0.00	$77.30
	09/01/2021	$49.45	$9.40	$19.25	$0.00	$78.10
	03/01/2022	$50.25	$9.40	$19.25	$0.00	$78.90

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *FLOORCOVERER - Local 2168 Zone I*

Effective Date - 09/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.13	$9.40	$1.79	$0.00	$34.32
2	55	$25.44	$9.40	$1.79	$0.00	$36.63
3	60	$27.75	$9.40	$13.88	$0.00	$51.03
4	65	$30.06	$9.40	$13.88	$0.00	$53.34
5	70	$32.38	$9.40	$15.67	$0.00	$57.45
6	75	$34.69	$9.40	$15.67	$0.00	$59.76
7	80	$37.00	$9.40	$17.46	$0.00	$63.86
8	85	$39.31	$9.40	$17.46	$0.00	$66.17

Effective Date - 03/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.53	$9.40	$1.79	$0.00	$34.72
2	55	$25.88	$9.40	$1.79	$0.00	$37.07
3	60	$28.23	$9.40	$13.88	$0.00	$51.51
4	65	$30.58	$9.40	$13.88	$0.00	$53.86
5	70	$32.94	$9.40	$15.67	$0.00	$58.01
6	75	$35.29	$9.40	$15.67	$0.00	$60.36
7	80	$37.64	$9.40	$17.46	$0.00	$64.50
8	85	$39.99	$9.40	$17.46	$0.00	$66.85

Notes: Steps are 750 hrs.
% After 09/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 $32.00/ 3&4 $38.36/ 5&6 $57.45/ 7&8 $63.86

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$48.18	$12.00	$15.60	$0.00	$75.78
	12/01/2019	$49.33	$12.00	$15.60	$0.00	$76.93
	06/01/2020	$50.43	$12.00	$15.60	$0.00	$78.03
	12/01/2020	$51.58	$12.00	$15.60	$0.00	$79.18
	06/01/2021	$52.68	$12.00	$15.60	$0.00	$80.28
	12/01/2021	$53.83	$12.00	$15.60	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$32.28	$12.00	$15.60	$0.00	$59.88
	12/01/2019	$33.07	$12.00	$15.60	$0.00	$60.67
	06/01/2020	$33.82	$12.00	$15.60	$0.00	$61.42
	12/01/2020	$34.60	$12.00	$15.60	$0.00	$62.20
	06/01/2021	$35.35	$12.00	$15.60	$0.00	$62.95
	12/01/2021	$36.14	$12.00	$15.60	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 35 (ZONE 2)*	07/01/2019	$40.16	$8.20	$21.45	$0.00	$69.81
	01/01/2020	$40.46	$8.20	$22.10	$0.00	$70.76
	07/01/2020	$41.56	$8.20	$22.10	$0.00	$71.86
	01/01/2021	$42.66	$8.20	$22.10	$0.00	$72.96

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *GLAZIER - Local 35 Zone 2*

Effective Date - 07/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.08	$8.20	$0.00	$0.00	$28.28
2	55	$22.09	$8.20	$5.78	$0.00	$36.07
3	60	$24.10	$8.20	$6.30	$0.00	$38.60
4	65	$26.10	$8.20	$6.83	$0.00	$41.13
5	70	$28.11	$8.20	$18.30	$0.00	$54.61
6	75	$30.12	$8.20	$18.83	$0.00	$57.15
7	80	$32.13	$8.20	$19.35	$0.00	$59.68
8	90	$36.14	$8.20	$20.40	$0.00	$64.74

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.23	$8.20	$0.00	$0.00	$28.43
2	55	$22.25	$8.20	$5.94	$0.00	$36.39
3	60	$24.28	$8.20	$6.48	$0.00	$38.96
4	65	$26.30	$8.20	$7.02	$0.00	$41.52
5	70	$28.32	$8.20	$18.51	$0.00	$55.03
6	75	$30.35	$8.20	$19.05	$0.00	$57.60
7	80	$32.37	$8.20	$19.59	$0.00	$60.16
8	90	$36.41	$8.20	$20.67	$0.00	$65.28

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$48.18	$12.00	$15.60	$0.00	$75.78
	12/01/2019	$49.33	$12.00	$15.60	$0.00	$76.93
	06/01/2020	$50.43	$12.00	$15.60	$0.00	$78.03
	12/01/2020	$51.58	$12.00	$15.60	$0.00	$79.18
	06/01/2021	$52.68	$12.00	$15.60	$0.00	$80.28
	12/01/2021	$53.83	$12.00	$15.60	$0.00	$81.43

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *OPERATING ENGINEERS - Local 4*

Effective Date - 06/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$26.50	$12.00	$0.00	$0.00	$38.50
2	60	$28.91	$12.00	$15.60	$0.00	$56.51
3	65	$31.32	$12.00	$15.60	$0.00	$58.92
4	70	$33.73	$12.00	$15.60	$0.00	$61.33
5	75	$36.14	$12.00	$15.60	$0.00	$63.74
6	80	$38.54	$12.00	$15.60	$0.00	$66.14
7	85	$40.95	$12.00	$15.60	$0.00	$68.55
8	90	$43.36	$12.00	$15.60	$0.00	$70.96

Effective Date - 12/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$27.13	$12.00	$0.00	$0.00	$39.13
2	60	$29.60	$12.00	$15.60	$0.00	$57.20
3	65	$32.06	$12.00	$15.60	$0.00	$59.66
4	70	$34.53	$12.00	$15.60	$0.00	$62.13
5	75	$37.00	$12.00	$15.60	$0.00	$64.60
6	80	$39.46	$12.00	$15.60	$0.00	$67.06
7	85	$41.93	$12.00	$15.60	$0.00	$69.53
8	90	$44.40	$12.00	$15.60	$0.00	$72.00

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 17 - A*	08/01/2019	$48.10	$13.20	$24.12	$2.56	$87.98
	02/01/2020	$49.75	$13.20	$24.12	$2.61	$89.68
	08/01/2020	$51.35	$13.20	$24.12	$2.66	$91.33
	02/01/2021	$53.00	$13.20	$24.12	$2.71	$93.03
	08/01/2021	$54.75	$13.20	$24.12	$2.76	$94.83
	02/01/2022	$56.50	$13.20	$24.12	$2.81	$96.63
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 103*	03/01/2019	$51.10	$13.00	$18.88	$0.00	$82.98
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 17 - A*	08/01/2019	$48.10	$13.20	$24.12	$2.56	$87.98
	02/01/2020	$49.75	$13.20	$24.12	$2.61	$89.68
	08/01/2020	$51.35	$13.20	$24.12	$2.66	$91.33
	02/01/2021	$53.00	$13.20	$24.12	$2.71	$93.03
	08/01/2021	$54.75	$13.20	$24.12	$2.76	$94.83
	02/01/2022	$56.50	$13.20	$24.12	$2.81	$96.63
For apprentice rates see "Apprentice- SHEET METAL WORKER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (TESTING AND BALANCING -WATER) *PIPEFITTERS LOCAL 537*	09/01/2019	$54.69	$10.95	$19.74	$0.00	$85.38
	03/01/2020	$56.19	$10.95	$19.74	$0.00	$86.88
	09/01/2020	$57.69	$10.95	$19.74	$0.00	$88.38
	03/01/2021	$59.19	$10.95	$19.74	$0.00	$89.88
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PIPEFITTERS LOCAL 537*	09/01/2019	$54.69	$10.95	$19.74	$0.00	$85.38
	03/01/2020	$56.19	$10.95	$19.74	$0.00	$86.88
	09/01/2020	$57.69	$10.95	$19.74	$0.00	$88.38
	03/01/2021	$59.19	$10.95	$19.74	$0.00	$89.88
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS *LABORERS - ZONE 2*	06/01/2019	$34.70	$7.85	$14.88	$0.00	$57.43
	12/01/2019	$35.56	$7.85	$14.88	$0.00	$58.29
	06/01/2020	$36.45	$7.85	$14.88	$0.00	$59.18
	12/01/2020	$37.34	$7.85	$14.88	$0.00	$60.07
	06/01/2021	$38.26	$7.85	$14.88	$0.00	$60.99
	12/01/2021	$39.17	$7.85	$14.88	$0.00	$61.90
For apprentice rates see "Apprentice- LABORER"						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (BOSTON)*	09/01/2019	$48.44	$12.80	$16.40	$0.00	$77.64

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Boston*

Effective Date - 09/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.22	$12.80	$11.90	$0.00	$48.92
2	60	$29.06	$12.80	$12.80	$0.00	$54.66
3	70	$33.91	$12.80	$13.70	$0.00	$60.41
4	80	$38.75	$12.80	$14.60	$0.00	$66.15

Notes:
Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER *IRONWORKERS LOCAL 7 (BOSTON AREA)*	03/16/2019	$46.66	$8.00	$23.50	$0.00	$78.16

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *IRONWORKER - Local 7 Boston*

Effective Date - 03/16/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$28.00	$8.00	$23.50	$0.00	$59.50
2	70	$32.66	$8.00	$23.50	$0.00	$64.16
3	75	$35.00	$8.00	$23.50	$0.00	$66.50
4	80	$37.33	$8.00	$23.50	$0.00	$68.83
5	85	$39.66	$8.00	$23.50	$0.00	$71.16
6	90	$41.99	$8.00	$23.50	$0.00	$73.49

Notes:

** Structural 1:6; Ornamental 1:4

Apprentice to Journeyworker Ratio:**

JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 2*	06/01/2019	$34.20	$7.85	$14.88	$0.00	$56.93
	12/01/2019	$35.06	$7.85	$14.88	$0.00	$57.79
	06/01/2020	$35.95	$7.85	$14.88	$0.00	$58.68
	12/01/2020	$36.84	$7.85	$14.88	$0.00	$59.57
	06/01/2021	$37.76	$7.85	$14.88	$0.00	$60.49
	12/01/2021	$38.67	$7.85	$14.88	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER"						
LABORER *LABORERS - ZONE 2*	06/01/2019	$33.95	$7.85	$14.88	$0.00	$56.68
	12/01/2019	$34.81	$7.85	$14.88	$0.00	$57.54
	06/01/2020	$35.70	$7.85	$14.88	$0.00	$58.43
	12/01/2020	$36.59	$7.85	$14.88	$0.00	$59.32
	06/01/2021	$37.51	$7.85	$14.88	$0.00	$60.24
	12/01/2021	$38.42	$7.85	$14.88	$0.00	$61.15

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LABORER - Zone 2*

Effective Date - 06/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$20.37	$7.85	$14.88	$0.00	$43.10
2	70	$23.77	$7.85	$14.88	$0.00	$46.50
3	80	$27.16	$7.85	$14.88	$0.00	$49.89
4	90	$30.56	$7.85	$14.88	$0.00	$53.29

Effective Date - 12/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$20.89	$7.85	$14.88	$0.00	$43.62
2	70	$24.37	$7.85	$14.88	$0.00	$47.10
3	80	$27.85	$7.85	$14.88	$0.00	$50.58
4	90	$31.33	$7.85	$14.88	$0.00	$54.06

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	06/01/2019	$33.95	$7.85	$14.88	$0.00	$56.68
	12/01/2019	$34.81	$7.85	$14.88	$0.00	$57.54
	06/01/2020	$35.70	$7.85	$14.88	$0.00	$58.43
	12/01/2020	$36.59	$7.85	$14.88	$0.00	$59.32
	06/01/2021	$37.51	$7.85	$14.88	$0.00	$60.24
	12/01/2021	$38.42	$7.85	$14.88	$0.00	$61.15
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	06/01/2019	$33.95	$7.85	$14.88	$0.00	$56.68
	12/01/2019	$34.81	$7.85	$14.88	$0.00	$57.54
	06/01/2020	$35.70	$7.85	$14.88	$0.00	$58.43
	12/01/2020	$36.59	$7.85	$14.88	$0.00	$59.32
	06/01/2021	$37.51	$7.85	$14.88	$0.00	$60.24
	12/01/2021	$38.42	$7.85	$14.88	$0.00	$61.15
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	06/01/2019	$34.15	$7.85	$14.83	$0.00	$56.83
	12/01/2019	$35.01	$7.85	$14.83	$0.00	$57.69
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	06/01/2019	$34.20	$7.85	$14.88	$0.00	$56.93
	12/01/2019	$35.06	$7.85	$14.88	$0.00	$57.79
	06/01/2020	$35.95	$7.85	$14.88	$0.00	$58.68
	12/01/2020	$36.84	$7.85	$14.88	$0.00	$59.57
	06/01/2021	$37.76	$7.85	$14.88	$0.00	$60.49
	12/01/2021	$38.67	$7.85	$14.88	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	06/01/2019	$33.95	$7.85	$14.88	$0.00	$56.68
	12/01/2019	$34.81	$7.85	$14.88	$0.00	$57.54
	06/01/2020	$35.70	$7.85	$14.88	$0.00	$58.43
	12/01/2020	$36.59	$7.85	$14.88	$0.00	$59.32
	06/01/2021	$37.51	$7.85	$14.88	$0.00	$60.24
	12/01/2021	$38.42	$7.85	$14.88	$0.00	$61.15
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 2*	06/01/2019	$33.95	$7.85	$14.88	$0.00	$56.68
	12/01/2019	$34.81	$7.85	$14.88	$0.00	$57.54
	06/01/2020	$35.70	$7.85	$14.88	$0.00	$58.43
	12/01/2020	$36.59	$7.85	$14.88	$0.00	$59.32
	06/01/2021	$37.51	$7.85	$14.88	$0.00	$60.24
	12/01/2021	$38.42	$7.85	$14.88	$0.00	$61.15
This classification applies to all tree work associated with the removal of standing trees, and trimming and removal of branches and limbs when the work is not done for a utility company for the purpose of operation, maintenance or repair of utility company equipment. For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR *LABORERS - ZONE 2*	06/01/2019	$34.20	$7.85	$14.88	$0.00	$56.93
	12/01/2019	$35.06	$7.85	$14.88	$0.00	$57.79
	06/01/2020	$35.95	$7.85	$14.88	$0.00	$58.68
	12/01/2020	$36.84	$7.85	$14.88	$0.00	$59.57
	06/01/2021	$37.76	$7.85	$14.88	$0.00	$60.49
	12/01/2021	$38.67	$7.85	$14.88	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER"						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2019	$41.49	$10.75	$19.61	$0.00	$71.85
	02/01/2020	$42.00	$10.75	$19.61	$0.00	$72.36
	08/01/2020	$43.08	$10.75	$19.76	$0.00	$73.59
	02/01/2021	$43.59	$10.75	$19.76	$0.00	$74.10
	08/01/2021	$44.71	$10.75	$19.92	$0.00	$75.38
	02/01/2022	$45.18	$10.75	$19.92	$0.00	$75.85

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MARBLE & TILE FINISHER - Local 3 Marble & Tile*

Effective Date - 08/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.75	$10.75	$19.61	$0.00	$51.11
2	60	$24.89	$10.75	$19.61	$0.00	$55.25
3	70	$29.04	$10.75	$19.61	$0.00	$59.40
4	80	$33.19	$10.75	$19.61	$0.00	$63.55
5	90	$37.34	$10.75	$19.61	$0.00	$67.70

Effective Date - 02/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.00	$10.75	$19.61	$0.00	$51.36
2	60	$25.20	$10.75	$19.61	$0.00	$55.56
3	70	$29.40	$10.75	$19.61	$0.00	$59.76
4	80	$33.60	$10.75	$19.61	$0.00	$63.96
5	90	$37.80	$10.75	$19.61	$0.00	$68.16

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2019	$54.42	$10.75	$21.30	$0.00	$86.47
	02/01/2020	$55.05	$10.75	$21.30	$0.00	$87.10
	08/01/2020	$56.40	$10.75	$21.45	$0.00	$88.60
	02/01/2021	$57.04	$10.75	$21.45	$0.00	$89.24
	08/01/2021	$58.44	$10.75	$21.61	$0.00	$90.80
	02/01/2022	$59.01	$10.75	$21.61	$0.00	$91.37

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 08/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.21	$10.75	$21.30	$0.00	$59.26
2	60	$32.65	$10.75	$21.30	$0.00	$64.70
3	70	$38.09	$10.75	$21.30	$0.00	$70.14
4	80	$43.54	$10.75	$21.30	$0.00	$75.59
5	90	$48.98	$10.75	$21.30	$0.00	$81.03

Effective Date - 02/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$27.53	$10.75	$21.30	$0.00	$59.58
2	60	$33.03	$10.75	$21.30	$0.00	$65.08
3	70	$38.54	$10.75	$21.30	$0.00	$70.59
4	80	$44.04	$10.75	$21.30	$0.00	$76.09
5	90	$49.55	$10.75	$21.30	$0.00	$81.60

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$47.69	$12.00	$15.60	$0.00	$75.29
	12/01/2019	$48.83	$12.00	$15.60	$0.00	$76.43
	06/01/2020	$49.91	$12.00	$15.60	$0.00	$77.51
	12/01/2020	$51.05	$12.00	$15.60	$0.00	$78.65
	06/01/2021	$52.14	$12.00	$15.60	$0.00	$79.74
	12/01/2021	$53.28	$12.00	$15.60	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$47.69	$12.00	$15.60	$0.00	$75.29
	12/01/2019	$48.83	$12.00	$15.60	$0.00	$76.43
	06/01/2020	$49.91	$12.00	$15.60	$0.00	$77.51
	12/01/2020	$51.05	$12.00	$15.60	$0.00	$78.65
	06/01/2021	$52.14	$12.00	$15.60	$0.00	$79.74
	12/01/2021	$53.28	$12.00	$15.60	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 2) *MILLWRIGHTS LOCAL 1121 - Zone 2*	04/01/2019	$38.87	$9.90	$18.50	$0.00	$67.27

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MILLWRIGHT - Local 1121 Zone 2*

Effective Date - 04/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$21.38	$9.90	$5.31	$0.00	$36.59
2	65	$25.27	$9.90	$15.13	$0.00	$50.30
3	75	$29.15	$9.90	$16.10	$0.00	$55.15
4	85	$33.04	$9.90	$17.06	$0.00	$60.00

Notes:

Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:5

MORTAR MIXER *LABORERS - ZONE 2*	06/01/2019	$34.20	$7.85	$14.88	$0.00	$56.93
	12/01/2019	$35.06	$7.85	$14.88	$0.00	$57.79
	06/01/2020	$35.95	$7.85	$14.88	$0.00	$58.68
	12/01/2020	$36.84	$7.85	$14.88	$0.00	$59.57
	06/01/2021	$37.76	$7.85	$14.88	$0.00	$60.49
	12/01/2021	$38.67	$7.85	$14.88	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$23.11	$12.00	$15.60	$0.00	$50.71
	12/01/2019	$23.68	$12.00	$15.60	$0.00	$51.28
	06/01/2020	$24.23	$12.00	$15.60	$0.00	$51.83
	12/01/2020	$24.80	$12.00	$15.60	$0.00	$52.40
	06/01/2021	$25.35	$12.00	$15.60	$0.00	$52.95
	12/01/2021	$25.93	$12.00	$15.60	$0.00	$53.53
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$27.57	$12.00	$15.60	$0.00	$55.17
	12/01/2019	$28.24	$12.00	$15.60	$0.00	$55.84
	06/01/2020	$28.89	$12.00	$15.60	$0.00	$56.49
	12/01/2020	$29.57	$12.00	$15.60	$0.00	$57.17
	06/01/2021	$30.21	$12.00	$15.60	$0.00	$57.81
	12/01/2021	$30.89	$12.00	$15.60	$0.00	$58.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$47.69	$12.00	$15.60	$0.00	$75.29
	12/01/2019	$48.83	$12.00	$15.60	$0.00	$76.43
	06/01/2020	$49.91	$12.00	$15.60	$0.00	$77.51
	12/01/2020	$51.05	$12.00	$15.60	$0.00	$78.65
	06/01/2021	$52.14	$12.00	$15.60	$0.00	$79.74
	12/01/2021	$53.28	$12.00	$15.60	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2019	$50.66	$8.20	$21.45	$0.00	$80.31
	01/01/2020	$50.96	$8.20	$22.10	$0.00	$81.26
	07/01/2020	$52.06	$8.20	$22.10	$0.00	$82.36
	01/01/2021	$53.16	$8.20	$22.10	$0.00	$83.46

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 07/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.33	$8.20	$0.00	$0.00	$33.53
2	55	$27.86	$8.20	$5.78	$0.00	$41.84
3	60	$30.40	$8.20	$6.30	$0.00	$44.90
4	65	$32.93	$8.20	$6.83	$0.00	$47.96
5	70	$35.46	$8.20	$18.30	$0.00	$61.96
6	75	$38.00	$8.20	$18.83	$0.00	$65.03
7	80	$40.53	$8.20	$19.35	$0.00	$68.08
8	90	$45.59	$8.20	$20.40	$0.00	$74.19

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.48	$8.20	$0.00	$0.00	$33.68
2	55	$28.03	$8.20	$5.94	$0.00	$42.17
3	60	$30.58	$8.20	$6.48	$0.00	$45.26
4	65	$33.12	$8.20	$7.02	$0.00	$48.34
5	70	$35.67	$8.20	$18.51	$0.00	$62.38
6	75	$38.22	$8.20	$19.05	$0.00	$65.47
7	80	$40.77	$8.20	$19.59	$0.00	$68.56
8	90	$45.86	$8.20	$20.67	$0.00	$74.73

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SIGN, PICTORIAL & DISPLAY) *PAINTERS LOCAL 35 - ZONE 2*	06/01/2013	$25.81	$7.07	$7.05	$0.00	$39.93

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER SIGN - Local 35 Zone 2*

Effective Date - 06/01/2013

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$12.91	$7.07	$0.00	$0.00	$19.98
2	55	$14.20	$7.07	$2.45	$0.00	$23.72
3	60	$15.49	$7.07	$2.45	$0.00	$25.01
4	65	$16.78	$7.07	$2.45	$0.00	$26.30
5	70	$18.07	$7.07	$7.05	$0.00	$32.19
6	75	$19.36	$7.07	$7.05	$0.00	$33.48
7	80	$20.65	$7.07	$7.05	$0.00	$34.77
8	85	$21.94	$7.07	$7.05	$0.00	$36.06
9	90	$23.23	$7.07	$7.05	$0.00	$37.35

Notes:
Steps are 4 mos.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	07/01/2019	$41.56	$8.20	$21.45	$0.00	$71.21
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2020	$41.86	$8.20	$22.10	$0.00	$72.16
	07/01/2020	$42.96	$8.20	$22.10	$0.00	$73.26
	01/01/2021	$44.06	$8.20	$22.10	$0.00	$74.36

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - New*

Effective Date - 07/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.78	$8.20	$0.00	$0.00	$28.98
2	55	$22.86	$8.20	$5.78	$0.00	$36.84
3	60	$24.94	$8.20	$6.30	$0.00	$39.44
4	65	$27.01	$8.20	$6.83	$0.00	$42.04
5	70	$29.09	$8.20	$18.30	$0.00	$55.59
6	75	$31.17	$8.20	$18.83	$0.00	$58.20
7	80	$33.25	$8.20	$19.35	$0.00	$60.80
8	90	$37.40	$8.20	$20.40	$0.00	$66.00

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.93	$8.20	$0.00	$0.00	$29.13
2	55	$23.02	$8.20	$5.94	$0.00	$37.16
3	60	$25.12	$8.20	$6.48	$0.00	$39.80
4	65	$27.21	$8.20	$7.02	$0.00	$42.43
5	70	$29.30	$8.20	$18.51	$0.00	$56.01
6	75	$31.40	$8.20	$19.05	$0.00	$58.65
7	80	$33.49	$8.20	$19.59	$0.00	$61.28
8	90	$37.67	$8.20	$20.67	$0.00	$66.54

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2019	$39.62	$8.20	$21.45	$0.00	$69.27
	01/01/2020	$39.92	$8.20	$22.10	$0.00	$70.22
	07/01/2020	$41.02	$8.20	$22.10	$0.00	$71.32
	01/01/2021	$42.12	$8.20	$22.10	$0.00	$72.42

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint*

Effective Date - 07/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.81	$8.20	$0.00	$0.00	$28.01
2	55	$21.79	$8.20	$5.78	$0.00	$35.77
3	60	$23.77	$8.20	$6.30	$0.00	$38.27
4	65	$25.75	$8.20	$6.83	$0.00	$40.78
5	70	$27.73	$8.20	$18.30	$0.00	$54.23
6	75	$29.72	$8.20	$18.83	$0.00	$56.75
7	80	$31.70	$8.20	$19.35	$0.00	$59.25
8	90	$35.66	$8.20	$20.40	$0.00	$64.26

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.96	$8.20	$0.00	$0.00	$28.16
2	55	$21.96	$8.20	$5.94	$0.00	$36.10
3	60	$23.95	$8.20	$6.48	$0.00	$38.63
4	65	$25.95	$8.20	$7.02	$0.00	$41.17
5	70	$27.94	$8.20	$18.51	$0.00	$54.65
6	75	$29.94	$8.20	$19.05	$0.00	$57.19
7	80	$31.94	$8.20	$19.59	$0.00	$59.73
8	90	$35.93	$8.20	$20.67	$0.00	$64.80

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (TRAFFIC MARKINGS) *LABORERS - ZONE 2*	06/01/2019	$33.95	$7.85	$14.88	$0.00	$56.68
	12/01/2019	$34.81	$7.85	$14.88	$0.00	$57.54
	06/01/2020	$35.70	$7.85	$14.88	$0.00	$58.43
	12/01/2020	$36.59	$7.85	$14.88	$0.00	$59.32
	06/01/2021	$37.51	$7.85	$14.88	$0.00	$60.24
	12/01/2021	$38.42	$7.85	$14.88	$0.00	$61.15
For Apprentice rates see "Apprentice- LABORER"						
PAINTER / TAPER (BRUSH, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	07/01/2019	$40.16	$8.20	$21.45	$0.00	$69.81
	01/01/2020	$40.46	$8.20	$22.10	$0.00	$70.76
	07/01/2020	$41.56	$8.20	$22.10	$0.00	$71.86
	01/01/2021	$42.66	$8.20	$22.10	$0.00	$72.96

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER - Local 35 Zone 2 - BRUSH NEW*

Effective Date - 07/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.08	$8.20	$0.00	$0.00	$28.28
2	55	$22.09	$8.20	$5.78	$0.00	$36.07
3	60	$24.10	$8.20	$6.30	$0.00	$38.60
4	65	$26.10	$8.20	$6.83	$0.00	$41.13
5	70	$28.11	$8.20	$18.30	$0.00	$54.61
6	75	$30.12	$8.20	$18.83	$0.00	$57.15
7	80	$32.13	$8.20	$19.35	$0.00	$59.68
8	90	$36.14	$8.20	$20.40	$0.00	$64.74

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.23	$8.20	$0.00	$0.00	$28.43
2	55	$22.25	$8.20	$5.94	$0.00	$36.39
3	60	$24.28	$8.20	$6.48	$0.00	$38.96
4	65	$26.30	$8.20	$7.02	$0.00	$41.52
5	70	$28.32	$8.20	$18.51	$0.00	$55.03
6	75	$30.35	$8.20	$19.05	$0.00	$57.60
7	80	$32.37	$8.20	$19.59	$0.00	$60.16
8	90	$36.41	$8.20	$20.67	$0.00	$65.28

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	07/01/2019	$38.22	$8.20	$21.45	$0.00	$67.87
	01/01/2020	$38.52	$8.20	$22.10	$0.00	$68.82
	07/01/2020	$39.62	$8.20	$22.10	$0.00	$69.92
	01/01/2021	$40.72	$8.20	$22.10	$0.00	$71.02

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - BRUSH REPAINT*

Effective Date - 07/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.11	$8.20	$0.00	$0.00	$27.31
2	55	$21.02	$8.20	$5.78	$0.00	$35.00
3	60	$22.93	$8.20	$6.30	$0.00	$37.43
4	65	$24.84	$8.20	$6.83	$0.00	$39.87
5	70	$26.75	$8.20	$18.30	$0.00	$53.25
6	75	$28.67	$8.20	$18.83	$0.00	$55.70
7	80	$30.58	$8.20	$19.35	$0.00	$58.13
8	90	$34.40	$8.20	$20.40	$0.00	$63.00

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.26	$8.20	$0.00	$0.00	$27.46
2	55	$21.19	$8.20	$5.94	$0.00	$35.33
3	60	$23.11	$8.20	$6.48	$0.00	$37.79
4	65	$25.04	$8.20	$7.02	$0.00	$40.26
5	70	$26.96	$8.20	$18.51	$0.00	$53.67
6	75	$28.89	$8.20	$19.05	$0.00	$56.14
7	80	$30.82	$8.20	$19.59	$0.00	$58.61
8	90	$34.67	$8.20	$20.67	$0.00	$63.54

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2019	$34.08	$12.41	$12.70	$0.00	$59.19
	12/01/2019	$34.08	$12.41	$13.72	$0.00	$60.21
	06/01/2020	$34.98	$12.41	$13.72	$0.00	$61.11
	08/01/2020	$34.98	$12.91	$13.72	$0.00	$61.61
	12/01/2020	$34.98	$12.91	$14.82	$0.00	$62.71
	06/01/2021	$35.78	$12.91	$14.82	$0.00	$63.51
	08/01/2021	$35.78	$13.41	$14.82	$0.00	$64.01
	12/01/2021	$35.78	$13.41	$16.01	$0.00	$65.20
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 1)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2019	$48.94	$9.90	$21.15	$0.00	$79.99
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 1)*	08/01/2019	$48.94	$9.90	$21.15	$0.00	$79.99

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PILE DRIVER - Local 56 Zone 1*

Effective Date - 08/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.47	$9.90	$21.15	$0.00	$55.52
2	60	$29.36	$9.90	$21.15	$0.00	$60.41
3	70	$34.26	$9.90	$21.15	$0.00	$65.31
4	75	$36.71	$9.90	$21.15	$0.00	$67.76
5	80	$39.15	$9.90	$21.15	$0.00	$70.20
6	80	$39.15	$9.90	$21.15	$0.00	$70.20
7	90	$44.05	$9.90	$21.15	$0.00	$75.10
8	90	$44.05	$9.90	$21.15	$0.00	$75.10

Notes:

Apprentice to Journeyworker Ratio:1:5

PIPEFITTER & STEAMFITTER *PIPEFITTERS LOCAL 537*	09/01/2019	$54.69	$10.95	$19.74	$0.00	$85.38
	03/01/2020	$56.19	$10.95	$19.74	$0.00	$86.88
	09/01/2020	$57.69	$10.95	$19.74	$0.00	$88.38
	03/01/2021	$59.19	$10.95	$19.74	$0.00	$89.88

Apprentice - *PIPEFITTER - Local 537*

Effective Date - 09/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$21.88	$10.95	$8.00	$0.00	$40.83
2	45	$24.61	$10.95	$19.74	$0.00	$55.30
3	60	$32.81	$10.95	$19.74	$0.00	$63.50
4	70	$38.28	$10.95	$19.74	$0.00	$68.97
5	80	$43.75	$10.95	$19.74	$0.00	$74.44

Effective Date - 03/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$22.48	$10.95	$8.00	$0.00	$41.43
2	45	$25.29	$10.95	$19.74	$0.00	$55.98
3	60	$33.71	$10.95	$19.74	$0.00	$64.40
4	70	$39.33	$10.95	$19.74	$0.00	$70.02
5	80	$44.95	$10.95	$19.74	$0.00	$75.64

Notes:

** 1:3; 3:15; 1:10 thereafter / Steps are 1 yr.

Refrig/AC Mechanic **1:1;1:2;2:4;3:6;4:8;5:10;6:12;7:14;8:17;9:20;10:23(Max)

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIPELAYER *LABORERS - ZONE 2*	06/01/2019	$34.20	$7.85	$14.88	$0.00	$56.93
	12/01/2019	$35.06	$7.85	$14.88	$0.00	$57.79
	06/01/2020	$35.95	$7.85	$14.88	$0.00	$58.68
	12/01/2020	$36.84	$7.85	$14.88	$0.00	$59.57
	06/01/2021	$37.76	$7.85	$14.88	$0.00	$60.49
	12/01/2021	$38.67	$7.85	$14.88	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER"						
PLUMBERS & GASFITTERS *PLUMBERS & GASFITTERS LOCAL 12*	09/01/2019	$57.69	$11.82	$17.01	$0.00	$86.52
	03/01/2020	$59.19	$11.82	$17.01	$0.00	$88.02
	09/01/2020	$60.69	$11.82	$17.01	$0.00	$89.52
	03/01/2021	$62.19	$11.82	$17.01	$0.00	$91.02

Apprentice - *PLUMBER/GASFITTER - Local 12*

Effective Date - 09/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$20.19	$11.82	$6.16	$0.00	$38.17
2	40	$23.08	$11.82	$6.99	$0.00	$41.89
3	55	$31.73	$11.82	$9.53	$0.00	$53.08
4	65	$37.50	$11.82	$11.18	$0.00	$60.50
5	75	$43.27	$11.82	$12.88	$0.00	$67.97

Effective Date - 03/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$20.72	$11.82	$6.16	$0.00	$38.70
2	40	$23.68	$11.82	$6.99	$0.00	$42.49
3	55	$32.55	$11.82	$9.53	$0.00	$53.90
4	65	$38.47	$11.82	$11.18	$0.00	$61.47
5	75	$44.39	$11.82	$12.88	$0.00	$69.09

Notes:

** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr
Step4 with lic$64.20, Step5 with lic$71.67

Apprentice to Journeyworker Ratio:**

PNEUMATIC CONTROLS (TEMP.) *PIPEFITTERS LOCAL 537*	09/01/2019	$54.69	$10.95	$19.74	$0.00	$85.38
	03/01/2020	$56.19	$10.95	$19.74	$0.00	$86.88
	09/01/2020	$57.69	$10.95	$19.74	$0.00	$88.38
	03/01/2021	$59.17	$10.95	$19.74	$0.00	$89.86
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	06/01/2019	$34.20	$7.85	$14.88	$0.00	$56.93
	12/01/2019	$35.06	$7.85	$14.88	$0.00	$57.79
	06/01/2020	$35.95	$7.85	$14.88	$0.00	$58.68
	12/01/2020	$36.84	$7.85	$14.88	$0.00	$59.57
	06/01/2021	$37.76	$7.85	$14.88	$0.00	$60.49
	12/01/2021	$38.67	$7.85	$14.88	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER *LABORERS - ZONE 2*	06/01/2019	$34.95	$7.85	$14.88	$0.00	$57.68
	12/01/2019	$35.81	$7.85	$14.88	$0.00	$58.54
	06/01/2020	$36.70	$7.85	$14.88	$0.00	$59.43
	12/01/2020	$37.59	$7.85	$14.88	$0.00	$60.32
	06/01/2021	$38.51	$7.85	$14.88	$0.00	$61.24
	12/01/2021	$39.42	$7.85	$14.88	$0.00	$62.15
For apprentice rates see "Apprentice- LABORER"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$48.18	$12.00	$15.60	$0.00	$75.78
	12/01/2019	$49.33	$12.00	$15.60	$0.00	$76.93
	06/01/2020	$50.43	$12.00	$15.60	$0.00	$78.03
	12/01/2020	$51.58	$12.00	$15.60	$0.00	$79.18
	06/01/2021	$52.68	$12.00	$15.60	$0.00	$80.28
	12/01/2021	$53.83	$12.00	$15.60	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$48.18	$12.00	$15.60	$0.00	$75.78
	12/01/2019	$49.33	$12.00	$15.60	$0.00	$76.93
	06/01/2020	$50.43	$12.00	$15.60	$0.00	$78.03
	12/01/2020	$51.58	$12.00	$15.60	$0.00	$79.18
	06/01/2021	$52.68	$12.00	$15.60	$0.00	$80.28
	12/01/2021	$53.83	$12.00	$15.60	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$32.28	$12.00	$15.60	$0.00	$59.88
	12/01/2019	$33.07	$12.00	$15.60	$0.00	$60.67
	06/01/2020	$33.82	$12.00	$15.60	$0.00	$61.42
	12/01/2020	$34.60	$12.00	$15.60	$0.00	$62.20
	06/01/2021	$35.35	$12.00	$15.60	$0.00	$62.95
	12/01/2021	$36.14	$12.00	$15.60	$0.00	$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER *TEAMSTERS 170 - Dauphinais (Bellingham)*	01/01/2019	$23.75	$10.56	$2.50	$0.00	$36.81
	12/01/2019	$24.00	$10.56	$2.50	$0.00	$37.06
	01/01/2020	$24.00	$11.01	$2.50	$0.00	$37.51
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$47.69	$12.00	$15.60	$0.00	$75.29
	12/01/2019	$48.83	$12.00	$15.60	$0.00	$76.43
	06/01/2020	$49.91	$12.00	$15.60	$0.00	$77.51
	12/01/2020	$51.05	$12.00	$15.60	$0.00	$78.65
	06/01/2021	$52.14	$12.00	$15.60	$0.00	$79.74
	12/01/2021	$53.28	$12.00	$15.60	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	06/01/2019	$34.20	$7.85	$14.88	$0.00	$56.93
	12/01/2019	$35.06	$7.85	$14.88	$0.00	$57.79
	06/01/2020	$35.95	$7.85	$14.88	$0.00	$58.68
	12/01/2020	$36.84	$7.85	$14.88	$0.00	$59.57
	06/01/2021	$37.76	$7.85	$14.88	$0.00	$60.49
	12/01/2021	$38.67	$7.85	$14.88	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$47.69	$12.00	$15.60	$0.00	$75.29
	12/01/2019	$48.83	$12.00	$15.60	$0.00	$76.43
	06/01/2020	$49.91	$12.00	$15.60	$0.00	$77.51
	12/01/2020	$51.05	$12.00	$15.60	$0.00	$78.65
	06/01/2021	$52.14	$12.00	$15.60	$0.00	$79.74
	12/01/2021	$53.28	$12.00	$15.60	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	08/01/2019	$44.64	$11.50	$15.90	$0.00	$72.04
	02/01/2020	$45.92	$11.50	$15.90	$0.00	$73.32
	08/01/2020	$47.35	$11.50	$15.90	$0.00	$74.75
	02/01/2021	$48.78	$11.50	$15.90	$0.00	$76.18
	08/01/2021	$50.21	$11.50	$15.90	$0.00	$77.61
	02/01/2022	$51.64	$11.50	$15.90	$0.00	$79.04

Apprentice - *ROOFER - Local 33*

Effective Date - 08/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.32	$11.50	$3.69	$0.00	$37.51
2	60	$26.78	$11.50	$15.90	$0.00	$54.18
3	65	$29.02	$11.50	$15.90	$0.00	$56.42
4	75	$33.48	$11.50	$15.90	$0.00	$60.88
5	85	$37.94	$11.50	$15.90	$0.00	$65.34

Effective Date - 02/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.96	$11.50	$3.69	$0.00	$38.15
2	60	$27.55	$11.50	$15.90	$0.00	$54.95
3	65	$29.85	$11.50	$15.90	$0.00	$57.25
4	75	$34.44	$11.50	$15.90	$0.00	$61.84
5	85	$39.03	$11.50	$15.90	$0.00	$66.43

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
(Hot Pitch Mechanics' receive $1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	08/01/2019	$44.89	$11.50	$15.90	$0.00	$72.29
	02/01/2020	$46.17	$11.50	$15.90	$0.00	$73.57
	08/01/2020	$47.60	$11.50	$15.90	$0.00	$75.00
	02/01/2021	$49.03	$11.50	$15.90	$0.00	$76.43
	08/01/2021	$50.46	$11.50	$15.90	$0.00	$77.86
	02/01/2022	$51.89	$11.50	$15.90	$0.00	$79.29
For apprentice rates see "Apprentice- ROOFER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 17 - A*	08/01/2019	$48.10	$13.20	$24.12	$2.56	$87.98
	02/01/2020	$49.75	$13.20	$24.12	$2.61	$89.68
	08/01/2020	$51.35	$13.20	$24.12	$2.66	$91.33
	02/01/2021	$53.00	$13.20	$24.12	$2.71	$93.03
	08/01/2021	$54.75	$13.20	$24.12	$2.76	$94.83
	02/01/2022	$56.50	$13.20	$24.12	$2.81	$96.63

Apprentice - *SHEET METAL WORKER - Local 17-A*

Effective Date - 08/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	$20.20	$13.20	$5.89	$0.00	$39.29
2	42	$20.20	$13.20	$5.89	$0.00	$39.29
3	47	$22.61	$13.20	$11.13	$1.41	$48.35
4	47	$22.61	$13.20	$11.13	$1.41	$48.35
5	52	$25.01	$13.20	$12.08	$1.51	$51.80
6	52	$25.01	$13.20	$12.33	$1.52	$52.06
7	60	$28.86	$13.20	$13.70	$1.67	$57.43
8	65	$31.27	$13.20	$14.65	$1.77	$60.89
9	75	$36.08	$13.20	$16.56	$1.98	$67.82
10	85	$40.89	$13.20	$17.96	$2.16	$74.21

Effective Date - 02/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	$20.90	$13.20	$5.89	$0.00	$39.99
2	42	$20.90	$13.20	$5.89	$0.00	$39.99
3	47	$23.38	$13.20	$11.13	$1.43	$49.14
4	47	$23.38	$13.20	$11.13	$1.43	$49.14
5	52	$25.87	$13.20	$12.08	$1.53	$52.68
6	52	$25.87	$13.20	$12.33	$1.54	$52.94
7	60	$29.85	$13.20	$13.70	$1.70	$58.45
8	65	$32.34	$13.20	$14.65	$1.82	$62.01
9	75	$37.31	$13.20	$16.56	$2.01	$69.08
10	85	$42.29	$13.20	$17.96	$2.20	$75.65

Notes:

Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2019	$34.54	$12.41	$12.70	$0.00	$59.65
	12/01/2019	$34.54	$12.41	$13.72	$0.00	$60.67
	06/01/2020	$35.44	$12.41	$13.72	$0.00	$61.57
	08/01/2020	$35.44	$12.91	$13.72	$0.00	$62.07
	12/01/2020	$35.44	$12.91	$14.82	$0.00	$63.17
	06/01/2021	$36.24	$12.91	$14.82	$0.00	$63.97
	08/01/2021	$36.24	$13.41	$14.82	$0.00	$64.47
	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2019	$34.83	$12.41	$12.70	$0.00	$59.94
	12/01/2019	$34.83	$12.41	$13.72	$0.00	$60.96
	06/01/2020	$35.73	$12.41	$13.72	$0.00	$61.86
	08/01/2020	$35.73	$12.91	$13.72	$0.00	$62.36
	12/01/2020	$35.73	$12.91	$14.82	$0.00	$63.46
	06/01/2021	$36.53	$12.91	$14.82	$0.00	$64.26
	08/01/2021	$36.53	$13.41	$14.82	$0.00	$64.76
	12/01/2021	$36.53	$13.41	$16.01	$0.00	$65.95
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1*	10/01/2019	$60.48	$9.47	$19.60	$0.00	$89.55
	01/01/2020	$60.07	$9.68	$19.80	$0.00	$89.55
	03/01/2020	$61.98	$9.47	$19.60	$0.00	$91.05
	10/01/2020	$63.48	$9.47	$19.60	$0.00	$92.55
	03/01/2021	$64.98	$9.47	$19.60	$0.00	$94.05

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SPRINKLER FITTER - Local 550 (Section A) Zone 1*

Effective Date - 10/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$21.17	$9.47	$11.15	$0.00	$41.79
2	40	$24.19	$9.47	$11.80	$0.00	$45.46
3	45	$27.22	$9.47	$12.45	$0.00	$49.14
4	50	$30.24	$9.47	$13.10	$0.00	$52.81
5	55	$33.26	$9.47	$13.75	$0.00	$56.48
6	60	$36.29	$9.47	$14.40	$0.00	$60.16
7	65	$39.31	$9.47	$15.05	$0.00	$63.83
8	70	$42.34	$9.47	$15.70	$0.00	$67.51
9	75	$45.36	$9.47	$16.35	$0.00	$71.18
10	80	$48.38	$9.47	$17.00	$0.00	$74.85

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	$21.02	$9.68	$11.35	$0.00	$42.05
2	40	$24.03	$9.68	$12.00	$0.00	$45.71
3	45	$27.03	$9.68	$12.65	$0.00	$49.36
4	50	$30.04	$9.68	$13.30	$0.00	$53.02
5	55	$33.04	$9.68	$13.95	$0.00	$56.67
6	60	$36.04	$9.68	$14.60	$0.00	$60.32
7	65	$39.05	$9.68	$15.25	$0.00	$63.98
8	70	$42.05	$9.68	$15.90	$0.00	$67.63
9	75	$45.05	$9.68	$16.55	$0.00	$71.28
10	80	$48.06	$9.68	$17.20	$0.00	$74.94

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$47.69	$12.00	$15.60	$0.00	$75.29
	12/01/2019	$48.83	$12.00	$15.60	$0.00	$76.43
	06/01/2020	$49.91	$12.00	$15.60	$0.00	$77.51
	12/01/2020	$51.05	$12.00	$15.60	$0.00	$78.65
	06/01/2021	$52.14	$12.00	$15.60	$0.00	$79.74
	12/01/2021	$53.28	$12.00	$15.60	$0.00	$80.88

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$47.69	$12.00	$15.60	$0.00	$75.29
	12/01/2019	$48.83	$12.00	$15.60	$0.00	$76.43
	06/01/2020	$49.91	$12.00	$15.60	$0.00	$77.51
	12/01/2020	$51.05	$12.00	$15.60	$0.00	$78.65
	06/01/2021	$52.14	$12.00	$15.60	$0.00	$79.74
	12/01/2021	$53.28	$12.00	$15.60	$0.00	$80.88

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 103*	03/01/2019	$38.33	$13.00	$16.82	$0.00	$68.15

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 103*

Effective Date - 03/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$15.33	$13.00	$0.46	$0.00	$28.79
2	40	$15.33	$13.00	$0.46	$0.00	$28.79
3	45	$17.25	$13.00	$13.42	$0.00	$43.67
4	45	$17.25	$13.00	$13.42	$0.00	$43.67
5	50	$19.17	$13.00	$13.73	$0.00	$45.90
6	55	$21.08	$13.00	$14.03	$0.00	$48.11
7	60	$23.00	$13.00	$14.34	$0.00	$50.34
8	65	$24.91	$13.00	$14.66	$0.00	$52.57
9	70	$26.83	$13.00	$14.96	$0.00	$54.79
10	75	$28.75	$13.00	$15.27	$0.00	$57.02

Notes:

Apprentice to Journeyworker Ratio:1:1

TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	08/01/2019	$53.34	$10.75	$21.30	$0.00	$85.39
	02/01/2020	$53.98	$10.75	$21.30	$0.00	$86.03
	08/01/2020	$55.33	$10.75	$21.45	$0.00	$87.53
	02/01/2021	$55.97	$10.75	$21.45	$0.00	$88.17
	08/01/2021	$57.37	$10.75	$21.61	$0.00	$89.73
	02/01/2022	$57.96	$10.75	$21.61	$0.00	$90.32

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*

Effective Date - 08/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.67	$10.75	$21.30	$0.00	$58.72
2	60	$32.00	$10.75	$21.30	$0.00	$64.05
3	70	$37.34	$10.75	$21.30	$0.00	$69.39
4	80	$42.67	$10.75	$21.30	$0.00	$74.72
5	90	$48.01	$10.75	$21.30	$0.00	$80.06

Effective Date - 02/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.99	$10.75	$21.30	$0.00	$59.04
2	60	$32.39	$10.75	$21.30	$0.00	$64.44
3	70	$37.79	$10.75	$21.30	$0.00	$69.84
4	80	$43.18	$10.75	$21.30	$0.00	$75.23
5	90	$48.58	$10.75	$21.30	$0.00	$80.63

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE*	06/01/2019	$40.50	$7.85	$16.05	$0.00	$64.40
	12/01/2019	$41.50	$7.85	$16.05	$0.00	$65.40
	06/01/2020	$42.49	$7.85	$16.05	$0.00	$66.39
	12/01/2020	$43.47	$7.85	$16.05	$0.00	$67.37
	06/01/2021	$44.49	$7.85	$16.05	$0.00	$68.39
	12/01/2021	$45.50	$7.85	$16.05	$0.00	$69.40
For apprentice rates see "Apprentice- LABORER"						
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE*	06/01/2019	$39.22	$7.85	$16.05	$0.00	$63.12
	12/01/2019	$40.22	$7.85	$16.05	$0.00	$64.12
	06/01/2020	$41.21	$7.85	$16.05	$0.00	$65.11
	12/01/2020	$42.19	$7.85	$16.05	$0.00	$66.09
	06/01/2021	$43.21	$7.85	$16.05	$0.00	$67.11
	12/01/2021	$44.22	$7.85	$16.05	$0.00	$68.12
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE*	06/01/2019	$39.10	$7.85	$16.05	$0.00	$63.00
	12/01/2019	$40.10	$7.85	$16.05	$0.00	$64.00
	06/01/2020	$41.09	$7.85	$16.05	$0.00	$64.99
	12/01/2020	$42.07	$7.85	$16.05	$0.00	$65.97
	06/01/2021	$43.09	$7.85	$16.05	$0.00	$66.99
	12/01/2021	$44.10	$7.85	$16.05	$0.00	$68.00
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4*	06/01/2019	$47.69	$12.00	$15.60	$0.00	$75.29
	12/01/2019	$48.83	$12.00	$15.60	$0.00	$76.43
	06/01/2020	$49.91	$12.00	$15.60	$0.00	$77.51
	12/01/2020	$51.05	$12.00	$15.60	$0.00	$78.65
	06/01/2021	$52.14	$12.00	$15.60	$0.00	$79.74
	12/01/2021	$53.28	$12.00	$15.60	$0.00	$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	08/01/2019	$35.12	$12.41	$12.70	$0.00	$60.23
	12/01/2019	$35.12	$12.41	$13.72	$0.00	$61.25
	06/01/2020	$36.02	$12.41	$13.72	$0.00	$62.15
	08/01/2020	$36.02	$12.91	$13.72	$0.00	$62.65
	12/01/2020	$36.02	$12.91	$14.82	$0.00	$63.75
	06/01/2021	$36.82	$12.91	$14.82	$0.00	$64.55
	08/01/2021	$36.82	$13.41	$14.82	$0.00	$65.05
	12/01/2021	$36.82	$13.41	$16.01	$0.00	$66.24
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)*	06/01/2019	$51.38	$7.85	$16.45	$0.00	$75.68
	12/01/2019	$52.38	$7.85	$16.45	$0.00	$76.68
	06/01/2020	$53.37	$7.85	$16.45	$0.00	$77.67
	12/01/2020	$54.35	$7.85	$16.45	$0.00	$78.65
	06/01/2021	$55.37	$7.85	$16.45	$0.00	$79.67
	12/01/2021	$56.38	$7.85	$16.45	$0.00	$80.68
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)*	06/01/2019	$53.38	$7.85	$16.45	$0.00	$77.68
	12/01/2019	$54.38	$7.85	$16.45	$0.00	$78.68
	06/01/2020	$55.37	$7.85	$16.45	$0.00	$79.67
	12/01/2020	$56.35	$7.85	$16.45	$0.00	$80.65
	06/01/2021	$57.37	$7.85	$16.45	$0.00	$81.67
	12/01/2021	$58.38	$7.85	$16.45	$0.00	$82.68
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)*	06/01/2019	$43.45	$7.85	$16.45	$0.00	$67.75
	12/01/2019	$44.45	$7.85	$16.45	$0.00	$68.75
	06/01/2020	$45.44	$7.85	$16.45	$0.00	$69.74
	12/01/2020	$46.42	$7.85	$16.45	$0.00	$70.72
	06/01/2021	$47.44	$7.85	$16.45	$0.00	$71.74
	12/01/2021	$48.45	$7.85	$16.45	$0.00	$72.75
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	06/01/2019	$45.45	$7.85	$16.45	$0.00	$69.75
	12/01/2019	$46.45	$7.85	$16.45	$0.00	$70.75
	06/01/2020	$47.44	$7.85	$16.45	$0.00	$71.74
	12/01/2020	$48.42	$7.85	$16.45	$0.00	$72.72
	06/01/2021	$49.44	$7.85	$16.45	$0.00	$73.74
	12/01/2021	$50.45	$7.85	$16.45	$0.00	$74.75
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
VAC-HAUL	08/01/2019	$34.54	$12.41	$12.70	$0.00	$59.65
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/01/2019	$34.54	$12.41	$13.72	$0.00	$60.67
	06/01/2020	$35.44	$12.41	$13.72	$0.00	$61.57
	08/01/2020	$35.44	$12.91	$13.72	$0.00	$62.07
	12/01/2020	$35.44	$12.91	$14.82	$0.00	$63.17
	06/01/2021	$36.24	$12.91	$14.82	$0.00	$63.97
	08/01/2021	$36.24	$13.41	$14.82	$0.00	$64.47
	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
WAGON DRILL OPERATOR	06/01/2019	$34.20	$7.85	$14.88	$0.00	$56.93
LABORERS - ZONE 2	12/01/2019	$35.06	$7.85	$14.88	$0.00	$57.79
	06/01/2020	$35.95	$7.85	$14.88	$0.00	$58.68
	12/01/2020	$36.84	$7.85	$14.88	$0.00	$59.57
	06/01/2021	$37.76	$7.85	$14.88	$0.00	$60.49
	12/01/2021	$38.67	$7.85	$14.88	$0.00	$61.40
For apprentice rates see "Apprentice- LABORER"						
WASTE WATER PUMP OPERATOR	06/01/2019	$48.18	$12.00	$15.60	$0.00	$75.78
OPERATING ENGINEERS LOCAL 4	12/01/2019	$49.33	$12.00	$15.60	$0.00	$76.93
	06/01/2020	$50.43	$12.00	$15.60	$0.00	$78.03
	12/01/2020	$51.58	$12.00	$15.60	$0.00	$79.18
	06/01/2021	$52.68	$12.00	$15.60	$0.00	$80.28
	12/01/2021	$53.83	$12.00	$15.60	$0.00	$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER	09/01/2019	$57.69	$11.82	$17.01	$0.00	$86.52
PLUMBERS & GASFITTERS LOCAL 12	03/01/2020	$59.19	$11.82	$17.01	$0.00	$88.02
	09/01/2020	$60.69	$11.82	$17.01	$0.00	$89.52
	03/01/2021	$62.19	$11.82	$17.01	$0.00	$91.02
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone)	09/01/2019	$28.83	$8.75	$1.86	$0.00	$39.44
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	08/30/2020	$29.67	$9.25	$1.89	$0.00	$40.81
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables)	09/01/2019	$40.84	$8.75	$10.02	$0.00	$59.61
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	08/30/2020	$42.03	$9.25	$10.27	$0.00	$61.55
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL	09/01/2019	$33.64	$8.75	$9.86	$0.00	$52.25
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	08/30/2020	$34.62	$9.25	$10.07	$0.00	$53.94
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs)	09/01/2019	$26.43	$8.75	$1.79	$0.00	$36.97
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class A CDL)	09/01/2019	$40.84	$8.75	$14.10	$0.00	$63.69
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	08/30/2020	$42.03	$9.25	$14.35	$0.00	$65.63
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class B CDL)	09/01/2019	$36.04	$8.75	$10.65	$0.00	$55.44
OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104	08/30/2020	$37.09	$9.25	$10.87	$0.00	$57.21
For apprentice rates see "Apprentice- LINEMAN"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	09/01/2019	$21.62	$8.75	$1.65	$0.00	$32.02
	08/30/2020	$22.25	$9.25	$1.67	$0.00	$33.17
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN -Inexperienced (<2000 Hrs.) *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	09/01/2019	$26.43	$8.75	$1.79	$0.00	$36.97
	08/30/2020	$27.20	$9.25	$1.82	$0.00	$38.27
For apprentice rates see "Apprentice- LINEMAN"						
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	09/01/2019	$48.05	$8.75	$17.19	$0.00	$73.99
	08/30/2020	$49.45	$9.25	$17.48	$0.00	$76.18

Apprentice - *LINEMAN (Outside Electrical) - East Local 104*

Effective Date - 09/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$28.83	$8.75	$3.36	$0.00	$40.94
2	65	$31.23	$8.75	$3.44	$0.00	$43.42
3	70	$33.64	$8.75	$3.51	$0.00	$45.90
4	75	$36.04	$8.75	$5.08	$0.00	$49.87
5	80	$38.44	$8.75	$5.15	$0.00	$52.34
6	85	$40.84	$8.75	$5.23	$0.00	$54.82
7	90	$43.25	$8.75	$7.30	$0.00	$59.30

Effective Date - 08/30/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$29.67	$9.25	$3.39	$0.00	$42.31
2	65	$32.14	$9.25	$3.46	$0.00	$44.85
3	70	$34.62	$9.25	$3.54	$0.00	$47.41
4	75	$37.09	$9.25	$5.11	$0.00	$51.45
5	80	$39.56	$9.25	$5.19	$0.00	$54.00
6	85	$42.03	$9.25	$5.26	$0.00	$56.54
7	90	$44.51	$9.25	$7.34	$0.00	$61.10

Notes:

Apprentice to Journeyworker Ratio:1:2

TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$30.73	$4.70	$3.17	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77
TREE TRIMMER *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	01/31/2016	$18.51	$3.55	$0.00	$0.00	$22.06

This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is not on the ground. This classification does not apply to wholesale tree removal.

TREE TRIMMER GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104*	01/31/2016	$16.32	$3.55	$0.00	$0.00	$19.87

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is on the ground. This classification does not apply to wholesale tree removal.

Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

Document 00 73 74

STATUTORY REQUIREMENTS
DECISION OF THE FRAMINGHAM PLANNING BOARD

1.1 SUMMARY

A. Comply with the Conditions of Approval issued by the Framingham Planning Board regarding the Site Plan Review, Special Permit, and Variance Applications.

B. A copy of the Decision of the *FRAMINGHAM PLANNING BOARD ON THE APPLICATION OF FRAMINGHAM PUBLIC SCHOOLS FOR LIMITED SITE PLAN REVIEW OF THE PROPERTY LOCATED AT 31 FLAGG DRIVE, DECISION DATED MAY 2, 2019* is bound herewith, and follows this page.

End of Document

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FRAMINGHAM
MASSACHUSETTS

FRAMINGHAM PLANNING BOARD
150 CONCORD STREET, FRAMINGHAM, MA 01702

PERMIT | FRAMINGHAM
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MEMBERS OF THE PLANNING BOARD: CHRISTINE LONG, CHAIR - LEWIS COLTEN, VICE CHAIR - VICTOR ORTIZ, CLERK - SHANNON FITZPATRICK - JOSEPH NORTON

DECISION OF THE FRAMINGHAM PLANNING BOARD
ON THE APPLICATION OF FRAMINGHAM PUBLIC SCHOOLS
FOR LIMITED SITE PLAN REVIEW OF THE PROPERTY LOCATED AT 31 FLAGG DRIVE
DECISION DATED MAY 2, 2019

The Applicant filed an application for Limited Site Plan Review, notice of the opening public hearing was published in MetroWest Daily Newspaper on April 11, 2019 and April 16, 2019; and the legal ad was mailed to parties of interest pursuant to the Framingham Zoning By-Law and M.G.L. Chapter 40A. The Planning Board held public hearings for the project on April 25, 2019 and May 2, 2019.

The project includes the construction of a new Fuller Middle School, off-street parking, landscaping, and associated site improvements. The property is zoned Single Family Residential (R-1) and listed as Framingham Assessor's Parcel ID: 102-82-8137-000; 102-82-4579-000; 102-82-2420-000; and 102-92-2532-000

On May 2, 2019, the Planning Board **APPROVED** the application with conditions. The **DECISION** was filed in the office of the City Clerk on May 3, 2019.

For additional information, please see the Planning Board's webpage at www.framinghamma.gov.

Christine Long, Chair FRAMINGHAM PLANNING BOARD

Any appeal from the Decision shall be made pursuant to G.L. Ch. 40A, Sec. 17 and must be filed within twenty (20) days after the date of filing of the Decision in the office of the Town Clerk. The Notice of Decision can be found in the MetroWest Daily Newspaper and on the Massachusetts Newspaper Publishers Association's (MNPA) website.

DECISION OF THE FRAMINGHAM PLANNING BOARD
ON THE APPLICATION OF FRAMINGHAM PUBLIC SCHOOLS
FOR LIMITED SITE PLAN REVIEW OF THE PROPERTY LOCATED AT 31 FLAGG DRIVE
DECISION DATED MAY 2, 2019

General Property Information

Project Number: PB-11-19
Property Address: 31 Flagg Drive
Assessor's Information: 102-82-8137-000; 102-82-4579-000; 102-82-2420-000; and 102-92-2532-000
Zoning District: Single Family Residential (R-1)

Application Information

Application(s): Limited Site Plan Review
Date application(s) were filed with the Planning Board: April 8, 2019
Date application(s) were filed with the City Clerk: April 8, 2019

General Project Contact Information

Applicant Name and Address: Framingham Public Schools, 73 Mt Wayte Avenue, Suite 5, Framingham, MA
Project Contact: Jonathan Levi Architects, 266 Beacon Street, Boston, MA 02116
Project Engineer Name: CDW Consultants, Inc., 6 Huron Drive, Natick, MA 01760
Traffic Engineer: Vanesse & Associates
Stormwater Engineer: CDW Consultants, Inc., 6 Huron Drive, Natick, MA 01760
Landscape Architect: CBA Landscape Architects, 24 Thorndike Street, 4th Floor, Cambridge, MA 02141

Legal Ad & Public Hearing Information

MetroWest Daily News Run dates of the Legal Ad: (more than 14 days prior) April 11, 2019 and
(7 days prior) April 16, 2019
Date of abutter/7 Abutting municipalities/parties of interest mailing: April 8, 2019
Date of opening public hearing: April 25, 2019
Date of continued public hearing: May 2, 2019

PLANNING BOARD PLAN APPROVAL INFORMATION

Date of Plan: April 8, 2019

PROJECT DESCRIPTION

The Project at 31 Flagg Drive was determined to be a protected use by the Building Commissioner (April 4, 2019), since it is classified as a Dover Amendment Use[1]. A Project classified as a Dover Amendment Use is reviewed under the Framingham Zoning By-Law with specific limited review standards set forth in Article 20: Regulations Governing Applications for Site Plan Review for Dover Amendment Uses. The Planning Board adopted Article 20 to ensure that the review of Dover Amendment Uses is legally followed since such projects are partially exempt from the Framingham Zoning By-Laws under M.G.L. c. 40A, Section 3.

The Applicant proposes to raze the existing Fuller Middle School and construct a new middle school on the same parcel. The new middle school will be designed to accommodate approximately 630 students, grades 6 through 8. The new middle school will be 136,790sf, three floors, and oriented for energy efficiency and sustainably. Furthermore, the new middle school will include a gymnasium and auditorium, which will be open for public uses but will maintain an internal separation and entry for each to allow each use to remain independent from one another.

PUBLIC HEARING

The Framingham Planning Board held its opening public hearing for the project located at 31 Flagg Drive on April 25, 2019, and later held a continued public hearing on May 2, 2019. Planning Board members present throughout the public hearings were the following: Christine Long, Chair; Lewis Colten, Vice-Chair; Shannon Fitzpatrick; and Joseph Norton. Victor Ortiz recused himself from the hearing. During the course of the public hearing process, the following individuals appeared on behalf of the Applicant: David Miles, School Committee member; Matt Torti, School Facility Manager; Joel Seeley, AIA, COO, Symmes, Maini & McKee Associates; Philip Gray, AIA, Jonathan Levi Architects; Christian Riordan, Consigli Construction Co., Inc.; Michael Caputo, General Superintendent, Consigli Construction Co., Inc.; Eric Wilhelmsen, PE, CDW Consultants, Inc.

Summary of Minutes

On April 25, 2019, Christine Long, Chair, read the legal advertisement and the Dover Amendment into the record stating that the application is for limited site plan review and is subject to the Dover Amendment.

Joel Seeley provided details of the project regarding storm water management, landscaping site lighting, construction phasing and the planned construction time line. The application is for the construction of a new school that will replace and demolish an existing 196,000 sf single story high school designed for 1200 students with a 137,000 sf middle school to accommodate 630 students. Mr. Seeley stated that the ZBA approved a height variance last April 2018. The plan is to provide a

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[1] *No zoning ordinance or by-law shall...prohibit, regulate or restrict the use of land or structures for religious uses or for educational purposes...provided, however, that such land or structure may be subject to reasonable regulations concerning the bulk and height of structures and determining yard sizes, lot area, setbacks, open space, parking and building coverage requirements* – MGL Chapter 40A, Section 3 cited in the Planning Board Rules and Regulations, Article 20: Regulations Governing Applications for Site Plan Review for Dover Amendment Uses, October 25, 2015

campus design that includes an amphitheatre area with a sloped area that allows students to enter on level two of the building, which reduces the appearance in height to appear as a two-story building rather than three stories. The project includes a new parking lot with 610 parking spaces and new playing fields. There is a separate community entrance to be used at all times so as not to interfere with operations while the school is in session and provides a complete separation of public use from the school use. The Applicant is meeting with the Conservation Commission again on May 1, 2019 and has met with them several times and they are adding several stormwater basins because of those meetings. Michael Caputo discussed the details of the plan for truck traffic, which requires the use of coming in from Route 9 onto Concord Street onto Normandy and with non-trailer traffic from Enzio to the Court House, back onto Concord Street to Route 9. The plan is to time the schedule of truck traffic in concert with the school schedule. A police detail will be used at Normandy and Concord to be able to make the left hand turn that is currently not allowed. Neighborhood streets that include Oaks, Warren, Prindiville Ave. and Dennison Avenue will be prohibited for use by trucks and will be part of the supplemental construction conditions provided in the information for bids when the project is offered for bid. Mr. Seeley stated they plan to start the project site work to install the foundation this summer and demolition of the existing school will take place in 2021 at the end of the construction project after all work has been completed. Matt Torti stated that this project has been evolving over the past few years and there was been many meetings held and all stakeholders have been involved and represented and thanked all those who have participated and provided input during the process to make it a success.

Mr. Torti noted that Fuller School contains other functions currently such as the Board of Health, parent information center, 25,000 sf is occupied by the building and grounds department, maintenance operation, wood shop, Early Childhood Assessment Program, and adult ESL program, which has over 500 vehicles parked at night for its program. Mr. Torti further stated that this project has been well vetted and thought out through a very long process and feels all issues have been addressed.

On April 25, 2019, the Planning Board provided the following comments:

- Shannon Fitzpatrick requested that all honey locust trees be removed from the landscaping plan and questioned the use of planting grass rather than another option. Mr. Seeley provided input received from Matt Torti regarding the reality of maintenance issues when using certain types of turf that resulted in their choices.
- Lewis Colten stated that he realizes the amount of effort that has gone into creating the plan for the construction of the school but requested clarification of the construction timeline and concern he has regarding students using the school during construction. The Applicant provided details of the plan to manage this. Mr. Colten requested clarification as to the huge amount of fill, 45,000 cubic feet, being brought in and how the truck traffic would be managed. Mr. Caputo stated there would be a daily sweeping and watering of the site. Mr. Colten asked for clarification of site lighting and requested a photometric plan for the site. Mr. Colten asked why there is a reduction in the number of students that the school services. Mr. Seeley stated

that this will be a middle school and was formerly a high school and MSBA has projected the number of students determined to be 610 but the school department petitioned the MSBA and as a result, the number was increased to 630 students. Mr. Colten requested clarification regarding drainage on the site.

- Joseph Norton requested where the staging area for fill would be and how it would be coordination with student drop off and pick up. Mr. Caputo stated there would be blackout times for truck traffic from 7:30-8:30 am and 2-3 pm while busses are queuing up there will be no truck traffic. Mr. Norton asked where truckers would park outside of this time period since it is an issue on another Planning Board project at this time.
- Christine Long asked if Consigli was hired as a Construction Project Manager at Risk for this project. Mr. Caputo stated that they are hired as such. Ms. Long also requested removal of all honey locust. Mr. Seeley stated consider them gone. Ms. Long asked if the project is union, non-union or open shop.

On April 25, 2019 and May 2, 2019, the Planning Board opened the floor for public comments. On April 25, 2019 members of the public made comments. All comments can be reviewed on the video stream capture of the public hearing and the associated meeting minutes.

FINDINGS

A. Section VI.F.6.a Retain Community Character

According to the Dover Amendment, M.G.L. c. 40A Section 3 and the Planning Board Rules and Regulations Article 20.3.3 the Applicant is not required to comply with the provisions related to "Retain Community Character" as referenced in the Framingham Zoning By-Law Section VI.F.6.a. In accordance with Article 20.3.3 of the Planning Board Rules and Regulations the applicant is not required to address the Traffic Impact Standards, the Environmental Impact Standards, the Fiscal Impact Standards, the Community Impact Standards, Health, Public services and utilities, Land use planning, under Section VI.F of the Framingham Zoning By-Law.

- The Fuller Middle school, originally designed as a high school was intended to accommodate approximately 1,200 high school students. The new school, which is intended for 630 middle school students, will further include 120 staff members.
- The new Fuller Middle school will include an auditorium that will accommodate 420, where the old auditorium seated 540 people.

B. Section IV.F.6.b. Traffic, parking, and public access

According to the Dover Amendment, M.G.L. c. 40A, Section 3 and the Planning Board Rules and Regulations Article 20.3.3.9 the Applicant is not required to comply with the provisions related to the "Traffic" portion of Section VI.F.6.b of the Framingham Zoning By-Law. In accordance with Article 20.3.3 of the Planning Board Rules and Regulations the applicant is not required to address the Traffic Impact Standards, the Environmental Impact Standards, the Fiscal Impact Standards, the Community

Impact Standards, Health, Public services and utilities, Land use planning, under Section VI.F of the Framingham Zoning By-Law.

Parking

- The site has been designed to accommodate vehicular movements safely throughout the site. Vehicles will be located on the property and not idle and/or park on Flagg Drive.
- The site has been designed to accommodate queuing for 17 buses, which can be parked simultaneously in front of the school.
- The new middle school has been designed to accommodate approximately 580 parking spaces, which will be required during construction. Post construction the site will have 479 parking spaces and during the evening hours 581 parking spaces.
- Approximately 40 bicycle racks will be installed on-site.

	Day Parking Requirements	Evening Parking Requirements
Adult ESL	5	425
Fuller Middle School	100	NA
Farley School	250	150
McCarthy School	85	NA
PIC	15	NA
Building and Grounds	20	5
Early Childhood	3	NA
Truant	1	1
Board of Health	0	0
SUBTOTAL	479	581
Contractor	100	NA
Adult ESL Off Site Parking	NA	0
TOTAL	579	581

Pedestrian

- Sidewalks will be provided throughout the project, which will connect the three schools (Fuller, McCarthy, and Farley) as a campus.
- Sidewalks will be designed and install to comply with all ADA requirements for accessibility.

Section VI.F.6.c. Environmental Impact

According to the Dover Amendment, M.G.L. c. 40A Section 3 and the Planning Board Rules and Regulations Article 20.3.3.5 the Applicant is not required to comply with provisions relative to

"Environmental Impact" as referenced in the Framingham Zoning By-Law Section VI.F.6.c In accordance with Article 20.3.3 of the Planning Board Rules and Regulations the applicant is not required to address the Traffic Impact Standards, the Environmental Impact Standards, the Fiscal Impact Standards, the Community Impact Standards, Health, Public services and utilities, Land use planning, under Section VI.F of the Framingham Zoning By-Law.

Section VI.F.6.d. Health

According to the Dover Amendment, M.G.L. c. 40A Section 3 and the Planning Board Rules and Regulations Article 20.3.3.6 the Applicant is not required to comply with the provision relative to "Health" as referenced in the Framingham Zoning By-Law Section VI.F.6.d In accordance with Article 20.3.3 of the Planning Board Rules and Regulations the applicant is not required to address the Traffic Impact Standards, the Environmental Impact Standards, the Fiscal Impact Standards, the Community Impact Standards, Health, Public services and utilities, Land use planning, under Section VI.F of the Framingham Zoning By-Law.

Section VI.F.6.e. Public Services and Utilities

According to the Dover Amendment, M.G.L. c. 40A Section 3 and the Planning Board Rules and Regulations Article 20.3.3.7 the Applicant is not required to comply with the provisions relative to "Public Services and Utilities" as referenced in the Framingham Zoning By-Law Section VI.F.6.e In accordance with Article 20.3.3 of the Planning Board Rules and Regulations the applicant is not required to address the Traffic Impact Standards, the Environmental Impact Standards, the Fiscal Impact Standards, the Community Impact Standards, Health, Public services and utilities, Land use planning, under Section VI.F of the Framingham Zoning By-Law.

- The new school will be connected to the same sewer manhole located on Flagg Drive that the existing school presently ties into. There are no anticipated impacts to the City's sewer infrastructure as the proposed school is replacing an existing school that was originally designed for more students.
- HVAC systems will be installed on the roof, with a penthouse enclosure for visual screening and sound abatement. The project team included an acoustical engineer that provided recommendations regarding sound attenuation for the rooftop units.
- The project has been designed to meet the LEED minimum certification, which will exceed the Massachusetts energy code by at least 20 percent.
- The new school will be connected to an 8-inch water main that presently loops around the Farley Building. The Fire Department and the Department of Public Works (DPW) recommended that such service remain looped post construction.
- Separate fire and domestic service lines will service the new school.
- The project will include the installation of three new fire hydrants; one will be located near the front entrance, one at each rear corner of the new school.
- The project is not anticipated to have any increased impact on the City's water infrastructure.

Section VI.F.6.f Land Use Planning
According to the Dover Amendment, M.G.L. c. 40A Section 3 and the Planning Board Rules and Regulations Article 20.3.3.8 the Applicant is not required to comply with the provisions relative to "Land Use Planning" as referenced in the Framingham Zoning By-Law Section VI.F.6.f In accordance with Article 20.3.3 of the Planning Board Rules and Regulations the applicant is not required to address the Traffic Impact Standards, the Environmental Impact Standards, the Fiscal Impact Standards, the Community Impact Standards, Health, Public services and utilities, Land use planning, under Section VI.F of the Framingham Zoning By-Law.

Based on the findings as shown in the submitted documentation and as presented during the public hearing process, the site plan and the proposed project complies with the requirements of Section II.B, IV.B, IV.E, and VI.F of the Framingham Zoning By-Law being consistent thereof.

CONDITIONS OF APPROVAL
The Planning Board finds that the Application and Site Plans submitted by the Applicant comply with all applicable provisions of Framingham's Zoning By-Law and General By-Laws relevant to this review. Accordingly, the Planning Board votes are pursuant to relevant provisions of these By-Laws. Therefore, said approval from the Planning Board is subject to the following conditions:

General Provisions

1. Prior to the commencement of authorized Site activity, the Applicant and the general contractor shall meet with the Planning Board Administrator, Building Commissioner, and the Framingham City Engineer to review this approval.
2. Prior to the commencement of authorized Site activity, the Planning Board Office shall be given written notice within not less than 48-hours. If activity on the Site ceases for a period of longer than 30 days, then written notice shall be given within not less than 48 hours to the Planning Board Office prior to restarting work.
3. Prior to the commencement of authorized Site activity the Applicant shall provide to the Planning Board Office the name, address and emergency contact telephone number of the individual or individuals who shall be responsible for all activities on site and who can be reached 24 hours a day, seven days a week. In the event project management changes, all new contact information shall be submitted to the Planning Board within twenty-four hours.
4. A copy of this Decision shall be kept on the Site in a location that is highly visible and accessible.
5. Prior to the issuance of any Department of Inspectional Services (Building Department) permit, an electronic copy of the approved signed Site Plans shall be provided to the Planning Board Office for distribution to municipal departments in order to be reviewed for compliance with this Decision. The Site Plans shall be revised if necessary to reflect the conditions of this Decision. In the event of a discrepancy between the Decision and the Site Plans, the Decision shall take precedence.
6. No material corrections, additions, substitutions, alterations, or any changes shall be made in any plans, proposals, and supporting documents approved and endorsed by the Planning

Board without the written approval of the Planning Board. Any request for a material modification of this approval shall be made in writing to the Planning Board for review and approval by the Planning Board or the Planning Board's Administrator and shall include a description of the proposed modification, reasons the modification is necessary, and any supporting documentation. Upon receipt of such a request, the Planning Board's Administrator may, in the first instance, make a determination in writing authorizing a minor modification to the Site Plans, or the Administrator may refer the matter to the Planning Board, which may consider and approve minor modifications at a regularly scheduled Planning Board meeting. In the event the Planning Board determines the change is major in nature (e.g., resulting in material changes, newly identified impacts, etc.), the Planning Board shall consider the modification at a noticed public hearing.

7. The Applicant shall record this Decision with exhibit(s) at the Middlesex South Registry of Deeds prior to the issuance of a building permit after the required appeal period has lapsed in accordance with M.G.L., c. 40A, Section 17. The Applicant shall submit proof of the decision being recorded to the Planning Board. Failure to record the decision prior to commencement of construction or to comply with the conditions of approval herein shall, upon notice to the Applicant and the opportunity for a hearing, render this Decision null and void.
8. In the event that the permit is not exercised nor substantial use thereof has not commenced from three years of the date of recording, except for good cause as determined by the Planning Board, the permit shall be deemed null and void.
9. The failure to comply with the Framingham Zoning By-Laws, Framingham General By-Laws and/or the terms of this Decision may, upon notice to the Applicant and the opportunity for a hearing, result in revocation of the following permits/approvals: Limited Site Plan Review, issued hereunder. The Planning Board shall, by first class mail, send the owner written notification of any failure to comply with the Framingham Zoning By-Laws, the Framingham General By-Laws, the Planning Board Rules & Regulations, and/or the terms of this Decision. If the Applicant believes that it is not in violation, it may request and will be granted an opportunity to attend a Planning Board meeting to try to resolve the alleged violation. If within 30 days from the date of mailing of said notice, the Applicant has not resolved the matter with the Planning Board or remedied the alleged violation (or demonstrated it has taken steps to do so), it shall be grounds for revocation of the approvals issued hereunder. At the expiration of the 30 day period, the Planning Board after a duly noticed public hearing, including notice to the owner by first class mail, may revoke the approvals issued hereunder if it finds by a four-fifths vote that there has been a violation of the By-law and/or the terms of this Decision and that the owner has failed to remedy it; alternatively, the Planning Board may continue the public hearing, or by a four-fifth vote extend the time period in which the violation may be corrected.

Site Construction

10. Following notice to the project manager for the Project, members or agents of the Planning Board shall have the right to enter the Site and to gather all information, measurements, photographs and/or other materials needed to ensure compliance with this approval in the course of construction of the Project. Members or agents of the Planning Board entering onto

the Site for these purposes shall comply with all safety rules, regulations, and directives of the Applicant and the Applicant's contractors.

11. The Applicant shall perform daily cleanup of construction debris, including soil, on municipal streets within 200 yards from the entrance of the Site driveways caused by the Site construction.
12. Outside construction, hours are limited to 7:00 AM - 5:30 PM Monday through Friday and 8:00 AM - 4:00 PM on Saturday. Absent emergency conditions, no construction is permitted on Sunday or legal holidays (New Year's Day, Martin Luther King Day, Presidents Day, Patriots Day, Memorial Day, 4th of July, Labor Day, Columbus Day, Veterans Day, Thanksgiving, and Christmas Day – or following Monday when the holiday falls on a weekend). No equipment on-site shall be started and allowed to warm up prior the start of the allowed construction hours. No vehicles are to arrive at the construction Site before the designated construction hours, which includes no vehicle parking, standing or idling on adjacent public streets. Oversized deliveries of construction materials shall occur after peak traffic hours.
13. The Applicant shall post a construction sign that provides the address of the project, contact information of the project manager, and any other additional relevant information. In the event that site project management changes, the Applicant is required to notify the Planning Board Administrator of such changes immediately to ensure communication with the Planning Board office and other municipal departments.
14. In the event of blasting or compaction during the construction phase, the Developer's Blasting Operator shall provide no less than ten days' advance notice of the commencement of blasting operations by certified mail to those property owners entitled to a pre-blast inspection pursuant to Massachusetts Comprehensive Fire Code: 527 CMR 1.00 et seq.
    a. Copies of said mailing shall be furnished to the Planning Board and the Framingham Fire Department.
    b. Copies of the blasting monitoring reports, noting any vibrations in excess of that allowable by regulation, shall be mailed to the above-referenced property owners, Planning Board and the Framingham Fire Department at the termination of blasting operations.
    c. The Blasting Operator shall provide notice to the Planning Board and the Framingham Fire Department of any reported damage to real property.
15. The Developer's Blasting Operator shall post a Blasting and/or Compaction Notice Sign in a conspicuous location along the roadway to inform the public of the proposed blasting for the property. Applicant shall notify all abutting residents of such blasting and/or compacting event at the time said notice is posted in a conspicuous location.
16. Said Blasting Notice Sign shall be posted at least ten days prior to any blasting on-site and abutters notified by mail within 500' of the property. The Developer's Blasting Operator shall encourage the abutting properties within 500' of the property boundaries to have their homes inspected prior to the commencement of blasting and/or compaction. Such reports shall be provided to the Developer's Blasting Operator prior to the commencement of blasting.

Snow Storage

17. Snow storage shall not obstruct sight lines to preserve public safety.

18. Snow storage shall be on-site in the snow storage areas designated on the Endorsed Site Plans. However, in the event of a prolonged snow event that results in all designated snow storage areas being full, then the Applicant shall be required to remove excess snow by trucking such excess snow off-site within forty-eight hours after the snowfall ends in the interest of public safety.

Sidewalks and Landscaping and Lighting

19. Sidewalks constructed as part of the project shall be accessible by all pedestrian users. All sidewalks shall be constructed of concrete unless otherwise agreed upon in consultation with the Planning Board Administrator.
20. The sidewalks and walkways shall be kept clear of snow and all other impediments and/or litter throughout the year. In the event of snow, the sidewalks and walkways shall be cleared within 48 hours of a snow event. Snow shall not be stored on or impede access/use of sidewalks and walkways.
21. The Applicant agrees to maintain any plantings or physical landscape features in perpetuity and in good health and at a height of two feet or less above the adjacent roadway grade where such plantings are located within the driveway sight lines. The Applicant agrees to work with the Administrator to provide all landscaping installations in accordance with the Planning Board's approved planting list. The Applicant has agreed to remove all honey locust from the landscape plan and replace with recommendations of the Planning Board.
22. The Applicant shall comply with the Planning Board Rules and Regulations relative to Site Lighting.
23. Non-security lighting within the off-street parking lot shall be turned off, one after hour the close of the structure.
24. The Applicant shall install 40-bicycle parking, in accordance with the requirements set forth in Section IV.B.7 of the Framingham Zoning By-Law.

Framingham Department Review

25. The Applicant shall comply with the letter of comment from the Department of Public Works (DPW), Re: Fuller Middle School – 31 Flagg Drive, Framingham, dated April 30, 2019
26. The Applicant shall comply with the correspondence sent by the Fire Department, via ACCELA on April 19, 2019
27. The Applicant shall comply with the correspondence sent by the Department of Inspectional Services (Building Department), via ACCELA on April 19, 2019
28. The Applicant shall comply with all applicable State Building and Fire Codes.

Special Provisions/Periodic Conformance Reporting and Review

29. The Applicant shall provide the following performance guarantees for the Project.
    a. Upon completion of the Project and prior to the request for a final use and occupancy permit, the Applicant shall provide the Planning Board with an "As Built Plan" stamped by a Professional Engineer registered in the Commonwealth of Massachusetts certifying that all improvements are completed in accordance with the approved Site Plans in a form acceptable to Framingham Department of Public Work's Engineering & Transportation Division (DPW).
    b. The as-built plan shall be submitted in both hard copy and electronic formats (PDF and AutoCAD) to the Department of Public Works and Planning Board Administrator for

certification. The AutoCAD file must conform to the current form of the Mass GIS Standard for Digital Plan Submission to Municipalities or other standard requested by the Framingham DPW. The plan shall include, but not be limited to, site utility improvements and tie-in dimensions to all pipes and connection points. The as-built information shall be delivered to DPW a minimum of 5 business days in advance of the Applicant seeking a final certificate of occupancy sign-off to allow time for DPW review and approval of submitted information. The Applicant shall also submit a statement certifying that all conditions of approval of this decision have been met and site improvements are complete.

30. All accessible off-street parking shall comply with the requirements set forth in 521 CMR relative to accessible parking. The Applicant shall ensure that all accessible spaces are designed to the universal standard.
31. All exterior trash and recycling dumpsters shall be located in an enclosure with a latching mechanism on the gate.
32. The Applicant shall enforce blackout times for truck traffic from 7:30-8:30 am and 2-3 pm during days where school is in session (Fuller Middle School and the McCarty School).
33. All work within a public right of way shall require a Police detail for the duration of such work.
34. The Applicant shall submit a landscape plan to the Planning Board Administrator for review and approval prior to the issuance of a building permit from the Department of Inspectional Services (Building Department).

WAIVER REQUESTS

No waivers were requested for this project

VOTES

The Planning Board voted four in favor, zero opposed, and zero in abstention to grant approval for the Framingham Public School's application for Limited Site Plan Review, with conditions for the construction of a new Fuller Middle School to be located at the property at 31 Flagg Drive.

Site Plan Review
Christine Long.....yes
Lewis Colton.....yes
Shannon Fitzpatrick.....yes
Joseph Norton.....yes

By: _____
Christine Long, Chair, Framingham Planning Board
Date of Signature: May 2, 2019

EXHIBITS

Not attached unless indicated

The Applicant has filed with the Planning Board various plans and reports required under the requirements of the Framingham Zoning By-Laws/Ordinances and the Framingham General By-Laws. During the review process, the Applicant and its professional consultants also submitted revisions to plans in response to requests by the Planning Board and by the various town departments that reviewed the Project. All of these plans, reports and correspondence are contained in the Planning Board's files and are hereby incorporated into this Decision by reference.

1. Form A – Application Cover Letter for the property at 31 Flagg Drive (PB-11-19), which was stamped in with the City Clerk on April 8, 2019
2. Form E-2 – Limited Site Plan Review under the Dover Amendment, MGL C. 40A, Section 3 for the property at 31 Flagg Drive (PB-11-19), which was stamped in with the City Clerk on April 8, 2019
3. Form E-2 – Limited Site Plan Review under the Dover Amendment, MGL C. 40A, Section 3 – Fuller Middle School, Planning Board Application, Supplemental Information
4. Site Plans for Fuller Middle School, project #1755, prepared by Jonathan Levi Architects and CDW Consultants, Inc., Civil & Environmental Engineers, dated April 8, 2019
5. Photometric Plan – Fuller Middle School (project #1722), prepared by Jonathan Levi Architects
6. Stormwater Management Report for: Fuller Middle School, 31 Flagg Drive Street, Framingham, MA, prepared by CDW Consultants, Inc., Report Preparation Date: April 5, 2019

The Planning Board received correspondence various municipal Departments who review the Project, and has been incorporated herein by reference.

1. Form B – Building Department Recognition Form, prepared by the Building Commissioner on April 4, 2019
2. Inter Office Memo – Project Review Request and Timeline, Re: Departmental Project Review – 31 Flagg Drive (PB-11-19), dated April 8, 2019, and stamped in with the City Clerk on April 8, 2019
3. Legal ad for the opening public hearing (April 25, 2019), which was advertised in the MetroWest Daily Newspaper on April 11, 2019 and April 16, 2019, and stamped in with the City Clerk on April 8, 2019
4. Letter of comment from the City of Framingham, Conservation & Open Space Division, Subject: Conservation Review – 31 Flagg Drive, dated May 2, 2019
5. Letter of comment from the City of Framingham, Department of Public Works, Re: Fuller Middle School – 31 Flagg Drive, Framingham, date April 30, 2019
6. Statement of comment provided by the Department of Inspectional Services (Building Department) via ACCELA on April 19, 2019
7. Statement of comment provided by the Framingham Fire Department via ACCELA on April 19, 2019
8. Statement of comment provided by the Framingham Police Department via ACCELA on April 8, 2019

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Section 01 10 00
SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Project description.

B. Project's environmental goals.

C. Definitions – Owner, and Architect.

D. Work by Owner.

E. Project Manual formats and conventions.

1.2 PROJECT DESCRIPTION

A. Work covered by Contract Documents: The Project consists of a new Middle School having a multi-story common atrium area in its center, with classrooms abutting along the edges, with study pods located throughout.

1. Project Address:

   31 Flagg Drive
   Framingham, Massachusetts 01702

2. Work included beyond the Contract Limits: Protection and replacement of abutting sidewalks and roadways in public way, and on adjacent properties.

3. Completeness: The Work shall be as shown on the Drawings and be complete in every respect and in conformance with all applicable requirements of the governing laws and codes.

B. Contract time: The Construction Manager may begin on-site work with receipt of a written Notice to Proceed, or suitable Letter of Intent. After commencement of work, the Construction Manager shall pursue the Work continuously and with diligence, and bring the Project to Substantial Completion in phases per the following:

1. Substantial Completion Dates for each Phase are indicated in CM's Supplemental Instructions to Bidders.

2. Substantial completion is the stage in the progress of the Work when the work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the Work for its intended use. This includes any and all permits required by governmental agencies necessary for occupancy and use.

3. Liquidated Damages stipulated in the Owner-Construction Manager Agreement are applicable for failure to achieve Substantial Completion for each phase by dates required.

C. Building Permits: Construction Manager is responsible to ensure all required permits are obtained, and that the work pertaining to permits is properly inspected and certified. Trade Contractors are required to obtain permits relating to their work.

1.3 PROJECT ENVIRONMENTAL GOALS

A. Overview of the environmental requirements for the Project: The Owner has established the environmental goal to construct a "green" building integrating the Owner's environmental operational mission into the Project.

1. The Owner's Project environmental goals coincide with LEED™ (Leadership in Energy and Environmental Design) Program for Certification under the United States Green Building Council's LEED Rating System (New Construction and Major Renovation), version 4.

a. Project has been registered with United States Green Building Council for LEED™ certification.

b. In support of the Owner's certification goals, Construction Manager is required to be in compliance with the specified environmental requirements deemed necessary and to provide the necessary support documentation.

c. Refer to Section 01 81 13 - SUSTAINABILITY REQUIREMENTS SUMMARY regarding special administrative and procedural requirements related the Owner's LEED goals.

d. Individual Specification Sections have additional detailed requirements.

B. Cooperative effort: The specifications are not intended to limit alternative means of achieving the Owner's environmental project objectives. Recommendations, and input from the Construction Manager and Trade Contractors for improving implementation of the Owner's environmental project objectives are strongly encouraged.

C. Construction Manager's participation: The Construction Manager shall provide all administrative and procedural requirements necessary for the Owner to achieve its environmental goals in the construction of this Project.

1. The Construction Manager shall incorporate into the construction specific "green" products which comply with the Owner's environmental goals and objectives. Additionally, the Construction Manager is required to utilize "green" products which are part of the building process but not included in the final construction, (for example, cleaners, shipping containers and similar supplementary items).

2. The Construction Manager is advised that special consideration and modification of the Construction Manager's means and methods may be additionally required to achieve the Owner's environmental goals which are beyond the requirements of the Contract Documents.

3. The Construction Manager shall designate a trained and qualified representative responsible for instructing workers and overseeing the Owner's environmental goals for this Project and completing the paperwork required for submission to U.S. Green Building Council.

4. The Construction Manager shall maximize environmentally-benign construction techniques, including:

a. Provide a waste and recycling program for handling and disposal of solid waste.

b. Maximize use and recycling of reusable delivery packaging.

c. Reduce the use of municipally supplied potable water.

d. Protect soil against erosion and topsoil depletion.

e. Minimize noise generation during construction.

D. Objectives: Major components of the Owner's environmental goals include construction utilizing "green products", pollution prevention during the construction process, and maintenance of healthy Indoor Air Quality (IAQ).

1. Green products and sustainable materials are required for incorporation into the Project: utilization of recycled materials and materials with high recycled content, use of designated sustainable managed products, and energy efficient equipment and fixtures. Green products and sustainable materials include:
   a. Products with low embodied energy (production, manufacturing, and transportation).
   b. Products that maximize recycled content in materials products, and systems.
   c. Products easy to maintain, repair, and that can be cleaned using non-toxic substances.
   d. Products will not negatively affect healthy indoor air quality.
   e. Wood and agrifiber products that are certified to be sustainably harvested by the Forest Stewardship Council (FSC).
   f. Reusable and recyclable packaging.
2. Pollution prevention as achieved through recycle and reuse of materials, waste handling procedures, and limiting harmful pollutants emitted into the air, soil, and waterways. Pollution prevention efforts include, but are not limited to:
   a. Providing additional temporary facilities and controls.
   b. Minimizing the release of carbon dioxide (CO_2) from fuels burned on site or fuels burned off site to supply electricity to the building.
   c. Avoiding the release of ozone-depleting compounds, such as HCFCs from refrigerants or foam insulation materials.
3. Enhancement, restoration, and protection of the natural environment of the site.
4. Water resource protection: Conserve and use water efficiently, limit on-site fresh water usage to the greatest extent possible, control water distribution systems and waste, minimize use of imported or mined water. Capture and utilize rainwater to the greatest extent permitted by Law. Utilize water-conserving appliances and equipment.
5. Air Quality is achieved by compliance with the limitation of indoor air concentrations of certain pollutants, at or below the established maximum allowable concentrations. Healthy air quality goals shall be maintained during construction, and through building commissioning.
6. Use construction practices that achieve the most efficient use of resources and materials.
7. Energy Efficiency (Operations Throughout Project Life): Materials and systems are intended to maximize energy efficiency for operation of Project throughout service life (substantial completion to ultimate disposition.

1.4 DEFINITIONS - OWNER, OWNER'S PROJECT MANAGER, CONSTRUCTION MANAGER AND ARCHITECT

A. Wherever the term "Owner" is used in this specification, it refers to:

City of Framingham
c/o City of Framingham School Building Committee (SBC)
73 Mt. Wayte Avenue
Framingham, Massachusetts 01702

1. The terms "Owner" and "Awarding Authority" as used in the Project Manual have the same meaning and are interchangeable in Contract Documents. Both terms refer to the same entity.
2. Important Tax Note: OWNER is exempt from certain taxes. It is therefore required that the Construction Manager, all Trade Contractors, and subcontractors purchasing taxable goods or services make known to suppliers that tax-exempt status of the Owner, in order that such taxes will not be applied to the goods under Contract. In the event that such taxes are paid on any items, the Construction Manager shall obtain rebates for the taxes and reimburse the Owner in the full amount by change order. The Owner will provide the necessary evidence and certificates of its tax-exempt status upon request of those concerned. The most prevalent taxes concerned are:
   a. Federal Excise Taxes as applied to articles which are taxable under Chapter 32 of the Internal Revenue Code of 1954, as amended. The Owner's Excise Tax Exemption Certificate Number is applicable.
   b. Sales and Use Tax imposed by the Commonwealth of Massachusetts: The Owner has been assigned Exemption Certificate Number with respect to leases, rental, or purchase of "tangible personal property", including building materials and supplies, subject to the Massachusetts Sales and Use Tax. This exemption does not apply to any equipment leased or rented by the Construction Manager for his own use on the construction of the Project.
   c. Sales and Use Tax imposed by the states where the Owner does not have exemption status: The Owner may choose to apply for tax exemption status in other states where major building materials and supplies are being purchased. In the event that the Owner obtains exemption status after bids are received, the Construction Manager shall adjust the Stipulated Sum by change order, for the amount equal to the scheduled taxes that where included in the Contractors Bid.
   d. Fines and Penalties: Construction Manager and Trade Contractors are fully responsible for payment of all penalties and fines accessed by authorities having jurisdiction for improper and illegal use of Owner's tax exemption certificate number.
3. All papers required to be delivered to the Owner shall, unless otherwise specified in writing to the contrary, be delivered to the office of the Architect:

B. Wherever the term "Owner's Project Manager" or "OPM" is used in the Contract Documents, it refers to:

SMMA / Symmes Maini & McKee Associates
1000 Massachusetts Avenue
Cambridge, Massachusetts 02138

Attn: Joel Seeley

C. Wherever the term "Construction Manager" or "Construction Manager at Risk" is used in the Contract Documents, it refers to:

Consigli Construction Company
72 Sumner Street
Milford, Massachusetts 01757

1. The terms "Construction Manager" and "Contractor" as used in the Project Manual have the same meaning and are interchangeable in Contract Documents. Both terms refer to the same entity.

D. Wherever the term "Architect", "Designer", or "Architect/Engineer", is used in the Contract Documents, it refers to:

Jonathan Levi Architects, LLP
266 Beacon Street
Boston Massachusetts 02116

1.5 WORK BY OWNER

A. Related work under separate agreements: The Owner will award separate contracts which may commence prior to, or during the work of this Contract. Work under separate agreements, in general include the following:

1. Abatement and Demolition of existing middle school building (scheduled for completion prior to the Work of this Contract).
2. Designated testing laboratory services.
3. Owner Furnished and Installed (OFI) Products: The Construction Manager has coordinating responsibility for the following work, provided by others under separate agreement(s) with the Owner:
   a. Telephone/Data and communications systems.
   b. Furnishings and equipment, artwork, loose casegoods and similar items.

B. Owner Furnished - Construction Manager Installed (OFCI) Products: The Construction Manager shall install the following Owner furnished items.

1. Refer to notes on Drawings and Schedules.

1.6 PROJECT MANUAL FORMATS AND CONVENTIONS

A. Project Manual Format: The Project Manual is organized into Divisions and subdivided into Sections and Documents using Construction Specification Institute (CSI) publication "MasterFormat" numbering system, latest edition.

1. Section Identification: Six/Eight digit Section numbers are utilized and cross-referenced throughout the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete

because only those Section numbers which are applicable to this Project are used.

2. Division One of the Project Manual governs procedural and administrative requirements of the Work. Division One requirements are applicable to all Sections and Documents in the Project Manual.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular as applicable to the context of the Contract Documents.

2. Imperative mood and streamlined language is generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Construction Manager. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Construction Manager or by others when so noted.

a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

Section 01 22 00
UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

A. Measurement and payment criteria applicable to portions of the Work performed under a unit price payment method.

B. Non-payment for rejected unit price Work.

1.2 RELATED REQUIREMENTS

A. Document 05 12 00 – STRUCTURAL STEEL FRAMING.

1.3 AUTHORITY

A. Measurement methods delineated in the individual specification sections are intended to complement the criteria of this Section. In the event of conflict, the requirements of the individual specification section shall govern.

B. Take all measurements and compute quantities. The Architect/Engineer will verify measurements and quantities.

C. Assist by providing necessary equipment, workers, and survey personnel as required.

1.4 UNIT QUANTITIES SPECIFIED

A. Quantities and measurements indicated in the Bid Proposal Forms as issued by the Construction Manager are for bidding and contract purposes only. Quantities and measurements supplied or placed in the Work and verified by the Architect shall determine payment.

B. If the actual Work requires more or fewer quantities than those quantities indicated, provide the required quantities at the unit sum/prices contracted.

1.5 MEASUREMENT OF QUANTITIES

A. Measurement devices:

1. Weigh scales: Inspected, tested and certified by applicable weights and measures department within the past year.
2. Platform scales: Of sufficient size and capacity to accommodate the conveying vehicle.
3. Metering devices: Inspected, tested and certified by applicable department within the past year.

B. Measurement by weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.

C. Measurement by volume: Measured by cubic dimension using mean length, width and height or thickness.

D. Measurement by area: Measured by square dimension using mean length and width or radius.

E. Linear measurement: Measured by linear dimension, at the item centerline or mean chord.

F. Stipulated sum/price measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

1.6 PAYMENT

A. Payment includes: Full compensation for all required labor, Products, tools, equipment, plant, transportation services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

B. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the Architect/Engineer multiplied by the unit sum/price for Work which is incorporated in or made necessary by the Work.

1.7 NON-PAYMENT FOR REJECTED PRODUCTS

A. Payment will not be made for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from the transporting vehicle.
   4. Products placed beyond the lines and levels of the required work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling and disposing of rejected Products.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULES

A. Refer to Document 00 54 22 – BID ATTACHMENT UNIT PRICES SCHEDULE (BID PACKAGE 2).

End of Section

Section 01 22 00.03

UNIT PRICES
(BID PACKAGE 3)

PART 1 - GENERAL

1.1 SUMMARY

A. Measurement and payment criteria applicable to portions of the Work performed under a unit price payment method.

B. Non-payment for rejected unit price Work.

1.2 RELATED REQUIREMENTS

A. Section 09 51 00 - ACOUSTICAL CEILINGS.

1.3 AUTHORITY

A. Measurement methods delineated in the individual specification sections are intended to complement the criteria of this Section. In the event of conflict, the requirements of the individual specification section shall govern.

B. Take all measurements and compute quantities. The Architect/Engineer will verify measurements and quantities.

C. Assist by providing necessary equipment, workers, and survey personnel as required.

1.4 UNIT QUANTITIES SPECIFIED

A. Quantities and measurements indicated in the Bid Proposal Forms as issued by the Construction Manager are for bidding and contract purposes only. Quantities and measurements supplied or placed in the Work and verified by the Architect shall determine payment.

B. If the actual Work requires more or fewer quantities than those quantities indicated, provide the required quantities at the unit sum/prices contracted.

1.5 MEASUREMENT OF QUANTITIES

A. Measurement devices:

1. Weigh scales: Inspected, tested and certified by applicable weights and measures department within the past year.
2. Platform scales: Of sufficient size and capacity to accommodate the conveying vehicle.
3. Metering devices: Inspected, tested and certified by applicable department within the past year.

B. Measurement by weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.

C. Measurement by volume: Measured by cubic dimension using mean length, width and height or thickness.

D. Measurement by area: Measured by square dimension using mean length and width or radius.

E. Linear measurement: Measured by linear dimension, at the item centerline or mean chord.

F. Stipulated sum/price measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

1.6 PAYMENT

A. Payment includes: Full compensation for all required labor, Products, tools, equipment, plant, transportation services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

B. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the Architect/Engineer multiplied by the unit sum/price for Work which is incorporated in or made necessary by the Work.

1.7 NON-PAYMENT FOR REJECTED PRODUCTS

A. Payment will not be made for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from the transporting vehicle.
   4. Products placed beyond the lines and levels of the required work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling and disposing of rejected Products.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULES

A. Refer to Document 00 54 22.03 – BID ATTACHMENT UNIT PRICES SCHEDULE (BID PACKAGE 3).

End of Section

Section 01 23 00
ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section consists of:
   1. Submission procedures for scheduled Alternates.
   2. Documentation of changes to Contract Sum and Contract Time.

1.2 REQUIREMENTS

A. Submit Alternates with full description of the proposed alternate and the affect on adjacent or related components.

B. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at the Owner's option. Accepted alternates will be identified in the Owner-Contractor Agreement.

C. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.3 SELECTION AND AWARD OF ALTERNATES

A. Indicate variation of Bid Price for Alternates described below and list where provided for Bid Form or any supplement to it, which requests a difference in Contract Price by adding to or deducting from the base bid price.

B. The lowest responsible and eligible bid will be determined on the basis of the base bid, adjusted by such alternate or alternates as may be included in the award of the Contract in the sole discretion of the Awarding Authority.

1.4 SCHEDULE OF ALTERNATES

A. ALTERNATE 1 – FLOORING
   1. Base bid: Linoleum tile flooring
   2. Alternate number 1:. Porcelain tile pavers in lieu of linoleum tile flooring at ground floor commons and cafeteria areas.

B. ALTERNATE 2 – SKYLIGHTS
   1. Base bid: Double pitch skylight with double pitch roofing at skylights.
   2. Alternate number 2: Continuous double pitch skylight structure with no double pitch roofing.

C. ALTERNATE 3 – LOCKERS
   1. Base bid:. Metal Lockers
   2. Alternate number 3:. Phenolic Lockers in lieu of metal lockers at Atrium.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

Section 01 25 13
PRODUCT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Product options.
   1. Product selections.
   2. Additional selection requirements for LEED Credit products.
   3. Visual matching.

B. Product substitution procedures.

1.2 RELATED REQUIREMENTS

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Basic product requirements.

1.3 PRODUCT OPTIONS

A. Product selections: Comply with the following for selection of products:
   1. Products specified by reference standards or by description only: Provide any acceptable product meeting those standards or description.
   2. Products specified by performance requirements only: Provide any acceptable product which has been tested to show compliance with specified requirements, including indicated performances.
   3. Products specified by naming one or more manufacturers: Provide products of manufacturers named, or submit a request for substitution for any manufacturer or product not named in accordance with Massachusetts General Laws, Chapter 30, Section 39M(b).

B. Additional product selection requirements regarding LEED Credit related products and materials:
   1. Provide products which comply with VOC emission limits required by the LEED Certification and Owner’s Environmental Policy.
   2. Provide products which comply with the LEED Certification requirements for recycled content.
   3. Provide complete written documentation with all product substitutions that the proposed products are fully compliant to specific LEED requirements applicable to the substitution.

C. Visual matching: Where Specifications require matching a sample, the Architect's decision on whether a proposed product matches is final. Where no product matches and complies with other requirements, comply with provisions for "substitutions" for selection of a matching product in another category.

1.4 PRODUCT SUBSTITUTION

A. Products specified by reference standards or by description only: Any product meeting those standards or description.

B. Pursuant to Massachusetts General Laws, Chapter 30, Section 39M(b), where products or materials are prescribed by manufacturer name, trade name or catalog reference, or indicated as proprietary, the word “or approved equal” shall be implied. The Architect will evaluate the proposed “equal” item on the following criteria:

1. The submitted “equal” item is at least equal in quality, durability, appearance, strength and design.
2. The submitted “equal” item is at least equal in function for the purpose intended by the design of the Work.
3. The submitted “equal” item conforms substantially to the detailed requirements for the items as indicated by the specifications.
4. The submitted “equal” item fully conforms to the LEED Credit requirements for Project LEED Certification.

C. The Architect's evaluation and decision on whether a proposed product is equal to that specified, based on the above evaluation requirements, is final. The Contractor retains the right to appeal the Architect’s determination of equality through regulated statutory provisions.

1. The Architect and Owner reserve the right to reject proposed substitutions where data for VOCs is not provided or where emissions of individual VOCs are higher than for specified materials.

D. Owner’s proprietary products (as identified and specified): Under provisions of Massachusetts General Laws, Chapter 30, Section 39M(b) the Owner has determined that specific products shall be proprietary for ‘sound reasons in the public interest’. This determination has been made under vote of the Owner, and has been recorded in writing for public record.

1. Contractor’s substitutions for designated proprietary products will require complete and full information for Architect’s and Owner’s evaluation. Contractor should carefully schedule substitutions for proprietary products to permit the review and evaluation process. Failure to submit complete data will cause delays in approvals of substitutions. No change in Contract Schedule, or increase in Contract Sum will be made to compensate for rejected substitutions and re-submittals.
2. Owner’s proprietary products are listed under Section 01 60 00 and in respective individual Specification Sections.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

Section 01 26 13
REQUESTS FOR INTERPRETATION

PART 1 – GENERAL

1.1 SUMMARY

A. Administrative requirements for Requests for Information (RFI's).

1.2 DEFINITIONS

A. Requests for Information (RFI):
   1. A document submitted by the Construction Manager to the Architect requesting clarification of a portion of the Contract Documents, hereinafter referred to as RFI.
   2. A properly prepared RFI shall include a detailed written statement that indicates the specific Drawings or Specification in need of clarification and the nature of the clarification requested.
      a. Drawings shall be identified by drawing number and location on the drawing sheet.
      b. Specifications shall be identified by Section number, page and paragraph.
      c. The Construction Manager shall provide suggestions or alternate solutions to the RFI if such suggestions are known or should be known.

B. Improper RFI's:
   1. RFI's that are not properly prepared, as required above.
   2. Improper RFI's will be processed by the Architect, the Construction Manager is responsible for such costs which will be deducted from monies due the Construction Manager. The Construction Manager will be notified by the Architect of the "back charge" amounts.

C. Frivolous RFI's:
   1. RFI's that request information that is clearly shown on the Contract Documents.
   2. Frivolous RFI's will be returned unanswered.

1.3 CONSTRUCTION MANAGER'S REQUESTS FOR INFORMATION

A. When the Construction Manager is unable to determine from the Contract Documents, the material, process or system to be installed, the Construction Manager shall submit an RFI to the Architect requesting a clarification of the indeterminate item.
   1. When possible, such clarification shall be requested at the next appropriate project meeting, with the response entered into the meeting minutes. When clarification at the meeting is not possible, either because of the urgency of the need, or the complexity of the item the Construction Manager shall prepare and submit an RFI to the Architect.

B. Individual Contractors and Each subcontractor shall endeavor to keep the number of RFI's to a minimum. In the event that the process becomes unwieldy, in the opinion of the Architect, because of the number and frequency of RFI's submitted, the Architect may require the Construction Manager to abandon the process and submit future requests as submittals, substitutions, or requests for change.

C. RFI's shall be submitted on a form acceptable to the Architect. Forms shall be completely filled in, and if prepared by hand, shall be fully legible after photocopying or electronic transmission in PDF format. Each page of attachments to RFI's shall bear the RFI number in the lower right corner.

D. RFI's shall be originated by the Construction Manager, individual contractors, or subcontractors as appropriate. Construction Manager shall endeavor to address and resolve subcontractor's RFI's to the extent possible for issues which are obviously covered by the Contract Documents, before forwarding to the Architect for processing.

1. RFI's from contractors, subcontractors or material suppliers shall be submitted through, reviewed by, and signed by the Construction Manager prior to submittal to the Architect.
2. RFI's shall be processed and sent to the Architect from the Construction Manager only. RFI's received by the Architect or the Architect's consultants from other parties shall not be accepted and will be returned unanswered.

E. Each subcontractor shall carefully study the Contract Documents to assure that the requested information is not available therein. RFI's which request information available in the Contract Documents will be deemed either "improper" or "frivolous" as noted above.

F. In cases where RFI's are issued to request clarification of coordination issues, for example pipe and duct routing, clearances, specific locations of work shown diagrammatically, and similar items, the Construction Manager shall fully lay out a suggested solution using drawings or sketches drawn to scale, and submit same with the RFI. RFI's, which fail to include a suggested solution, will be returned unanswered with a requirement that the Construction Manager submit a complete request.

G. RFI's used for the following purposes will be returned without review:

1. To request approval of submittals.
2. To request approval of substitutions.
3. To request coordination information already indicated in the Contract Documents.
4. To request changes which entail adjustments in the Contract Time or the Contract Sum (additional cost or credit).
5. To request different methods of performing work than those drawn and specified.
6. To request interpretation of Architect/Engineer's actions on submittals.
7. Incomplete RFI's or RFI's with numerous errors.

H. In the event the Construction Manager believes that a clarification by the Architect results in additional cost or time, Construction Manager shall not proceed with the

Work indicated by the RFI without a written authorization from the Architect. RFI's shall not automatically justify a cost increase in the Work or a change in the Schedule.

1. Answered RFI's shall not be construed as approval to perform extra work.
2. Unanswered RFI's will be returned with a stamp or notation: Not Reviewed.

I. Construction Manager will prepare and maintain a log of RFI's and provide updated copies at the weekly Construction Progress Meetings showing outstanding RFI's.

J. RFI Response: The Architect will endeavor to respond in a timely fashion to RFI's, however, the following minimum time periods are required. RFI's which are received by the Architect after 1PM local time shall be considered received on the following working day.

1. RFI's which require only Architect's Response: Construction Manager shall allow up to ten (10) calendar days review and response time,
2. RFI's which require Architect's and an Engineering or Consultant Response: Construction Manager shall allow up to fifteen (15) calendar review and response time.

1.4 ARCHITECT'S RESPONSE TO RFI'S

A. Architect will respond to RFI's on one of the following forms:

1. Properly prepared RFI's:
   a. Response on the RFI form.
   b. Architect's Supplemental Instruction.
   c. Request for Proposal.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

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Section 01 29 00
PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Schedule of Values.

B. Applications for payment.
   1. Procedures for application for payment.
   2. Initial application for payment.
   3. Monthly application for payment.
   4. Application for payment at substantial completion.
   5. Final payment application.

C. Payment for stored materials.

D. Change procedures.

1.2 COORDINATION

A. Coordinate the Schedule of Values and Applications for Payment with the Construction Manager's Construction Schedule, List of Subcontracts, and Submittal Schedule.
   1. Related Requirements:
      a. Section 01 32 00 – CONSTRUCTION PROGRESS DOCUMENTATION: Construction Manager's Construction Schedule.
      b. Section 01 33 00 - SUBMITTAL PROCEDURES: Construction Manager's Construction Submittal Schedule.

1.3 SCHEDULE OF VALUES

A. Coordinate preparation of the Schedule of Values with preparation of the Construction Manager's Construction Schedule.
   1. Schedule of values shall be used only as basis for Construction Manager's application for payment.
   2. Include as one line item on the schedule of values the dollar value of specified shop drawings; manufacturer’s technical literature, specifications, illustrations, and product data; calculations; physical samples; test reports; maintenance data; certifications; schedules; and other submittals specified in individual Sections of the Project Manual.
   3. Breakdown schedule of values into separate line items for each Specification Section, each line item having a value of not more than $25,000.
      a. Additionally provide break-out of the following specific items as individual line items:
         1) Mock-ups.
         2) Submittals.
         3) Extra stock.

4) Cost for Construction Manager's 1 year basic service contract, and all contracted service contracts.
5) As-built updates to list of required submittals for payment.

4. Break-out Construction Manager's 1 year warranty for each product item.

B. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
   1. Construction Manager's construction schedule.
   2. Application for Payment form.
      a. List of subcontractors.
      b. List of products.
      c. List of principal suppliers and fabricators.
      d. Schedule of submittals.

C. Submit typewritten schedule of values to the Architect at least 10 days prior to submitting first application for payment.

D. Sub-Schedules: Where the Work is separated into phases that require separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

E. Identification: Include the following Project identification on the Schedule of Values:
   1. Project name and location.
   2. Name of the Architect.
   3. Project number.
   4. Construction Manager's name and address.
   5. Date of submittal.

F. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:
   1. Generic name.
   2. Related Specification Section.
   3. Name of Trade Contractor.
   4. Name of manufacturer or fabricator.
   5. Name of supplier.
   6. Change Orders (numbers) that have affected value.
   7. Dollar value.
   8. Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent.

G. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.
   1. Upon request by Architect, submit data that will substantiate values given.

H. Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.

I. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

J. Unit Cost Allowances: Show line item value of unit cost allowances as a product of unit cost times measured quantity as estimated from the best indication in the Contract Documents.

K. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.

L. At the Construction Manager's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense.

M. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 PROCEDURES FOR APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.

1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

B. Payment Application Times: Each progress payment date is as indicated in the Agreement. The period of construction Work covered by each Application or Payment is the period indicated in the Agreement.

C. Payment Application Forms: Use AIA Document G 702 and Continuation Sheets G 703 as the form for Application for Payment, or other forms approved by the Owner’s Project Manager (OPM).

D. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.

1. Entries shall match data on the Schedule of Values and Construction Manager's Construction Schedule. Use updated schedules if revisions have been made.

2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

E. Transmittal: Submit 3 executed copies of each Application for Payment to the Architect by means ensuring receipt within 24 hours.

F. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Architect.

1.5 INITIAL APPLICATION FOR PAYMENT

A. Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:

1. List of Trade Contractors, and subcontractors, with contact information.
2. Updated insurance certificates for all Trade Contractors and subcontractors working onsite.
3. List of principal suppliers and fabricators.
4. Schedule of Values.
5. Construction Manager's Construction Schedule (preliminary if not final).
6. Schedule of principal products.
7. Schedule of unit prices.
8. Submittal Schedule (preliminary if not final).
9. List of Construction Manager's staff assignments.
10. List of Construction Manager's principal consultants.
11. Copies of building permits.
12. Copies of authorizations and licenses from governing authorities for performance of the Work.
13. Initial progress report.
14. Report of pre-construction meeting.
15. Data needed to acquire Owner's insurance.
16. Initial settlement survey and damage report, if required.
17. Names, addresses and telephone numbers of key members of Construction Manager, Superintendent and personnel at the site, to be contacted in the event of emergencies which may occur during non-working hours

1.6 MONTHLY APPLICATION FOR PAYMENT

A. Administrative actions and submittals that must precede or coincide with submittal of the period Application for payment, include the following:

1. As-built record documents, required documents and submittal records on site.
2. Copies of Construction Manager's daily reports.
3. Accepted overtime for Owner's Project Manager for each specific month.
4. Construction Manager's backup documentation for each Trade Contractor or subcontractor requesting payment.
5. Construction Manager’s construction schedule, updated, with corrective action plan as applicable.
6. Weekly up-to-date, accurate, certified submission of payroll records.

7. Pre-installation meeting conducted in accordance with Section 01 31 00, prior to first billing for any activity.
8. Material Status Report.
9. Stored Materials forms.
10. Submittal Schedule and submittal status reports.
11. Monthly Progress report and Notarized Progress report Statement from the Construction Manager's project manager stating that the work is on schedule and that the Construction Manager will meet the Substantial Completion date for the Work and the Substantial Completion dates for every portion thereof as established under Construction Phasing Schedule Section.
12. Construction progress photographs.
13. Quality control reports and procedures in compliance with Section 01 45 00 - QUALITY CONTROL.
14. Summary of Project waste and diversion report (updated each month) in compliance with Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

1.7 APPLICATION FOR PAYMENT AT SUBSTANTIAL COMPLETION:

A. Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

B. Administrative actions and submittals that shall proceed or coincide with this application include:
   1. Occupancy permits and similar approvals.
   2. Warranties (guarantees) and maintenance agreements.
   3. Test/adjust/balance records.
   4. Maintenance instructions.
   5. Meter readings.
   6. Start-up performance reports.
   7. Change-over information related to Owner's occupancy, use, operation and maintenance.
   8. Final cleaning.
   9. Application for reduction of retainage, and consent of surety.
   10. Advice on shifting insurance coverage.
   11. Final progress photographs.
   12. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.
   13. Final summary of Project waste and diversion report in compliance with Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

1.8 FINAL PAYMENT APPLICATION

A. Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:

1. Completion of Project Closeout requirements.
2. Completion of items specified for completion after Substantial Completion.
3. Assurance that unsettled claims will be settled.
    a. Assurance that Work not complete and accepted will be completed without undue delay.
4. Transmittal of required Project construction records to Owner.
5. Certified property survey.
6. Proof that taxes, fees and similar obligations have been paid.
7. Removal of temporary facilities and services.
8. Removal of surplus materials, rubbish and similar elements.
9. Change of door locks to Owner's access.

1.9 PAYMENT FOR STORED MATERIALS

A. Provide supporting documentation for the value of stored materials. Acceptable form of supporting documentation include a certified and notarized invoice from the manufacturer or supplier which indicates the actual amount due, including discounts to which the Construction Manager may be entitled, and the date which the invoice was paid.

B. Provide notice to Architect 48 hours in advance, and provide transportation for Architect and Owner’s Representative to the site where materials are stored to permit inspection of the materials.

C. With Application for Payment, submit notarized certificate of title and evidence of insurance for materials stored off-site.

D. With each subsequent Application for Payment, indicate in the appropriate columns the value of stored material which has been taken from off-site location and brought to the project site. Provide supporting documentation.

1.10 CHANGE PROCEDURES

A. The Architect will advise of minor change in the Work not involving adjustment to Contract Sum/Price or Contract Time as authorized under the General and Supplementary Conditions of Contract, by issuing supplemental instructions on AIA Form G710.

B. The Architect may issue a Proposal Request or Notice of Change which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the request price will be considered valid. The Construction Manager will prepare and submit an estimate within 10 days.

C. The Construction Manager may propose changes by submitting a request for change to the Architect describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time and full documentation and a statement describing the effect on Work by Trade Contractors and other subcontractors.

Document any requested substitutions in accordance with Section 01 25 13 - PRODUCT SUBSTITUTION PROCEDURES.

D. Stipulated Sum/Price Change order:

1. Based on Proposal Request or Notice of Change and Contractors price quotation or Contractors request for a Change Order as approved by the Architect.

E. Unit Price Change Order:

1. For a pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under a Construction Change Directive. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.

F. Construction Change Directive:

1. Architect may issue a directive on AIA Form G713 CONSTRUCTION CHANGE DIRECTIVE signed by the Owner instructing the Construction Manager to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work and designate method of determining any change in Contract Sum/Price or Contract Time.
2. Promptly execute the change.

G. Time and Material Change Order:

1. Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract. Architect will determine the change allowable in Contract Sum/Price and Contract Time as provided in the Contract Documents.
2. Maintain detailed records of work done on Time and Material basis. Document each quotation for a change in cost or time with sufficient data to allow evaluation of proposed changes and to substantiate changes in the Work.

H. Documentation of change in Contract Sum/Price and Contract Time:

1. Change order Forms: AIA G701CM CHANGE ORDER.
2. Maintain detailed records. Document each quotation for a change in cost or time with sufficient data to allow evaluation of the quotation.
3. On request, provide additional data to support computations:
    a. Quantities of products, labor and equipment.
    b. Taxes, insurance and bonds.
    c. Overhead and profit.
    d. Justification for any change in Contract Time.
    e. Credit for deletions from Contract, similarly document.
4. Support each claim for additional costs and for work done on a time and material basis, with additional information:
    a. Origin and date of claim.
    b. Dates and times work was performed, and by whom.
    c. Time records and wage rates paid.

d. Invoices and receipts for products, equipment , and subcontracts, similarly documented.

l. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

Section 01 31 00
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Project coordination.

B. Project meetings.

1.2 GENERAL PROJECT COORDINATION

A. Coordination: The Construction Manager is fully responsible for coordinating the Work of this Contract including scheduling, submittals, LEED certification, Work and other activities included in various Sections to assure efficient and orderly sequence of installation of interdependent construction elements. The Construction Manager is responsible for coordinating actual installed location and interface of work, and to make provisions to accommodate items scheduled for later installation.

B. Where installation of one component depends on installation of other components before or after its own installation, schedule activities in the sequence required to obtain efficient installation with the least amount of alterations, or cutting and patching, to completed Work.

1. The Contractor shall be responsible to uncover work completed in order to install ill-timed work, at no additional cost to the Owner.

C. Where space is limited, coordinate installation of different components to assure maximum accessibility for maintenance, service and repair.

D. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service such equipment.

F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

G. Coordinate completion and clean up of Work of separate Sections in preparation for Substantial Completion and Owner’s occupancy.

H. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner’s activities.

1.3 UTILITIES, MECHANICAL AND ELECTRICAL COORDINATION

A. Coordinate all Work of this Project. Provide full and complete coordination for utilities, mechanical and electrical work in Divisions 11, 13, 21 through 28 and 33, with Work of other Divisions.

1. Each Trade Contractor shall compare his drawings and specifications with those of other Trades and report any discrepancies between them to the Construction Manager. The Construction Manager shall obtain from the Architect written instructions for changes necessary in the mechanical or electrical work, to ensure that all work is installed in coordination and cooperation with other Trades installing interrelated work. Before installation, each Trade Contractor shall make proper provisions to avoid interferences in a manner approved by the Architect. All changes required in the work of each Trade Contractor caused by his negligence, shall be corrected by him at his own expense, to the Architect's satisfaction.

B. Give all advance notice to public utility companies as required by law, and provide proper disposition, subject to Architect’s approval of all existing pipe lines, conduits, sewers, drains, poles, wiring, and other utilities that in any way interfere with the Work, whether or not they are specifically shown on the Drawings.

C. Coordination regarding existing utilities:

1. Notify Owner and appropriate authorities when coming across an unknown utility line(s), and await decision as to how to dispose of same.
2. When an existing utility line must be cut and plugged or capped, moved, or relocated, or has become damaged, notify the Owner and Utility company involved, and assure the protection, support, or moving of utilities to adjust them to the new work.
3. The Contractor shall be responsible for all damage caused to existing, active utilities located within the limits of this Contract, whether or not such utilities are shown on the Drawings, including resultant damages or injuries to persons or properties.

D. General coordination of piping, ductwork, conduits and equipment:

1. The Contract Drawings are diagrammatic only intending to show general runs and general locations of piping, ductwork, equipment and sprinkler heads. Determine exact routing and location of individual systems prior to fabrication of components or installation.
    a. Piping runs requiring pitch have “right-of-way” over those systems that do not pitch.
    b. System components whose elevations cannot be changed have “right-of-way” over those components whose elevations can be changed.
2. Adjust locations of piping, ductwork, conduits and equipment as required to accommodate new work with interferences anticipated and as encountered during installation.
    a. Locate piping, conduits and ductwork to be clear of swinging doors, access doors, and clear for unimpeded equipment access.
3. Provide all offsets, transitions and changes of direction for all systems, as may be required to maintain proper clearances for headroom, and as may be

required for coordination with other “fixed-in-place” building components (such as structural systems).

a. Furnish all vents, drains and similar accessories as may be required for offsets, transitions and changes of direction.

4. Provide openings in the work for penetration of mechanical and electrical work.

5. Coordinate final locations of ceiling mounted devices (including air distribution devices, thermostats, heaters, control devices, sprinkler heads and similar work) with reflected ceiling plans. Review locations with Architect and obtain approval of all devices prior to installation.

1.4 COORDINATION DOCUMENTS

A. General: Prepare coordination drawings for areas where close coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space necessitates maximum utilization of space for efficient installation of different components.

1. Coordination Drawings include, but are not necessarily limited to:

a. Structure.

b. Partition/room layout.

c. Ceiling layout and heights.

d. Light fixtures.

e. Access panels.

f. Sheet metal, heating coils, boxes, grilles, diffusers, and similar items.

g. All heating piping and valves.

h. Smoke and fire dampers.

i. Soil, waste and vent piping.

j. Major water.

k. Rain water drainage piping.

l. Major electrical conduit runs, panelboards, feeder conduit and racks of branch conduit.

m. Above ceiling miscellaneous metal.

n. Sprinkler piping and heads.

o. All equipment, including items in the Contract as well as OFCI and OFI items.

p. Equipment located above finished ceiling requiring access for maintenance and service. In locations where acoustical lay-in ceilings occur, indicate areas in which the required access area may be greater than the suspended grid system.

q. Seismic Restraints.

B. Timing: Prior to fabricating materials or beginning work, supervise and direct the creation of one complete set of coordination drawings showing complete coordination and integration of work, including, but not limited to, structural, architectural, mechanical, plumbing, fire protection, elevators, and electrical disciplines.

C. Intent: Coordination drawings are for the Construction Manager's and Trade-Contractor's use during construction and are not to be construed as replacing shop drawings or record drawings. Architect's review of submitted coordination drawings shall not relieve the Construction Manager from his overall responsibility for the coordination of the Work of the Contract.

D. Base sheets: Architect will provide CAD files for use by the Construction Manager and Trade Contractors for the development of building coordination drawing "base sheets" upon signed receipt of Architect's disclaimer form. Construction Manager is responsible to preparation of, and furnishing one accurately scaled set of building coordination drawing "base sheets" showing all architectural and structural work. Base sheets shall be at appropriate scale; congested areas and sections through vertical shafts shall be at larger scale.

1. Highlight all fire rated and smoke partitions.
2. Indicate horizontal and vertical dimensions to avoid interference with structural framing, ceilings, partitions, and other services.
3. Indicate elevations relative to finish floor for bottom of ductwork and piping and conduit (6 inches and greater in diameter).
4. Indicate the main paths for the installation, or removal of, equipment from mechanical and electrical rooms.

E. Construction Manager shall circulate coordination drawings to the following Trade Contractors, subcontractors and any other installers whose work might conflict with other work. Each of these subcontractors shall accurately and neatly show actual size and location of respective equipment and work. Each subcontractor shall note apparent conflicts, suggest alternate solutions, and return drawings to Construction Manager.

1. Elevator Trade Contractor.
2. Plumbing Trade Contractor.
3. Fire protection Trade Contractor r.
4. Heating ventilating and air conditioning Trade Contractor.
5. Electrical Trade Contractor.

F. Construction Manager is responsible to review and modify and approve coordination drawings in cooperation with Trade Contractors, individual installers and subcontractors to assure conflicts are resolved before work in field is begun and to ensure location of work exposed to view is as indicated or as approved by Architect.

1. The Construction Manager shall stamp, sign and submit coordination drawing originals to Architect for review.
2. Do not commence work in areas described in the coordination drawings until receipt of Architect's comments.

1.5 GENERAL PROJECT ADMINISTRATION

A. Prepare memoranda for distribution to each party involved outlining required coordination procedures. Include required notices, reports, and attendance at meetings.

B. Prepare similar memoranda for the Owner and separate contractors where coordination of their Work is required.

C. Conduct conferences among Trade Contractors and other contractors, subcontractors and others concerned with the Work, to establish and maintain coordination and schedules, and to resolve coordination matters in dispute.

D. Administrative Procedures: Coordinate scheduling and timing of administrative procedures with other activities to avoid conflicts and ensure orderly progress. Such activities include:

1. Preparation of schedules.
2. Installation and removal of temporary facilities.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Project Closeout activities.

1.6 SITE MOBILIZATION CONFERENCE

A. In addition to the pre-bid conference specified under Section 00 11 16 - INVITATION TO BID, the Architect may, prior to commencement of the Work, schedule a meeting at a meeting room provided by the Owner.

1. Attendance is required by Owner, Architect, Owner's Project Manager, engineering consultants, Construction Manager's Project Manager and Superintendent, Construction Manager's LEED Representative, Trade Contractors, and other major subcontractors, applicators, installers and suppliers. Other persons are required to attend as the Architect may direct or the Construction Manager may wish to have present.
2. Items of Agenda:
   a. Use of premises by Owner, Contractor, and subcontractor(s).
   b. Owner's requirements and partial occupancy considerations.
   c. Demolition procedures, identity tagging of existing furnishings and equipment for salvage or disposal.
   d. Temporary utilities.
   e. Barricading and protection of the public, dust barriers.
   f. Survey and building layout.
   g. Wetlands protection.
   h. Potentially difficult areas of work.
   i. Project coordination.
   j. Construction-waste management and recycling procedures.
   k. LEED Certification requirements and procedures.
   l. Indoor air quality standards and testing requirements.
   m. Security and housekeeping procedures.
   n. Construction schedules.
   o. Work beyond Contract Limit.
   p. Procedures for testing and inspection.

q. Procedures for maintaining record documents.

r. Requirements for equipment start-up.

s. Inspection and acceptance of equipment put into service during construction period.

1.7 PRE-INSTALLATION/PRE-FABRICATION CONFERENCES

A. When required in individual specification sections, prior to commencing the work of that trade, convene a pre-installation conference at work site, if possible, on same day as weekly progress meeting.

B. Notify Architect and Owner's Project Representative a minimum of one week in advance of meeting date.

C. Attendance is required by Construction Managers' Project Manager and Superintendent, and parties directly affecting, or affected by, work of the Section.

1.8 COORDINATION MEETINGS

A. In addition to other specified meetings and additional meetings as required. General Contractor shall hold project coordination meetings, at least monthly at regularly scheduled times. Hold meetings more frequently when necessary to ensure full coordination of work. Request representation at each meeting by every entity involved in coordination or planning for work of the entire project. Conduct meetings in a similar manner to progress meetings, to resolve coordination problems.

B. Keep minutes of coordination meetings and distribute copies to all attendees, related parties and to Owner, Resident Project Representative(s), Architect and its engineering consultants within 3 business days following meeting. Coordination meetings shall continue on an appropriate schedule, even after completion of coordination drawings by Contractor, to review progress and resolve minor conflicts not identified in the coordination drawings.

C. The following trades shall participate in coordination meetings, preparation of coordination drawings and reviews. Additional trades shall participate as the Contractor deems necessary for proper coordination of the Work.

1. Concrete work.
2. Masonry.
3. Structural steel, light gage metal framing and metal fabrications.
4. Rough carpentry.
5. Air and vapor barrier work.
6. Finish wall and ceiling construction.
7. Food service equipment.
8. Elevators.
9. Fire protection systems.
10. Plumbing systems, including roof drainage, waste and vent systems and distribution.
11. Ductwork including appurtenances and equipment.

12. HVAC piping.
13. HVAC equipment and controls.
14. Electrical lighting, power, communications and signaling, fire detection and related systems.
15. Excavation, site utilities and site improvements.

D. All adjustments necessary to achieve full coordination shall be determined in a timely manner, so as not to delay the work. Include time necessary for consideration by the Architect and Resident Project Representative(s) for proposed modifications. No claim for additional compensation for extension of time arising from delays due to failure of Contractor to identify potential conflicts requiring coordination in a timely manner or from additional work made necessary by such failure will be valid.

1.9 PROGRESS MEETINGS

A. The Construction Manager shall schedule and administer meetings throughout the progress of the Work at regular intervals; make arrangements for meetings, prepare agenda with copies for participants, preside at meeting and record minutes.

1. Distribute copies within 24 hours to Architect, Owner and participants, and to those affected by decisions made. Architect will review and send comments within 2 working days from receipt of minutes.
2. Scheduled Frequency of Meetings: Weekly.

B. Attendance: Required are Construction Manager's Project Manager and Project Superintendent, and each Trade Contractor, applicator, installer, and supplier whose work is on-going or scheduled. Owner, Architect, engineering consultants, and other persons are required to attend as the Architect may direct. Subcontractors, vendors, suppliers shall be present at meetings upon request of Contractor.

1. Attendee Authority: Trade Contractors, subcontractors and supplier representatives present at meetings shall have authority to act for and make commitments for, the entity which they represent.
2. Restricted Attendance: Owner and Architect reserve the right to expel or exclude from any Progress Meeting any person(s) or company representative(s) without statement of reason or excuse.
3. Attendance of Architect's Consultants: Construction Manager shall make an attendance request for specific Architect's consultants and engineers at least 72 hours in advance of the meeting. Clearly identify In the request all consultant related issues and topics to be discussed at the meeting. The Architect will decide if its consultant or engineer will attend.
4. Attendance of Owner's Independent Consultants: Construction Manager shall make an attendance request for specific Owner's consultants at least 72 hours in advance of the meeting. Clearly identify In the request all consultant related issues and topics to be discussed at the meeting. The Owner will decide if its consultant(s) will attend.

C. Items of Agenda:

1. Review minutes of previous meetings.

2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identifications of problems which impede planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Coordination of projected progress.
10. Maintenance of quality and work standards.
11. Progress of Work to be adjusted under coordination requirements, and effect of proposed changes on progress schedule and coordination.
12. Review of construction waste management and recycling performance, material quantities disposed and diverted for recycling.
13. LEED Certification Progress Report.
14. Other business relating to Work.

1.10 SPECIAL PROJECT MEETINGS AND BUILDING COMMITTEE MEETINGS

A. Special project meetings: The Construction Manager shall conduct special project meetings as required throughout the course of the Work. Special Project Meetings are those held in addition to the regularly scheduled progress meetings. The Architect and Owner are not required to attend these meetings. Special meeting issues include, but are not limited to:
   1. Safety issues.
   2. Labor issues.
   3. Construction waste management and recycling issues.
      a. Review of construction waste management and recycling, including waste stream diversion progress updates.
   4. Special scheduling issues.

B. Environmental Quality Review Meetings: The Construction Manager shall conduct special Environment Quality review meetings throughout the course of the Work.
   1. Meetings may be held in conjunction with dates of Project Progress Meetings. The Construction Manager shall notify both the Owner and Architect at least 7 days in advance of the meeting dates. The General Contractor along with any requested or necessary Trade Contractors, subcontractors, applicators, vendors or material suppliers shall attend.
   2. Meeting shall include the following topics:
      a. Review of construction waste management and recycling.
      b. Review of sustainability / environmental related submittals and update on LEED Certification progress.
      c. Review of indoor air quality testing.

C. Building Committee Meetings: Construction Manager is advised of obligation to attend Building Committee Meetings (may be held in evenings) as requested by Owner's Project Manager (OPM), at no additional cost to the Contract.

D. Additional Special Meetings requested by the Architect or Owner: The Construction Manager along with any requested or necessary Trade-Contractors, subcontractors, applicators, vendors or material suppliers shall attend additional meetings when requested by the Architect or Owner as they deem necessary. Such meetings may be convened on short notice if conditions at the project site so require and attendance is mandatory. The Architect and Owner are not limited as to the number of additional meetings that may be requested, or the agenda for such meetings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

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Section 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Survey and layout data.

B. Critical Path Method (CPM) scheduling of the Work.

C. Contract progress reporting.
   1. Look ahead activity reports.
   2. Special Reports - Unusual Event Reporting.

D. Work Documentation:
   1. Periodic site observations.
   2. Verification of built tolerances.
   3. Construction progress photographs.
   4. LEED documentation photographs.
   5. Construction progress video taping.

1.2 SURVEY AND LAYOUT DATA

A. Prior to starting any construction work, stake out all limits of cut and fill, the limits of proposed walkways and site improvements. Promptly upon completion of layout work and before any construction work is begun on the site, notify the Architect and Owner's Project Manager (OPM), who shall conduct a field inspection of the stakeout. The Architect reserves the right to adjust the location of such layouts as it deems necessary to comply with the intent of the Contract Documents.

1.3 CRITICAL PATH METHOD (CPM) SCHEDULING OF THE WORK

A. Definitions:
   1. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
      a. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
      b. Predecessor activity is an activity that must be completed before a given activity can be started.
   2. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
   3. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.
   4. Event: The starting or ending point of an activity.

5. Float: The measure of leeway in starting and completing an activity.
    a. Float time is not for the exclusive use or benefit of either Owner or Construction Manager, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Date of Substantial Completion.
    b. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
    c. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
6. Fragnet: An amplified portion of the CPM schedule, to study a special sequence or establish a difficult time estimate, showing its predecessors, successors and impacts.
7. Major Area: A story of construction, a separate building, or a similar significant construction element.
8. Milestone: A key or critical point in time for reference or measurement.
9. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

B. General CPM Requirement: The Construction Manager shall develop and maintain a Network Diagram to demonstrate fulfillment of the contract requirements and shall utilize the plan for scheduling, coordinating and monitoring the Work (including all activities of subcontractors, equipment vendors and suppliers). A conventional Critical Path Method (CPM) Precedence Diagramming Method (PDM) technique will be utilized to satisfy both time and cost applications.

C. Preliminary CPM Schedule: Submit for Architect's and Owner's review Critical Path Method (CPM) construction schedule in triplicate within 45 calendar days after date of commencement stated on Notice to Proceed. Revise and resubmit as required.
1. Before the first progress payment can be approved, the Construction Manager must have an approved CPM Schedule as described herein. It is the Construction Manager's responsibility to submit the CPM schedule with sufficient time for review by the Owner and Architect and any re-submittals and corresponding reviews that may be necessary prior to approval of the first requisition.
2. Software: Provide to the Architect one complete and legal copy of all software used to prepare the CPM Progress Schedule. Include documentation and user manuals. Software and CPM provided by the Construction Manager shall be fully compatible and useable with Microsoft's "Windows" operating system. Software provided to the Architect will be used solely for "this project only".
3. Supporting data: Submit the following supporting data in addition to the CPM Network Plots:
    a. The proposed number of working days per week.
    b. The holidays to be observed during the life of the contract (by day, month, and year).
    c. The planned number of shifts per day.
    d. The number of hours per shift.

e. List the major construction equipment to be used on the site, describing how each piece relates to and will be used in support of the submitted network diagram work activities/events.

D. CPM Progress Schedule shall be as described below:

1. Network Diagram Plots, General: The network diagram shall be an activity or arrow diagram. The diagram shall show relationships between the various activities. Exercise sufficient care to produce a clear, legible and accurate network diagram. Group activities related to specific physical areas of the project, on the network diagram for ease of understanding and simplification. Provide a key plan on each network diagram sheet showing the project area associated with the work activities/events shown on that sheet.
2. Work Activities (not less than 200 lines), as a minimum include:
   a. All major, and critical minor portions of the work.
      1) Break up the work into activities/events of a duration no longer than 20 work days each, except as to non-construction activities/events (for example: procurement of materials, delivery of equipment, curing times) and any other activities/events for which the Architect may approve the showing of a longer duration.
   b. Fabrication and delivery time for each item requiring off site fabrication.
   c. Each mock-up and in-place sample.
   d. Temporary facilities and controls.
3. Show not only the activities/events for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area, floor, or building, to another area, floor, or building, for at least five trades who are performing major work under this contract.
4. Identify all events on which the work is dependent on actions of Architect and Owner, including:
   a. Submittal of shop drawings, equipment schedules, samples, color submission, coordination drawings, templates, fabrication and material delivery times.
   b. Architect/Engineer's review of shop drawings, equipment schedules, samples and templates as defined under Section 01 33 00. Construction Manager shall additionally schedule and allow for in the CPM Progress Schedule time for Architect's response to Construction Manager' s request for clarifications and interpretations of the Contract Documents. Time required for such activity, up to 10 or more days, is part of the normal construction process and is not a valid reason for extension of Contract Time, nor increase in the Contract Amount.
   c. Delivery times of equipment furnished under separate Contracts with Owner, where the Construction Manager has responsibility for installation or coordination.
   d. Interruption of Owner's existing utilities, delivery of Owner furnished products (OFI and OFCI), rough-in drawings for OFI and OFCI products, project phasing and Owner's scheduling and use of site requirements.
   e. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.

5. Activity Descriptive Information: identify the following for each work activity/event:
    a. Activity/Event ID number. (Uniquely number each activity/event.. The network diagram should be generally numbered in sequence; left to right; top to bottom, and omitting numbers ending in 3, 6, and 9).
    b. Concise description of activity (35 characters or less including spaces preferred).
    c. Work location code, coordinated with key plan.
    d. Performance responsibility or trade code using defined and approved abbreviations.
    e. Nodes that correspond to the activities on the network diagram.
    f. Duration (in work days).
    g. Early Start (calendar day).
    h. Late Start (calendar day).
    i. Early Finish (calendar day).
    j. Late Finish (calendar day).
    k. Total float time.
    l. Manpower required (average number of men per day).
    m. Work Activity/Event Cost Data (as described below).

E. CPM Submittal Requirements: Submit three copies of Network Plots, and have approved an updated CPM prior to the approval of each progress payment.
    1. Plot format (each submittal): Colored plots (minimum 30 by 40 inches) and a CD-ROM disc.
        a. Electronic info shall be in compressed Primavera, (PDM) format.
    2. Plots and reports required:
        a. Network diagram plots.
            1) Bar chart plot.
            2) Time logic plot.
            3) Critical Path items of work only plot.
            4) Early start and finish plot.
            5) Late start and finish plot.
            6) Individual monthly activity plots for each month for the duration of the entire Contract.
        b. Activity List.
        c. Shop drawing and sample submittal schedule.
    3. Updates: Update and reissue the CPM Progress Schedule in coordination with each application for progress payment. Submission of complete and accurate monthly CPM Progress Schedules is a pre-requisite to the Architect's Certificate of Payment. The updated CPM; shall include the items specified herein above, in addition the updated CPM shall show the following:
        a. Changes to the Contract and their effect on the schedule and Activity/event costs.

b. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.

c. Revisions to schedule as required to reflect actual prosecution and progress of the Project. Show current status of activities completed or partially completed. Identify actual start dates and finish dates for each activity.

d. Modifications to the Construction Manager's plan of action for future activities.

F. Work Activity/Event Cost Data:

1. Provide cost loading for all work activities/events except procurement activities. The cumulative amount of all cost loaded work activities/events (including alternates) shall equal the total contract price. Prorate overhead, profit and general conditions on all work activities/events for the entire project length. The Construction Manager shall generate from this information cash flow curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish. These cash flow curves will be used by the Architect to assist him in determining approval or disapproval of the cost loading.

   a. In the event of disapproval, the Construction Manager shall revise and resubmit.

   b. Negative work activity/event cost data will not be acceptable.

2. Provide cost loading for work activities/events related to guarantee period services, and system testing, balancing and adjustment.

G. Special CPM Progress Schedule Meetings: The Owner may require additional special CPM review meetings at any time during the Contract to review the CPM Progress Schedule updates.

H. Responsibility for Project Completion:

1. Whenever it becomes apparent from the current progress review meeting or the updated CPM progress schedule that phasing or contract completion dates will not be met, the Construction Manager shall execute some or all of the following remedial actions:

   a. Increase construction manpower in such quantities and trades as necessary to eliminate the backlog of work.

   b. Increase the number of working hours per shift, shifts per working day, working days per week (pending approval of Owner), the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.

   c. Reschedule the work in conformance with the specification requirements.

2. Prior to proceeding with any of the above actions, the Construction Manager shall notify and obtain approval from the Owner’s Representative for the proposed schedule changes. If such actions are approved, the CPM revisions shall be incorporated by the Construction Manager into the network diagram before the next update, at no additional cost to the Owner.

I. Extension of Contract Time: Each time an extension of Contract Time is requested, submit the request with justification and evidence supporting the request and submit a completely revised and updated CPM Project Schedule showing the

impact of the proposed extension of Contract Time on the Progress Schedule. Construction Manager Time may only be adjusted by Change Order issued by the Owner.

1.4 CONTRACT PROGRESS REPORTING

A. Look ahead activity reports: Prepare each week throughout the term of construction a listing of upcoming construction activities. Each weekly report shall include a listing of planned construction activities for the upcoming 2 weeks (14 calendar days). Submit a Look Ahead Activity Report at each job meeting to all participants. If no meeting is planned on a given week, mail the reports directly to both Architect/Engineer and Owner's Project Representative.

1. Maintain a record of all Look Ahead Activity Reports in a 3-ring binder in the Construction Manager's field office and make available for review by Architect/Engineer and Owner's Project Representative.

B. Special Reports:

1. Unusual Event Reporting: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Construction Manager's personnel, evaluation of results or effects, and similar pertinent information.

1.5 WORK DOCUMENTATION - PERIODIC SITE OBSERVATIONS

A. Observe and maintain a record of tests. Record the following:

1. Specification section number, product(s), and name of subcontractor or installer.
2. Name of testing agency and name of inspector.
3. Name of manufacturer's representative present.
4. Date, time and duration of tests.
5. Type of test and results.
6. Retesting required.

B. Observe startup and adjustments; record time and date of equipment start-up and results.

C. Observe equipment demonstrations to Owner; record times and additional information required for operation and maintenance manuals.

D. Assist Architect/Engineer with final inspections. Prepare list of items to be completed and corrected.

1.6 WORK DOCUMENTATION - VERIFICATION OF BUILT TOLERANCES

A. Verification of as-built tolerances: Frequently review work to ensure compliance with Contract Document requirements and verify built construction is plumb, level, and in proper alignment within specified tolerances.

1. Milestone certification: Inspect and verify the Work is installed is complete and complies with the Contract Documents and is within the specified tolerances.

Submit certification to both Architect and Owner's Representative for the following milestones:

a. Completion of foundation systems and slabs on grade.
b. Completion of structural steel.
c. Completion of secondary supporting steel elements and decking.
d. Completion of light gage steel framing.
e. Completion of suspended concrete slabs.
f. Completion of exterior masonry walls.
g. Completion of interior masonry walls.
h. Completion of interior metal framing systems.

2. Improper work: Comply with requirements of Contract Documents. Correct all non-conforming and improper Work which deviates from the requirements of the Contract Documents or which exceed specified tolerances. Built work over non-conforming work is not acceptable and will require complete removal and reinstallation.

1.7 WORK DOCUMENTATION - CONSTRUCTION PROGRESS PHOTOGRAPHS

A. Furnish digital photographs of site and construction throughout the progress of Work, produced by a photographer acceptable to Architect.
   1. Submit photographic submittals on Discs: 2 copies, per submission.
      a. Progress photographs, submit monthly and at final project completion.
      b. LEED compliance photographs, submit within 3 days from date of photograph.

B. Views: Take photographs from differing directions indicating the relative progress of the Work. Take photographs monthly on date for Application of Payment, and at final completion.
   1. Prior to start of site enabling take one set of exterior photographs showing existing site conditions.
   2. As a minimum each month during the Work, furnish the following number of views (as appropriate to Work being performed):
      a. Views of site construction: 4.
      b. Exterior views of building: 4.
      c. Interior views: 6, each floor.
   3. Take additional photographs for the following major portions of work:
      a. Start and completion of site preparation.
      b. Completion of hazardous material abatement.
      c. Completion of excavations, prior to form work or footings.
      d. Completion of demolition.
      e. Completion of foundations.
      f. Each stage of completion of structural framing.
      g. Enclosure of building.

h. Provide 3 roof top photographs each month during roofing work, plus another 3 at completion of roofing and flashing work.

C. Additional photograph scope: Take additional photographs for the LEED documentation regarding IEQ Credit – *Construction Indoor Air Quality Management Plan,* which requires documenting protection of ducts, and both on-site stored or installed absorptive materials.

1. General,
   a. All photographs shall be date imprinted by camera.
   b. Furnish not less than 12 photographs per date, from at least 3 different dates as directed by Architect/Engineer. Submit with IAQ checklist.
2. Dates for LEED Document photographs shall be pre-scheduled with Architect. Photographs will occur near the beginning, middle, and end of construction
3. Views: Coordinate photograph views with Construction IAQ Management Plan to highlighting the following six requirements of SMACNA IAQ Guideline for Occupied Buildings under Construction, 2nd Edition, 2007, ANSI/SMACNA 008-208 (Chapter 3).
   a. For HVAC Protection, submit photographs demonstrating compliance with LEED requirements such as the following methods to protect HVAC work during construction.
      1) Ductwork sealed off with plastic during construction.
      2) MERV 8 filters on return ductwork, if unable to close off.
      3) HVAC equipment protected from the elements and construction debris.
   b. For Source Control, submit photographs demonstrating compliance with LEED requirements such as control methods used for the following
      1) Recover, isolate, and ventilate containers of VOC containing materials, if stored within the building.
      2) Exhaust fumes from idling vehicles and gas-powered equipment to the exterior with funnels or temporary piping, if used within the building.
   c. For Pathway Interruption, submit photographs demonstrating compliance with LEED requirements such as the following:
      1) Depressurization methods for work areas.
      2) Barriers used to contain construction area.
   d. For Housekeeping methods, submit photographs demonstrating compliance with LEED requirements for housekeeping, such as the following
      1) Ensure all surfaces in space are kept clean (remove or cover furniture before renovation).
      2) Protection of porous building materials from exposure to moisture and store in clean areas prior to installation.
   e. For Scheduling, submit photographs demonstrating compliance with LEED requirements such as the following
      1) Replacement of filtration media prior to occupancy.

D. Photograph Submissions:

1. Submission of Progress Photo Discs: Identify each disc on the back with the following information:
   a. Project identification.
   b. Date and time of exposure , and orientation(s) of view.
   c. Photographer's name, address and phone number.
2. LEED compliance photographs, submit within 3 days from date of photograph.
   a. Prints: 2 sets.
   b. Discs: 2 copies.
3. Submission of Progress Photo Prints: if requested shall be furnished a prevailing commercial rates.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

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Section 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Submittal coordination.

B. Submittal procedures and grading.

C. Schedule of Submissions.

D. Shop drawings, product data and samples.

E. Manufacturer's instructions.

F. Manufacturer's certificates.

G. Emergency addresses.

H. Erosion and sediment control program.

1.2 SUBMITTAL COORDINATION

A. If submittals are rejected or returned to the Construction Manager two times, the Construction Manager shall take appropriate action to provide an approvable final third submission. The Architect shall have no obligation to review any submittal rejected or returned 3 times.

B. General: The Construction Manager is fully responsible for delay in the delivery of materials, progress of the Work and damages incurred due to Construction Manager's failure to submit, revise and resubmit submissions in accordance with the requirements herein, and in a coordinated and timely manner.

C. Make submittals in a proper and timely fashion, allowing for administrative procedures, Architect's review, corrections to submissions and resubmittal, if necessary, and fabrication of products without delaying the project. Minimum processing times required by the Architect are as follows:

1. Review for Architect's Office only: Allow a minimum of 10 working days for review and processing. Some submittals may require additional time.
    a. Simultaneous submission of a large number of shop drawings and product data may require longer than 10 working days for review. (In particular submittals for Divisions 3, 5, 6, 21, 22, 23, 25 and 26).
    b. Complex Systems (structural, mechanical, electrical) may require longer than 10 working days for review each time shop drawings, layout drawings, and product data are submitted or resubmitted.
2. Review by Architect and its consultant(s): Allow 10 working days for review and processing of submittals by Architect plus an additional 5 working days for review by each consultant as applicable.
3. Reprocessing of submittals: For submittals requiring resubmittal, re-processing time required shall be the same as first submittal.

4. No extension of Contract Time will be authorized due to failure to transmit submittals sufficiently in advance of scheduled performance of Work.

D. Make submittals of similar items, systems, or those specified in a single specification section together.

E. Make submittals for products which other products are contingent upon, first.

F. The Construction Manager is fully responsible for delay in the delivery of materials or progress of work caused by late review of shop drawings due to failure of the Construction Manager to submit, revise, or resubmit shop drawings in adequate time to allow the Architect checking and processing of each submission or resubmission.

1.3 SCHEDULE OF SUBMISSIONS

A. Schedule procedure: Immediately after being awarded the Contract, meet with the Architect to discuss the schedule of submissions and then prepare and submit within 14 calendar days for approval a schedule of submissions for the Work. The schedule of submissions shall be related to the entire Project, and shall contain the following:

1. Shop Drawing Schedule (for shop and setting drawings to be provided by the Construction Manager).
2. Sample Schedule (for samples to be provided by the Construction Manager).
3. With respect to portions of the Work to be performed by Subcontractors, such schedule of submissions for the work of each Subcontractor shall be submitted for approval within 30 calendar days after execution of a subcontract with such Subcontractor.

B. List all submissions required of each trade:

1. Include the Specification Section number, name of subcontractor or vendor, submittal type, item, description, type, quantity and size (where applicable) of each submission.
2. For each submission, provide the following dates, as estimated:
    a. Scheduled date of submission.
    b. Required date of approval. (permit time for appropriate review and resubmissions as may be required).
    c. Estimated date of beginning fabrication or manufacture of product (where applicable).
    d. Required date of submission of product to testing laboratory.
    e. Required date of testing laboratory approval.
    f. Required date for delivery of product to site.
    g. Required date for beginning of installation of product.
    h. Required date for completion of installation (and in-place testing).
    i. Required dates for documentation as indicated in Section 01 78 00 – CLOSEOUT SUBMITTALS.
        1) Project record documents.
        2) Project record drawings.

3) Required date for operation and maintenance data and preventative maintenance instructions.
4) Materials and finishes manuals.
5) Warranties and bonds.
6) Maintenance contracts.
7) Spare parts and maintenance materials.

C. For each submittal, schedule to allow adequate time for review by the Architect and its consultants. The Architect will not be responsible for Work performed in shop or field prior to approval. Long-lead items requiring expedited action must be clearly indicated.

1. The schedule shall be reviewed and resubmitted as necessary to conform to approved modifications to the construction Project Schedule, and shall be updated as may be required by the Architect.

D. Posting of submittal schedule: Print and distribute the submittal schedule to Architect, Owner, subcontractors and other parties affected. Post copies in field.

E. Update schedule throughout progress of the Project, coordinated with scheduling changes in the Work, and redistribute monthly in conjunction with submittal of Application for Payment.

1.4 SUBMITTAL PROCEDURES AND GRADING

A. Prepare and submit to the Architect, all specified and requested submittals.

B. Provide space for Construction Manager, Architect and engineering consultant review stamps, on the front page of each item's submittal copy. Apply Construction Manager's stamp, signed or initialed certifying that review, verification of products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and the Contract Documents. The Architect's stamp shall contain the following data (Engineering consultant review stamps may vary in language, but intent of language is similar):

_____ APPROVED	_____ APPROVED AS NOTED
_____ REJECTED	_____ REVISE AND RESUBMIT
_____ REVIEWED	_____ NOT REQUIRED FOR REVIEW

1. The Architect will insert the date of action taken and an identification of the person taking the action.
2. Submittal grading:
   a. APPROVED - No corrections, no marks.
   b. REJECTED - Submittal is rejected as not in accord with the Contract Documents, too many corrections, or other justifiable reasons. When returning submission, Architect will state reasons for rejection. Correct and resubmit, do not fabricate.
   c. REVIEWED - No corrections by Architect, submittal is referred to consulting engineer(s) for review and approval or rejection. Do not fabricate rejected items or those requiring correction; revise and resubmit as directed by consulting engineer.

d. APPROVED AS NOTED - Minor corrections required are as noted; all items can be fabricated as noted, without further correction and resubmission of original submission; checking is complete and all corrections are deemed obvious without ambiguity.

e. REVISE AND RESUBMIT - Resubmission is required; checking may be incomplete; details of items noted by checker are to be clarified further before full review can be given. Correct and resubmit, do not fabricate noted items requiring correction.

f. NOT REQUIRED FOR REVIEW – Document returned without review.

3. Review/approval neither extends nor alters any contractual obligations of the Architect, Engineer or Construction Manager.

C. Identify all variations from Contract Documents, and product or system limitations which may be detrimental to successful performance of the completed work.

D. Construction Manager's review: Review all shop drawings, product data and samples. Include, without limitation, verification of the following:

1. Proper title, original date, drawing number (which shall be changed if resubmitted), revision numbers and dates, designation of project Construction Manager, subcontractor and/or supplier.

2. Identification of Shop Drawings, Product Data or Samples by Specification Section and subsection or paragraph where appropriate and identification of Contract Drawings by number and detail.

3. On each submittal, as a minimum, Construction Manager shall identify the following:

a. Errors, inconsistencies, and omissions discovered in the contract documents and field conditions must be reported at once to the Architect.

b. Any variations from code requirements contained in the contract documents must be reported promptly in writing to both the Architect and Owner.

c. Promptly report to the Architect information that any design, process, or product infringes on a patent.

d. Names of subcontractor(s) and supplier(s). Include name(s) of contact person(s), address, telephone and fax number(s).

E. Revise and resubmit submittals as required, identify all changes made since previous submittal. Distribute copies of reviewed submittals to concerned parties; instruct parties to promptly report any inability to comply with provisions.

1.5 SUBMISSION REQUIREMENTS AND QUANTITIES

A. General: Provide a cloud-based document management system such as Newforma™, Procore™, Skysite™, or similar system approved by Owner's Project Manager and Architect, dedicated for the exchange and storage of files related to this Project. All submissions (except physical samples) shall be processed through the electronic submittal system.

B. Furnish Architect with electronic files through the Adobe Acrobat Portable Document Format (PDF) files for each of the following submittal types:

1. Schedules, including, but not limited to:

a. Construction Schedule.
b. Schedule of Values.
c. Schedule of shop drawings, product data, and samples.
d. Schedule of Environmental Submissions.

2. Shop drawings.
3. Product data, manufacturer's instructions and certificates and similar submissions.
4. Erosion control program.
5. LEED Certification and Waste Management reports.
6. Emergency addresses: 1 file to Architect, and 1 file direct to Owner.

C. Furnish Architect with the following quantities of the following physical submittals:
1. Samples: Sets of 3 identical samples of each submission required.

D. General submission of physical submittals.; deliver to Architect at the following address:

Jonathan Levi Architects
266 Beacon Street
Boston, MA 02116

E. Transmit submittals to Architect at the above address, with individual transmittal forms, for each submission.
1. On transmittal form, identify Project, Contractor, subcontractor, installer, or supplier, pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate. Transmittals received by the Architect from sources other than the Contractor will be returned without any action taken.
2. Contractor shall number submittals sequentially by Specifications Section prior to submittal. Resubmitted items shall retain number and be noted as resubmitted (example 260000-1 R1).

1.6 SHOP DRAWINGS

A. General: Provide accurately prepared, large scale and detailed shop drawings prepared specifically for this Project. Shop drawings shall include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Standard information prepared without specific reference to Project are not considered shop drawings.
1. Show adjacent conditions and related work. Show accurate field dimensions where appropriate.
2. Identify materials and products shown. Note all conditions where require coordination with other trades and special installation procedures.
3. Show gage and thickness of materials.
4. Indicate welding details and joint types.
5. Show every component of fabricated items, notes regarding manufacturing process coatings and finishes, identifying numbers conforming to the Contract Documents (i.e. stair numbers, door numbers and similar items), dimensions, and appropriate trade names.

6. Show anchorage and fastening details, including type, size and spacing.
7. Review each submittal for conformity with the Contract requirements prior to submittal, certify such review on each shop drawing with Construction Manager's stamp, signature and date. Reference on shop drawings to other sections, installers, suppliers, or trade(s) shall designate the appropriate specification sections, and the term "by others" shall not be used.

B. Size of Format: Not less than 8-1/2 by 11 inches, and no larger than 30 by 42 inches, except for templates, patterns and similar full-size drawings.

C. The Architect's comments and corrections will be made on the electronic submission (PDF) and returned to the Construction Manager. If necessary, the Construction Manager then shall make the necessary corrections on the original drawings and resubmit the corrected drawings in electronic format (PDF) as specified. Prints of any submittals required for the Architect's own use, and those of engineering consultants, will be made without cost to the Construction Manager. The Construction Manager is responsible to distribute and furnish (at no additional cost to Owner) all shop documents needed for use by the Construction Manager, subcontractors, installers, vendors and suppliers.

D. Drawing submittals returned "APPROVED" or "APPROVED AS NOTED" Obtain and distribute adequate prints for construction, including one print of each for designated Owner's and Architect's Project Representative(s), and then return the originals to the subcontractor or supplier from whom he originally received them.

E. Drawing submittals returned " REVISE AND RESUBMIT " or " REJECTED ": Contractor shall first obtain a record print and then forward them to source for correction of original drawings. Resubmit corrected documents in same manner as first submission.

F. Shop Drawings returned " NOT REQUIRED FOR REVIEW ": Obtain a record print, and return originals to source; do not resubmit.

G. Each drawing shall have a title block on the right hand side containing the following data:

Name of project -	FULLER MIDDLE SCHOOL
Architect -	Jonathan Levi Architects
Owner's Project Manager-	SMMA
Construction Manager -	Consigli Construction Company
Trade Contractor:	
Subcontractor/supplier -	
Date of submission -	

H. Each drawing shall have a clear space on the right hand side for review stamps of both the Architect and Construction Manager.

1. The Construction Manager's Review and Action Stamp: Provide suitable space on label or title block for Construction Manager's review and action stamp. Stamp and sign each submittal to show Construction Manager's review and approval prior to transmittal Architect. Submittals not signed and stamped by Construction Manager will be returned without action.

a. Only submittals received from the Construction Manager will be considered for review by the Architect. Construction Manager shall review each submittal for accuracy and conformance with the requirements of the Contract Documents, and particularly for field measurements and proper fit with adjoining work. Modify submittals as required to show interface with adjacent work and attachment to Building.

b. The Construction Manager's Review and Action Stamp shall contain the following language or similar:

> APPROVED FOR CONFORMANCE
> WITH THE CONTRACT DOCUMENTS.
>
> All dimensions and quantities have been reviewed and are accepted by _____
> ***Construction Manager's Name***
>
> All dimensions and field conditions have been or will be verified prior to fabrication of the items described herein.

c. Submittals received from the Construction Manager shall be signed and comply with review requirements. Submittals not certified or improperly certified (stamped but not reviewed) will be returned to the Construction Manager without Architect's review. Claims due to the return of uncertified, improperly prepared or inadequately reviewed submittals will be rejected.

1.7 PRODUCT DATA

A. Submit Product data as specified, and as the Architect may additionally prescribe. Product data includes, but is not limited to:

1. Catalog cuts.
2. Complete specifications.
3. Standard color charts.
4. Performance data.
    a. Compliance with recognized trade association standards.
    b. Compliance with recognized testing agency standards, labels and seals.
5. Environmental data including, but not limited to:
    a. Chemical composition.
    b. VOC content.
    c. Material certifications as applicable to product.
6. Certified laboratory test report data.
7. Health and safety precautions.
8. Illustrated capacities, characteristics, wiring diagrams, controls, and other pertinent information for complete product and product use description.

B. If more than one size or type is shown on any printed sheet, indicate clearly intended item(s).

1.8 SAMPLES

A. Submit samples clearly labeled as to its material, type or make, manufacturer, size or gauge, and other pertinent data, accompanied by an appropriate transmittal form. Samples shall show full range of color and texture variation that can be expected.

1. When accepted or not accepted, the Architect will retain one set of samples and return the other to the Construction Manager. Samples will not be permitted for use in the project.

1.9 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification Sections, submit manufacturer's printed instructions for delivery, handling, storage, assembly, installation, start-up, adjusting, and finishing.

B. Identify conflicts between manufacturer's instructions and Contract Documents.

1.10 MANUFACTURER'S CERTIFICATES

A. When specified in individual specification Sections, submit manufacturer's certificates and installer certificates to Architect for review.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference date, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

D. Provide submittals required by LEED Certification for Project as specified under Section 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS.

1. LEED Certification submittal are separate and distinct from shop approval submittals and may not be combined as a joint submittal with shop approval submittals.

2. All LEED Certification submittals shall be accompanied with PRODUCT SUBMITTAL FORM.

1.11 EMERGENCY ADDRESSES

A. Within 15 days of Notice to Proceed, submit in writing, the name, addresses and telephone numbers of key members of their organization including Construction Manager's Superintendent and personnel at the site, to be contacted in the event of emergencies at the building site, which may occur during non-working hours.

1.12 EROSION AND SEDIMENT CONTROL PROGRAM

A. Submit erosion and sediment control program within 30 days after date of Owner-Construction Manager Agreement for Architect's review. Revise and resubmit as required.

B. Erosion and sediment program shall indicate proposed methods, materials to be employed, and schedule for effecting erosion and siltation control and preventing erosion damage. Provide sufficient information to fully explain the program; the following are the minimum requirements:

1. Proposed methods for actuating erosion and siltation control including 1 inch equals 40 feet (1”=40’) scale plans indicating location of erosion control devices and siltation basins.
2. List of proposed materials including manufacturer's product data, in accordance with Division 31 - EARTHWORK and Division 33 - EXTERIOR IMPROVEMENTS.
3. Schedule of and sediment control program indicating specific dates from implementing programs in each major area of Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

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Section 01 41 00

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section consists of:

1. Applicable codes and regulations.
    a. Additional authorities having jurisdiction.
2. Trade union jurisdictions.
3. Wage rate compliance.

1.2 DEFINITIONS

A. Regulations include laws, ordinances, statutes and lawful orders issued by authorities having jurisdiction, and rules, conventions and agreements within the construction industry that control performance of the Work, whether lawfully imposed by authorities having jurisdiction or not.

1.3 APPLICABLE CODES AND REGULATIONS

A. All work shall be performed in accordance with the latest version, by DATE OF ISSUE for Contract Documents, current on date of Owner-Contractor Agreement, except as indicated otherwise, of all applicable codes including the following:

1. 2015 International Building Code (IBC) with Massachusetts Building Code, Ninth Edition amendments (780 CMR).
2. 2015 International Energy Conservation Code with Massachusetts Building Code amendments, (Effective August 12, 2016 under the 780 CMR, Eighth Edition).
3. 2015 International Mechanical Code (IMC).
4. Massachusetts Electrical Code (2017 National Electrical Code [NFPA 70, 2017 edition], with Massachusetts modifications from 527 CMR 12.00).
5. Massachusetts Fuel, Gas, and Plumbing Code (2002 National Fuel Gas Code [ANSI Z223.1-NFPA 54], with Massachusetts modifications from 248 CMR 5.00).
6. Massachusetts Comprehensive Fire Safety Code (527 CMR) [2012 NFPA 1 as amended], effective January 1, 2015, as amended through November 4, 2016 and MGL Chapter 148.
7. Commonwealth of Massachusetts Regulation 521 CMR: *Architectural Access Board*.
8. Commonwealth of Massachusetts Regulation CMR 38:00 - *Regulations For Governing School Building Assistance Act*, Chapter 645, 603.
9. Massachusetts Board of Elevator Regulations (524 CMR).
10. Commonwealth of Massachusetts, Department of Public Works. “STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES CONSTRUCTION”.
11. City of Framingham Zoning Ordinances, as amended.

12. National Fire Protection Association: NFPA 241 – *Standard for Safeguarding Building Construction and Demolition Operations,* 2013 Edition.
13. United States Occupational Safety and Health Administration (OSHA): Standard Nº. 29-CFR-1926.59 - HAZARD COMMUNICATION STANDARD.
14. United States Department of Justice, Nº 28 CFR Part 36 - AMERICANS WITH DISABILITIES ACT, (Public Law 101-336).

B. Additional Agencies having jurisdiction: In addition to agencies related to the code documents listed above, the following have additional jurisdiction over this Project.
   1. City of Framingham Inspectional Services.
   2. City of Framingham Board of Health.
   3. Massachusetts Department of Environmental Protection.

C. Publication Dates: Where the date of issue of a code or regulation is not specified, comply with the standard in effect as of date of Contract Documents, or as otherwise required by authorities having jurisdiction.

1.4 TRADE UNION JURISDICTIONS

A. Maintain current information on jurisdictional matters, regulations, actions and pending actions; and administer/supervise performance of Work in a manner which will minimize possibility of disputes, conflicts, delays, claims or losses.

1.5 WAGE RATE COMPLIANCE

A. The General Contractor is responsible to ensure that the rate per hour to be paid to mechanics, apprentices, teamsters, laborers and other workers employed on the Work shall not be less than the approved wage rates applicable to this project. A legible copy of the approved rates, along with equal opportunity requirements, shall be posted on a weatherproof bulletin board outside the field office and be clearly visible for review by all workers.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

Section 01 41 17

UTILITIES NOTIFICATION

PART 1 – GENERAL

1.1 GENERAL PROVISIONS

A. Comply with all regulations and laws concerning excavation, demolition, or explosive work and be advised of utility notification requirements under Chapter 82, Section 40 of the Massachusetts General Laws.

1.2 ADMINISTRATIVE AUTHORITY

A. Notification of utilities within the Commonwealth is performed through the Utilities Underground Plant Damage Prevention System, commonly referred to as “Dig Safe”.

1.3 REGULATORY REQUIREMENTS

A. Contractors must notify “Dig Safe” by telephone before performing any earth moving operations including: digging, trenching, boring, site demolition, excavation, backfilling, grading, or explosive work in all public ways and private property.

B. This notification must be made at least 72 hours (excluding weekends and holidays) prior to the Work described above, but not more than 30 calendar days before commencement of the contemplated Work. Notification shall occur between 6:00 AM to 6:00 PM local time from Monday to Friday, except in cases of emergency.

1. The toll free phone number is: **811**.
2. Provide the following information:
    a. Municipality.
    b. Location of work.
    c. Intersecting street.
    d. Type of work.
    e. Starting date and time of work.
    f. Name and title of caller.
    g. Phone number of caller.
    h. Best time for “Dig Safe” to return calls.
    i. Company name of General Contractor or Construction Manager.
    j. Company name of sub-contractor performing subgrade work.

C. Member utilities of the Utilities Underground Plant Damage Prevention System are required to respond to the notice within 72 hours from the time said notice is received by designating at the locus the location of pipes, mains, wires, or conduits.

1. Locations of underground utilities will be marked by spray paint or stakes. Marks will be color coded with additional descriptions of letters and arrows as required.

D. Do not commence work until “Dig Safe” has been properly notified and has responded as described above.

E. Subsequently notify “Dig Safe” of unanticipated additional blasting required after the initial notification to “Dig Safe” has been made. Do not perform the additional blasting work in less than 4 hours following the subsequent notification.

1.4 PROTECTION

A. The Contractor is fully responsible for protection of the utility location markings, wherever these occur, on or off-site.

B. Perform Work in such a manner, and with reasonable precautions taken to avoid damage to utilities under the surface in said areas of work. Immediately notify any known or suspected damage to underground utilities to the owner of such utilities.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION (not used)

End of Section

Section 01 42 00
REFERENCES

PART 1 - GENERAL

1.1 SUMMARY

A. Abbreviations and Acronyms.

B. Definitions

C. Reference Standards.

1.2 ABBREVIATIONS AND ACRONYMS

A. The following list of common abbreviations are referenced in individual specification sections. This list is provided for convenience to the Contractor and is not intended to define all abbreviations use in the Contract Documents.

1. Abbreviations for contract and specifications.

DCAMM	Massachusetts Division of Capital Asset Management and Maintenance
DOE	Massachusetts Department of Education
EPA	United States Environmental Protection Agency
HVAC	Heating, ventilating, and air conditioning
IAQ	Indoor Air Quality
IEQ	Indoor Environmental Quality
LEED™	United States Green Building Council, *Leadership in Energy and Environmental Design Rating System*
MEPA	Massachusetts Environmental Protection Agency
MGL	Commonwealth of Massachusetts General Laws
MSDS	Material Safety Data Sheet
NIC	Not in Contract
OFCI	Owner Furnished, Contractor Installed
OFI or OFOI	Owner Furnished and Installed (Owner Furnished, Owner Installed)
OPM	Owner's Project Manager (as defined in Section 01 10 00).
VOC	Volatile Organic Compounds

B. Abbreviations for measurements and quantities.

C	Celsius
cm	Centimeter
F	Fahrenheit
Hrs	Hours
Kg	Kilogram
L	Liter
M	meter
m^2 or SM	square meter

m^3 or CM	cubic meter
mm	Millimeter
Mths	Months
psi	Pounds per square inch
t	ton

1.3 DEFINITIONS

A. Definitions of contracting parties (Owner, Owner's Project Manager, Construction Manager, and Architect): Refer to Section 01 10 00 – PROJECT SUMMARY.

B. Definitions for terms utilized in the Contract Documents:

1. "As necessary," "as directed," "when directed," "satisfactory," "good and sufficient," "approved," or other general qualifying terms are used on the Drawings: These terms are deemed to be followed by the words, "in the opinion of the Architect," or "by the Architect," as the case may be."
2. "Addenda": written or graphic instruments issued prior to the execution of the Contract which modify or interpret the Bidding Documents, including the Drawings and Specifications, by additions, deletions, clarifications or corrections.
3. "Approval," "approved, "approved equal," "or equal," or "other approved" means as approved by the Architect."
4. The terms "Contractor", "General Contractor", and "Construction Manager" as used in the Project Manual have the same meaning and are interchangeable in Contract Documents. These terms refer to the same entity, defined in Section 01 10 00 – SUMMARY.
5. The term "Trade Contractor:" A subcontractor for designated portions of work as defined by MGL Title 11, Chapter 149A, Section 8, which require a regulated selection process.
6. The term "Day": is defined as the following:
    a. The term "calendar day" is a full 24 hour period, starting from 12 AM (midnight), and includes all weekends and legal holidays.
    b. The term "working day" shall mean any calendar day except Saturdays, Sundays, and legal holidays at the place of the building.
    c. Where the term "day" is used without the adjective of "calendar" or "working", it shall mean "calendar day".
7. The terms "Designer", "Architect", and "Architect/Engineer" as used in the Project Manual have the same meaning and are interchangeable in Contract Documents. These terms refer to the same entity.
8. "Furnish and Install" or "Provide": items identified shall be furnished and installed under this Contract. The term "Furnish", when used separately, shall mean that the items referred to shall be furnished, only. Similarly the term "install", when used separately, shall mean that the items referred to shall be installed, only.
9. "Knowledge," "recognize" and "discover," their respective derivatives and similar terms in the Contract Documents, as used in reference to the Contractor, shall be interpreted to mean that which the Contractor knows (or should know), recognizes (or should recognize) and discovers (or should

discover) in exercising the care, skill and diligence required by the Contract Documents. Analogously, the expression “reasonably inferable” and similar terms in the Contract Documents shall be interpreted to mean reasonably inferable by a Contractor familiar with the Project and exercising the care, skill and diligence required of the contractor by the Contract Documents.

10. “Not in Contract” or “N.I.C.”: equipment, furnishings, or other materials not included as a part of this Contract.
11. “Product”: materials, systems and equipment.
12. Definitions pertaining to sustainable development: As defined in ASTM E 2114 - *Standard Terminology for Sustainability Relative to the Performance of Buildings,* and as specified herein.
13. “Biobased Materials”: As defined in the Farm Security and Rural Investment Act, for purposes of Federal procurement of biobased products, “biobased” means a “commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials.” Biobased materials also include fuels, chemicals, building materials, or electric power or heat produced from biomass as defined by The Biomass Research and Development Act of 2000.
    a) “Biobased Content”: The amount of biobased carbon in the material or product as a percentage of weight (mass) of the total organic carbon in the material or product.
14. “Chain-of-Custody: Process whereby a product or material is maintained under the physical possession or control during its entire life cycle.
15. “Composite panel products”: Manufactured wood products including, but are not limited to particle board (PB), Medium Density Fiberboard (MDF), wheatboard and strawboard and similar manufactured products
16. “Deconstruction: Disassembly of buildings for the purpose of recovering materials.
17. “DfE (Design for the Environment)”: A technique that includes elements of resource conservation and pollution prevention as applied in various product sectors. A technique that incorporates approaches which are part of product (or assembly) concept, need and design. Considerations involve material selection, material and energy efficiency, reuse, maintainability and design for disassembly and recyclability. Refer to ISO Guide 64, and EPA’s website at http://www.epa.gov/dfe/ for additional clarification on Design for the Environment for additional clarification
18. “Environmentally preferable products”: Products and services that have a lesser or reduced effect on the environment in comparison to conventional products and services. Refer to EPA’s Final Guidance on Environmentally Preferable Purchasing for more information <http://www.epa.gov/epp/guidance/finalguidancetoc.htm>.
19. “Non-Renewable Resource”: A resource that exists in a fixed amount that cannot be replenished on a human time scale. Non-renewable resources have the potential for renewal only by geological, physical, and chemical processes taking place over of millions of years. Examples include: iron ore, coal, and oil.
20. “Perpetual Resource”: A resource that is virtually inexhaustible on a human time scale. Examples include solar energy, tidal energy, and wind energy.

21. "Recycled Content Materials": Products that contain preconsumer or post-consumer materials as all or part of their feedstock. Recycled content claim shall be consistent with Federal Trade Commission (FTC) Guide for the Use of Environmental Marketing Claims.
22. "Renewable Resource": A resource that is grown, naturally replenished, or cleansed, at a rate which exceeds depletion of the usable supply of that resource. A renewable resource can be exhausted if improperly managed. However, a renewable resource can last indefinitely with proper stewardship. Examples include: trees in forests, grasses in grasslands, and fertile soil.

1.4 REFERENCE STANDARDS

A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by DATE OF ISSUE for Contract Documents, current on date of Owner-Contractor Agreement.

C. Obtain copies of standards when required by Contract Documents.

D. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

E. The contractual relationship to the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

F. Schedule of References

1. Listed below are abbreviations for the names and titles of trade association names, federal government agencies and similar organizations which are referenced in the individual specification sections. The addresses and URL's (Uniform Resource Locators) provided are for the Contractor's convenience and are believed to be current and accurate, however addresses and URL's frequently change, and no assurance is made on their accuracy:

AA	Aluminum Association 900 19th Street N.W., Suite 300 Washington, DC 20006 www.aluminum.com
ABAA	Air Barrier Association of America 1600 Boston-Providence Highway Walpole, MA 02081 www.airbarrier.org
AAMA	American Architectural Manufacturer's Association 1827 Walden Office Sq., Suite 104 Schaumburg, IL 60173-4268 www.aamanet.org
AATCC	American Association of Textile Chemists and Colorists PO Box 12215, 1 Davis Drive, Research Triangle Park, NC 27709-2215 www.aatcc.org
ACI	American Concrete Institute, International 38800 Country Club Drive, Farmington Hills, Michigan 48331 www.aci-int.org
ACPA	American Concrete Pipe Association 222 West Las Colinas Boulevard, Suite 641, Irving TX www.concrete-pipe.org

ADC	Air Diffusion Council 104 S. Michigan Ave, Suite 1500, Chicago, IL 60603 www.flexibleduct.org
AFPA	American Forest & Paper Association (Formerly NFPA National Forest Products Association) 1111 19th St. N.W., Suite 800, Washington, DC 20036 www.afandpa.org
AGA	American Gas Association Inc. 1515 Wilson Blvd. Arlington, VA 22209-2469 www.agagas.com
AGAI	American Galvanizers Association Inc. 12200 E.Lliff Ave, Suite 204, Aurora, CO 80014-1252 www.galvanizeit.org
AIA	American Institute of Architects 1735 New York Avenue, N.W., Washington, DC 20006-5292 www.aia.org
AIHA	American Industrial Hygiene Association 2700 Prosperity Ave, Suite 250, Fairfax VA 22031 www.aiha.org
AISC	American Institute of Steel Construction 1 E. Wacher Dr., Suite 3100, Chicago,IL 60601-2001 www.aisc.org
AMCA	Air Movement and Control Association 30 W. University Drive, Arlington Heights, IL 60004-1893 www.amca.org
ANSI	American National Standards Institute 11 W. 42nd Street, 13 Floor, New York, NY 10036 www.ansi.org
APA	APA - The Engineered Wood Association (formerly APA - American Plywood Association) P.O. Box 11700, Tacoma, WA 98411-0070 www.apawood.org
ARI	Air-Conditioning and Refrigeration Institute 4301 N. Fairfax Dr., Suite 425, Arlington, VA 22203 www.ari.org
ASCA	Architectural Spray Coaters Association 230 West Wells Street, Suite 311, Milwaukee WI 53203 www.aecinfo.com
ASCE	American Society of Civil Engineers 1015 15th St. N.W., Washington, DC 20005 www.asce.org
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers 1791 Tullie Circle NE, Atlanta GA.30329 www.ashrae.org
ASME	American Society of Mechanical Engineers 345 East 47th Street, New York, NY 10017-2392 www.asme.org
ASTM	American Society for Testing and Materials 100 Barr Harbor Drive, West Conshohocken, PA 19428 www.astm,.org

AWI	Architectural Woodwork Institute 46179 Westlake Drive, Suite 120, Potomac Falls, VA 20165 www.awinet.org
AWMAC	Architectural Woodwork Manufacturers Association of Canada Unit 02A 4803 Centre St. NW, Calgary, Alberta, Canada www.awmac.com
AWPA	American Wood Preservers' Association P.O. Box 286, Woodstock, MD 21163-0286 www.awpa.com
AWPI	American Wood Preservers' Institution 1945 Old Gallows Rd., Suite 150, Vienna, VA 22182 www.oas.org
AWS	American Welding Society 550 LeJeune Road, N.W., Miami, FL 33126 www.aws.org
BHMA	Builders Hardware Manufacturers Association, Inc. 355 Lexington Ave., 17 Floor New York, NY 10017 www.buildershardware.com
BIA	Brick Industry Association 11490 Commerce Park Drive, Reston, VA 22091-1525 www.bia.org
CSA	Canadian Standards Assoc. International, Forest Products Group Sussex Centre, Suite 402, 90 Burnhamthorpe Road West, Mississauga, Ontario, Canada www.csa.ca
CDA	Copper Development Association 260 Madison Ave., 16th Floor, New York, NY 10016 www.copper.org
CISCA	Ceilings & Interior Systems Construction Association 579 W. North Ave., Suite 301, Elmhurst, IL 60126 www.cisca.org
CRI	Carpet and Rug Institute 310 Holiday Ave, Dalton, GA 30720 ww.carpet-rug.com
CRSI	Concrete Reinforcing Steel Institute 933 N. Plum Grove Road, Schaumburg, IL 60173-4758 www.crsi.org
CPSC	Consumer Product Safety Commission 5401 Westbard Ave., Bethesda, MD 20816-1469 www.cpsc.gov
CSDA	Concrete Sawing and Drilling Association 100 Second Ave S., Ste 402N, St. Petersburg, FL 33701 www.csda.org
DHI	Door and Hardware Institute 14170 Newbrook Dr., Chantilly, VA 22021-2223 www.dhi.org
FM	Factory Mutual Engineering & Research Corp. 1151 Boston-Providence Turnpike Norwood, MA 02062 www.fmglobal.com
FSC	Forest Stewardship Council (United States Chapter) 1155 30th Street NW, Suite 300, Washington, DC 20007 www.c-f-c.com

GA	Gypsum Association 6525 Belcrest Road, Suite 480, Hyattsville, MD 20782 www.gypsum.org
GANA	Glass Association of North America 2945 S.W. Wanamaker Dr., Suite A, Topeka, KS 66612-5321 www.glass.org
GICC	Glazing Industry Code Committee 3310 Harrison St., Topeka, KS 66611-2279 www.glazingcodes.net
HPVA	Hardwood Plywood & Veneer Association 1825 Michael Faraday Drive Reston, Virginia 20190 www.hpva.org
IGCC	Insulating Glass Certification Council 3933 US Route 11, PO Box 2040, Cortland, NY 13045 www.igcc.org
IPA	Industrial Perforators Association 710 N. Plankinton Ave., Suit 622 Milwaukee, WI 53203 www.iperf.org
ILI	Indiana Limestone Institute of America, Inc. Stone City Bank Building, Suite 400, Bedford, IN 47421 www.iliai.com
IPCI	International Polished Concrete Institute Norris TN www.ipcaonline.org
LSGA	Laminators Safety Glass Association 3310 Harrison Street, Topeka KS 66611-2279 www.glass.org
MCAA	Mason Contractors Association of America 1910 S. Highland Ave. Suite 101, Lombard, IL 60148 www.masoncontractors.org
MFMA	Maple Flooring Manufacturers Association 60 Revere Drive, Suite 500, Northbrook, IL 60062 www.maplefloor.org
MIA	Marble Institute of America, Inc. 33505 State Street, Farmington, MI 48335 www.marble-institute.com
MIL	Military Specifications and Standards Naval Publications and Forms Center 5801 Tabor Avenue, Philadelphia, PA 19120 www.milspec.com
NAAMM	National Association of Architectural Metal Manufacturers 8 South Michigan Avenue, Suite 1000, Chicago, IL 60603 www.naamm.org
NCMA	National Concrete Masonry Association 2302 Horse Pen Road, Herndon, VA 20171-3499 www.ncma.org
NEBB	National Environmental Balancing Bureau 8575 Government Circle, Gaithersburg, MD 20877-4121 www.nebb.org
NEMA	National Electrical Manufacturers' Association 1300 N. 17th St., Suite 1846, Rosslyn, VA 22209 www.nema.org

NFPA	National Fire Protection Association 1 Battery March Park, PO Box 9101, Quincy, MA 02269 www.nfpa.org
NFRC	National Fenestration Rating Council 6305 Ivy Lane, Greenbelt MD 20770 www.nfrc.org
NFSHSA	National Federation of State High School Associations PO Box 20626, Kansas City MO. 64195 www.nfhs.org
NRCA	National Roofing Contractors Association 10255 W. Higgins Road, Suite 600, Rosemont, IL 60018-5607 www.nrca.net
NSF	NSF International 789 N. Dixboro Road, PO Box 130140. Ann Arbor, MI 48105 www.nsf.org *(formerly National Sanitation Foundation)*
NSPI	National Spa and Pool Institute 2111 Eisenhower Avenue, Alexandria VA 22314 www.nspi.org
NTMA	National Terrazzo and Mosaic Association 110 E. Market St., Suite 200A, Leesburg, VA 20176 www.ntma.com
PCA	Portland Cement Association 5420 Old Orchard Road, Skokie, IL 60077-1083 www.cement.org
PEI	Porcelain Enamel Institute 4004 Hillsboro Pike, Suite 224B, Nashville, TN 37215 www.porcelainenamel.com
PS	Product Standard U. S. Department of Commerce www.omg.org
SDI	Steel Deck Institute P.O. Box 25, Fox River Grove, IL 60021-0025 www.sdi.org
SDI	Steel Door Institute 30200 Detroit Road, Cleveland, OH 44145-1967 www.steeldoor.org
SEI	Structural Engineering Institute of the American Society of Civil Engineers 1801 Alexander Bell Drive Reston VA 20191 www.seinstitute.org
SGCC	Safety Glass Certification Council RMS, P.O. Box 9 Henderson Harbor, NY 13651 www.sgcc.org
SIGMA	Sealed Insulating Glass Manufacturers Association 401 N. Michigan Ave., Suite 2400, Chicago, IL 60611 www.glasschange.com
SJI	Steel Joist Institute 3127 10th Ave. N., Myrtle Beach, SC 29577 www.steeljoist.org

SMACNA	Sheet Metal and Air Conditioning Contractors' National Association 4201 Lafayette Center Dr., Chantilly, VA 22022-1209 www.smacnapa.org
SPIB	Southern Pine Inspection Bureau 4709 Scenic Highway, Pensacola, FL 32504-9094 www.spib.org
SSMA	Steel Stud Manufacturer's Association 8 South Michigan Avenue, Chicago IL 60603 www.ssma.com
SSPC	The Society for Protective Coatings 40 24th Street, 6th Floor, Pittsburgh PA 15222-4623 www.sspc.org
SWRI	Sealant, Waterproofing & Restoration Institute 2841 Main Street, Suite 585, Kansas City, MO 64108 www.swrionline.org
TCNA	Tile Council of North America, Inc. 100 Clemson Research Blvd., Anderson, SC 29625 www.tileusa.com *(formerly TCA, Tile Council of America)*
TMS	The Masonry Society 3970 Broadway, Suite 201D, Boulder CO 80304 www.masonrysociety.org
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road, Northbrook, IL 60602 www.ul.com
USGBC	United States Green Building Council 1800 Massachusetts Avenue NW, Suite 300 Washington DC 20036 www.usgbc.org
WDMA	Window & Door Manufacturers Association (formerly National Wood Window & Door Association, NWWDA) 205 E. Touhy Avenue, Suite G-54, Des Plaines, IL 60018 www.nwwda.org
WI	Woodwork Institute PO Box 980247 West Sacramento, CA 95798 www.woodworkinstitute.com

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

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Section 01 43 39

MOCK-UPS

PART 1 - GENERAL

1.1 SUMMARY

A. Mock-up requirements.

1. Mock-up assemblies are required for, but not limited to the following:
    a. On-site enclosed partial building having components and elements indicated as a single assembly.
    b. Mock-up of roof blocking.
2. Additional field samples and mock-ups specified in individual Specification Sections.

B. All mock-ups specified herein, under other Sections of the Specifications, and shown on drawings will be reviewed and approved by the Architect and Owner. Unaccepted mock-ups shall be replaced or reconstructed in part or in total and the extent of the replacement or reconstruction shall be at the discretion of the Architect and Owner. The Construction Manager shall carry forth mock-up replacement or reconstruction until Architect's acceptance is obtained. Mock-up costs, including as many replacements or reconstruction as necessary to gain Architect's acceptance, shall be included in the Contract Cost and Schedule.

1.2 RELATED REQUIREMENTS

A. Section 01 45 00 - QUALITY CONTROL.

B. Section 01 45 29 – TESTING LABORATORY SERVICES.

1.3 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Shop Drawings:
    a. Provide for each mockup indicating sizes, finishes and method of construction and installation of each component.
    b. Exterior wall mock-up: Provide complete coordination drawings for mock-up assembly, including detail drawings for typical section and plan cut conditions for each discrete system of the Exterior Wall Mock-Up. Circulate mock-up drawings between all trades involved with mock-up for input. As minimum indicate on Drawings:
        1) Foundation/grade/base transitions of the exterior wall
        2) Punched opening head, jambs, and sill conditions;
        3) Wall to roof transitions.
        4) Air-barrier and all transitions to adjoining materials.
        5) Written narrative describing sequence of mock-up assembly.

1.4 GENERAL

A. Scheduling: All specified Mock-ups are required to be fabricated, reviewed and accepted prior to ordering of materials for the project, and prior to construction of building elements which the Mock-ups demonstrate.

B. Where requested by Architect, or as specified in individual specification sections, assemble and erect specified items, with specified attachment and anchorage devices, flashings, seals, and finishes. Remove mock-up assemblies prior to date of Final Inspection, or as directed.

C. Mock-ups, when approved by the Architect, will be used as datum for comparison with the remainder of the Work for the purposes of acceptance or rejection. Maintain mockup throughout construction period until Substantial Completion or as otherwise directed by Architect.

1. Approval of mock-ups and field samples do not constitute approval of deviations from the Contract Documents.
2. Finishes, colors and textures of components shall be as specified for each component and shall be selected by the Architect.

D. Demolish and remove from site prior to requesting inspection for certification of Substantial Completion, all Mock-ups which are not permitted to remain as part of the finished work.

1.5 COORDINATION

A. Coordinate work of trades and schedule elements to expedite the fabricating, furnishing, and installation of multiple component mock-ups specified herein, in other Sections of the Specifications, and as shown in the Contract Documents.

PART 2 - PRODUCTS

2.1 EXTERIOR BUILDING MOCK-UP FOR TESTING AND REVIEW

A. General, Integrated Exterior Mockups: Construct integrated exterior mockup(s) according to Contract Drawings and approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.

B. Mockup Unit: Shall consist of one full size facsimile enclosed building containing building elements indicated on Drawings using specified products as noted.

1. General description: Mockup Unit shall include exterior construction, with light gage steel stud framing backup and sheathing assembly. Mockup shall include all components specified and indicated which are typical to the exterior wall construction and additional components specified herein.
   a. Fabricate mockup unit with face brick and concrete masonry units as specified, with selected mortar and backup consisting of 6 inch cold formed metal studs, exterior sheathing board on both sides of studs, and specified brick anchors.
      1) Provide additional metal stud framing and cross-bracing required for construction of various components of the mockup panel.

2) Provide concealed various wood blocking, edgings, nailers, curbs, and cants required for receipt of various finishes and surfacing materials.

b. Include into mockup assembly all flashing, joint sealers, and all finish trim and accessories necessary to show typical completed construction.

2. Finishes, colors and textures of components shall be as specified for each component and shall be selected by the Architect.
3. Materials: Use identical materials and finishes, details, and anchorage systems proposed for use in the exterior wall systems. Simulate actual construction conditions as accurately as possible.
4. Location: Construct mock-up assembly on site at location approved by the Architect (separate from actual building).
5. Construction Manager shall construct and seal a large walk-in chamber on the back- side of the mock-up.

C. Components to be included in the mockup include, but are not limited to:

1. Section 03 30 00 - CAST-IN-PLACE CONCRETE.
   a. Provide a concrete foundation wall to a depth required to support wall mockup.
2. Section 04 20 00 - UNIT MASONRY.
   a. Provide type of brick and colored mortar specified, installed over gypsum sheathing with specified anchorage devices.
      1) Install brick over sheathing with specified anchorage devices and cavity insulation.
      2) Provide masonry ties, through-wall flashing, mortar netting, and weeps.
   b. Provide face brick in bond pattern, mortar color, and joint type to be used in the Work.
3. Section 05 40 00 - COLD-FORMED METAL FRAMING:
   a. Provide cold formed metal stud framing with bracing as required for construction and support of the mockup panel.
4. Section 06 16 00 - SHEATHING:
   a. Install sheathing board, on both sides of metal stud framing, with taped joints and membrane flashing.
5. Section 07 27 26 - FLUID-APPLIED AIR BARRIERS:
   a. Provide fluid applied air barrier over sheathing and masonry back-up.
6. Section 07 92 00 - JOINT SEALANTS:
   a. Provide joint sealant at perimeter of all components. Colors shall be selected by the Architect.
7. Section 08 43 13 - ALUMINUM-FRAMED STOREFRONTS: Provide fixed sash type punched window fabricated from storefront framing.
   a. Fabricate with removable stop for installation of glass.
   b. Storefront to be powder coat finished to match selected PVDF finish specified for aluminum storefront, matching color and sheen.
   c. Storefront used in mock-up may not be incorporated into the Work.

d. Provide specified glazing, in glass type designated by Architect.

2.2 MOCK-UP PERFORMANCE TESTING

A. Testing of exterior wall mock-up as specified under Section 01 45 29 – TESTING LABORATORY SERVICES.

PART 3 - EXECUTION

3.1 PREPARATION

A. Construct mock-ups at locations indicated or, if not indicated, at locations directed by the Architect.

B. Construct mockup in time to make product and/or assembly modifications without delaying production work.

3.2 INSTALLATION

A. Construct mockup to duplicate actual job conditions.
   1. Locate at an area on site as directed by the Architect.
   2. Provide foundations, bases, supports and braces adequate to make mockup stable and safe.

B. Provide weather protection for materials in mockups that are not exposed to weather in intended service.

3.3 REMOVAL

A. Retain mock-ups during construction as a standard for judging completed work until time designated by the Architect and the Owner,
   1. Completely demolish and remove mockups from the job site at time designated by Architect.
   2. Accepted mock-ups (which are specifically identified by the Architect to become part of the work) may be incorporated into the work provided they are not damaged during subsequent construction.

End of Section

Section 01 45 00
QUALITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. General quality assurance and control of installation.

B. Site safety, worker safety and training.

C. Construction Manager's quality control (QC) program.

D. Source quality control.

E. Field samples and mock-ups.

F. Manufacturer's field services and reports.

G. Field quality control, Owner's right for confirmation.

1.2 RELATED REQUIREMENTS

A. Section 01 45 29 - TESTING LABORATORY SERVICES.

1.3 GENERAL QUALITY ASSURANCE AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply fully with manufacturers' instructions, including performance of each step in sequence. Notify Architect when manufacturers' instructions conflict with the provisions and requirements of the Contract Documents; obtain clarification before proceeding with the work affected by the conflict.

C. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate high standards or more precise workmanship.

D. Perform work by persons qualified to produce workmanship of specified quality.

E. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.4 SITE SAFETY, WORKER SAFETY AND TRAINING

A. General: The Construction Manager, and Trade Contractors, shall, at all times, exercise reasonable precautions for the safety of all persons. All rules, regulations, and laws concerning safety that are in effect at the work site, and in particular, all applicable regulations of the Occupational Safety and Health Administration (OSHA) of the U.S. Government, in addition to specified requirements shall be complied with in all respects.

1. Construction Manager's responsibility for safety shall apply continuously twenty four (24) hours per Day during the term of this Contract and is not limited to normal working hours.

B. Construction Manager's Safety Program: Prior to commencement of the Work, the Contractor shall develop and implement a Safety and Health Plan to comply with the Occupational Safety and Health Administration (OSHA) standards for the Construction Industry and all other applicable Federal, State, local laws and regulations. Construction Manager's Safety and Health Plan, and included health and safety procedures and policies, shall be submitted to the Architect and Owner's Representative within fifteen (15) Days after the date of Notice to Proceed and in no event later than commencement of the Work, whichever occurs first.

1. Perform pre planning to ensure access Is provided to Fire Department for all areas of the work site throughout the duration of the Contract. The Construction Manager's shall provide the Fire Department site access maps, updated regularly, to reflect changes in the layout of the work site and shall notify the Fire Department when each update is made
2. Post and maintain, at prominent locations throughout the Project site, emergency telephone numbers and shall insure that all personnel on site are continuously aware of this information.
3. Ensure safe access to the Work for the Owner, Architect, Architect's consultants, their designated representatives, and all others charged with inspection, testing and monitoring of the Work, and visitors to the site. The Construction Manager's shall furnish site visitors with safety equipment, test equipment, safety apparel and instructions that are required to insure their safety on site, and In the performance of their duties related to the Work of this Contract

C. All employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration (OSHA) that is at least 10 hours in duration. The OSHA training and certification course shall occur at the time each employee begins work. Furnish documentation to Owner and Architect, for each employee documenting successful completion of the OSHA safety training and certification course. Submit with the first certified payroll report. Comply fully with all laws and regulations applicable to awards made subject to Massachusetts General Laws (MGL) Chapter 149, Section 44A.

1.5 CONSTRUCTION MANAGER'S QUALITY CONTROL PROGRAM

A. Procedures: Construction Manager, contractors and each subcontractor shall include all labor, materials, equipment, services and incidental items necessary to implement quality control procedures to the extent necessary to demonstrate and maintain compliance with the Contract Documents.

B. It is recognized that the Construction Manager maintains standing written procedures as a corporation for the assurance of quality in finished projects. The Architect and Owner shall review and approve such corporate QA/QC program; review will be against the guidance provided by the following paragraphs and approval may be conditioned with requirements to expand specific sections to meet specific requirements of the Owner and/or the Owner's funders.

C. Quality Control Plan: Within 20 days after Notice to Proceed, the Construction Manager shall submit a Quality Control (QC) Plan to the Owner's Representative and Architect for approval. The plan shall address the following, as a minimum:

1. The Construction Manager's commitment to quality and implementing and managing the QC program.
2. Identification of the Construction Manager's onsite QC Manager, with name, qualifications, duties and responsibilities. The QC Manager shall have the authority to direct the removal and replacement of non-conforming work. The QC Manager shall be present for all QC meetings, inspections and tests during the project.
3. Procedures for addressing and commenting QC with Construction Manager's staff, all subcontractors and suppliers, and Owner, Architect and Owner's representative.
4. Procedures for review of submittals and submittal status, and documentation of same.
5. Procedures for pre-installation meetings and documentation of same.
6. Procedures for inspections of deliveries and documentation of same.
7. Procedures for benchmark inspections, defined as initial installations, and documentation of same.
8. Procedures for mockup inspections and documentation of same.
9. Procedures for equipment in place, inspections and documentation of same.
10. Procedures for inspections prior to closures of concealment and documentation of same.
11. Procedures for start-up and commissioning and documentation of same.
12. Procedures for turnover and documentation of same.
13. Procedures for identifying, recording, tracking correcting and reporting items requiring rework, using a Rolling Completion list chronological item number, phase area, date listed, description, party responsible for correction, date notified, and date corrected.
14. Procedures for testing and documentation of same.
15. Procedures for corrective action on Architect's Field Reports and Testing Agency reports and documentation of same.

D. Procedures for reporting on all of the above on a monthly basis as a condition precedent to review of the Construction Manager's application for payment.

1.6 SOURCE QUALITY CONTROL

A. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Product Labeling: Attach label from agency approved by authority having jurisdiction for products, assemblies, and systems required to be labeled by applicable code(s).

1. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label.

a. Model number.

b. Serial number.

c. Performance characteristics.

1.7 FIELD SAMPLES

A. Install field samples demonstrating quality level for the Work, at the site as required by individual specifications Sections for review and acceptance by Architect. Remove field samples prior to date of Final Inspection, or as directed.

1.8 MOCK-UPS

A. Where requested by Architect, or as specified in individual specification sections, assemble and erect specified items, with specified attachment and anchorage devices, flashings, seals, and finishes. Remove mock-up assemblies prior to date of Final Inspection, or as directed.

B. Mock-ups, when approved by the Architect/Engineer, will be used as datum for comparison with the remainder of the Work for the purposes of acceptance or rejection.

C. Demolish and remove from site prior to requesting inspection for certification of Substantial Completion, all Mock-ups which are not permitted to remain as part of the finished work.

1.9 TESTING LABORATORY AND INSPECTION SERVICES

A. Owner will appoint, employ, and pay services of an independent firm to perform inspection and testing and other services specified in individual specification Sections and as required by the Architect.

B. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.

1. Notify Architect and independent firm 48 hours prior to expected time for operations requiring services.

2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

C. Retesting required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Architect. Payment for retesting will be charged to the Contractor by deducting inspection or testing charges from the Contract Sum.

1.10 MANUFACTURER'S FIELD SERVICES AND REPORTS

A. When called for by individual Specification Sections, provide at no additional cost to the Owner, manufacturers' or product suppliers' qualified staff personnel, to observe site conditions, start-up of equipment, adjusting and balancing of equipment, conditions of surfaces and installation, quality of workmanship, and as specified under the various Sections.

1. Individuals shall report all observations, site decisions, and instructions given to applicators or installers. Immediately notify Architect of any circumstances which are supplemental, or contrary to, manufacturer's written instructions.

2. Submit full report within 30 calendar days from observed site conditions to Architect for review.

1.11 FIELD QUALITY CONTROL

A. The Owner reserves the right to take samples and perform, at random, tests of approved materials delivered to the job site to verify compliance of actual materials with specifications.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

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Section 01 45 29
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section consists of the following:
1. Quality assurance.
2. Laboratory responsibilities.
3. Laboratory reports.
4. Limits on testing laboratory authority.
5. Contractor responsibilities.
6. Contractor submittals.
7. Schedule of inspections and tests.
8. Concrete in situ relative humidity, calcium chloride and acidity/alkalinity testing.

1.2 REFERENCES

A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. ANSI/ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the. Testing and/or Inspection of Soil and Rock
2. ANSI/ASTM E329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
3. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
4. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.
5. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
6. ASTM F1869 – Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
7. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In-Situ Probes
8. ASTM F710 – Standard Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.

1.3 QUALITY ASSURANCE

A. Comply with requirements of ANSI/ASTM D 3740 and ANSI/ASTM E 329.

B. Laboratory: Authorized to operate in state in which Project is located.

C. Laboratory staff: Maintain a full time specialist on staff to review services. Provide registered Engineer on staff for all review of services related to structural testing.

D. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either the National Bureau of Standards (NBS) Standards or accepted values of natural physical constraints.

1.4 LABORATORY RESPONSIBILITIES

A. Cooperate with Architect and Contractor in performance of services; provide qualified personnel promptly on notice.
   1. Attend preconstruction conferences and progress meetings, as requested.

B. Acquaint Owner, Architect, and Contractor's superintendent with testing procedures and with all special conditions encountered at the site.

C. Perform specified Inspection, sampling, and testing of products and construction methods in accordance with specified standards as specified in individual technical specification sections:
   1. Comply with specified standards, ASTM, ANSI, and other recognized authorities.
   2. Conduct and interpret the tests and state in each report whether the test specimens comply with the requirements, and specifically state any deviations therefrom.
   3. Obtain Contractor's written acknowledgment of each inspection, sampling, and test made. Test samples of mixes submitted by Contractor.
   4. Ascertain compliance of materials and mixes with requirements of Contract Documents.

D. Promptly notify Architect and Contractor of irregularities, deficiencies, or non-conformance of Work or Products which are observed during performance of services.

E. Promptly submit written report of each test and inspection; one copy each to Architect, Owner, Contractor, and one copy to Project Record Documents File.

F. Perform additional inspections and tests required by Architect/Engineer.

1.5 LABORATORY REPORTS

A. After each test, promptly distribute directly from the testing laboratory, copies of laboratory report to:
   1. Owner’s Project Manager.
   2. Architect's office.
   3. Consulting engineer's office.
   4. Construction Manager's office.
   5. Municipal Inspectional Services Department, if required.

B. Include in report the following information:
   1. Date issued.

2. Project title and number.
3. Testing laboratory name, address, and telephone number.
4. Name and signature of laboratory inspector.
5. Date and time of sampling.
6. Record of temperature and weather conditions (as appropriate to test).
7. Identification of product and Specifications Section.
8. Location of sample or test in the Project.
9. Type of inspection or test.
10. Results of tests and compliance with Contract Documents.
11. Interpretation of test results, when requested by Architect.
12. Observations regarding compliance with Contract Documents.

1.6 LIMITS ON TESTING LABORATORY AUTHORITY

A. Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Laboratory may not approve or accept any portion of Work.

C. Laboratory may not assume any duties for Construction Manager.

D. Laboratory has no authority to stop the Work.

1.7 CONSTRUCTION MANAGER'S RESPONSIBILITIES

A. Coordinate and cooperate with laboratory personnel, provide access to Work.
   1. Monitor each inspection, sampling, and test.
   2. Provide Laboratory or Agency with written acknowledgment of each Inspection, sampling, and test.
   3. Within 24 hours notify Architect and Owner in writing of reasons for not acknowledging Laboratory results.

B. Secure and deliver to the Laboratory or designated location, adequate quantities of representational samples of materials proposed to be used and which require testing, along with proposed mix designs.

C. Furnish incidental labor and facilities:
   1. To provide access to Work to be tested.
   2. To obtain and handle samples at the Project site or at the source of the Product to be tested.
   3. To facilitate inspections and tests.
   4. For storage and curing of test samples.

D. Furnish verification of materials and equipment compliance with Contract Documents.

E. Notify Architect/Engineer and laboratory 24 hours prior to expected time for operations requiring inspection and testing services.

F. Identify materials to be tested or inspected by Testing Laboratory or Agency.

G. After determination of need for testing or inspecting by Owner, notify Laboratory sufficiently in advance, minimum five days, of operations to allow for its assignment of personnel and scheduling of tests.

1. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to Contractors negligence.

H. Make arrangements with laboratory and pay for additional samples and tests required for the following conditions:

1. Initial testing indicates Work does not comply with Contract Documents.
2. Contractor requested testing for additional testing and laboratory services beyond specified requirements.

1.8 CONDUCT OF INSPECTIONS AND TESTS

A. The Construction Manager shall notify the Owner, Architect, and Testing Laboratory a minimum of 72 hours before the performance of work to permit the proper conduct of Owner-authorized inspections and tests.

B. Representatives of Testing Laboratory will inspect the manufacture, assembly, and placement of materials as required and as authorized by the Owner, and report their findings to the Architect, Owner, and Contractor.

C. Work shall be checked as it progresses, but failure to detect any defective work or materials shall in no way prevent later rejection when such defect is discovered nor shall it obligate the Owner to accept such work.

1.9 SCHEDULE OF TESTING OF EXTERIOR WALL MOCK-UP BY OWNER

A. Testing of Exterior Wall Mock-Up: Testing of exterior wall mock-up by Owner's Testing Agency includes, but not be limited to the following:

B. Test Pressurization/ Depressurization With smoke:

1. Test Method: ASTM E1186.
2. Test Criteria: No detectable leakage on materials or assemblies tested. Mock-up will establish Benchmark for ASTM E1186 testing in the field
3. Test Specimen/Focus: Air vapor barrier, ties, joints, junctions and transitions
4. Testing Quantity: As required.

C. Test Leak Detection with water:

1. Test Method: ASTM E1186.
2. Test Criteria: No detectable leakage on materials or assemblies tested.
3. Test Specimen/Focus: Air vapor barrier, ties, joints, junctions and transitions
4. Testing Quantity: As required.

D. Test Water Testing by AAMA Nozzle:

1. Test Method: AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems.
2. Test Criteria: No water leakage with differential pressure at three areas..
3. Test Specimen/Focus: evaluate the joints, gaskets, and sealant details in the storefront system glazing against water leakage
4. Testing Quantity: 2.

1.10 SCHEDULE OF TESTING AND LABORATORIES BY OWNER

A. Except as otherwise specified, Owner will appoint, employ, and pay services of independent firm(s) to perform inspection and testing and other services specified herein, in individual specification Sections, and as additionally required by the Architect.

B. Except as otherwise specified, Owner will employ services of an independent laboratory to perform specified inspection and testing;

C. Requirements for testing, observations, and inspections are described in individual specification sections; the schedule provided below is not intended to completely describe all of the inspection and testing Work required for this Contract, and is only furnished as a guide.

1. Section 03 30 00 - Cast-in-Place Concrete: Concrete test cylinders
2. Section 04 20 00 - Unit Masonry: One day per week observation of masonry installation. grout, mortar and prism testing.
    a. Three cylinders tested for compressive strength at 10 days; ASTM C 91 test.
3. Section 05 12 00 - Structural Steel Framing: Testing of welds of field and shop fabricated components. Testing of bolting.
    a. Bolt torque testing.
    b. Welding X-ray and ultrasonic tests as specified.
    c. Coating thickness of primer coats.
4. Section 05 21 00 - Steel Joist Framing.
5. Section 05 31 00 - Steel Decking: Periodic inspection of steel decking installation prior to concrete placement.
6. Section 07 84 00 - Fireproofing: Testing and certification of density and thickness of installation.
7. Section 07 92 00 - Joint Sealants: Chemical analysis; adhesive strength; compatibility with adjacent materials; elasticity.
1. Section 08 43 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS:
    a. Air Leakage Testing (ASTM E783): ASTM E783 - Standard Test Method for Field. Perform in conjunction with ASTM E186 smoke tracer leakage testing so that leakage paths can be evaluated
        1) Recommended Frequency: Three testing days per system evaluated. Each testing day will include three areas. Perform the first tests occur as soon as possible after the installation begins, the second tests occur approximately 25% of the way through the

installation, and the third tests occur between 50% and 100% completion of each assembly type.

b. Water Penetration Testing with Differential Pressure (ASTM E1105): ASTM E1105 - - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air
   1) Recommended Frequency: Provide a total of three testing days per system. Each testing day should include water penetration testing with differential pressure at three areas (for a total of nine areas of each storefront system tested). The first tests shall occur as soon as possible after the installation begins, the second tests occur approximately 25% of the way through the installation, and the third tests occur between 50% and 100% completion of each assembly.

c. Water Testing by AAMA Nozzle (AAMA 501.2): AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts- to evaluate the joints, gaskets, and sealant details in the storefront system glazing against water leakage.
   1) 75 lf of testing three times throughout the project: first at the initial installation of each type of system, then again approximately 25% of the way through installation, and finally between 50% and 100% of the way through installation. Test the perimeter condition based on linear footage equal to 1/3 of water penetration.

2. Section 09 91 00 - Painting: Chemical analysis; coating thickness
3. Section 09 96 00 - High Performance Coatings: Chemical analysis; coating thickness
4. Division 31, 32, 33 - Earthwork, Exterior Improvements, Utilities sections: Continuous observations basis during the installation of the foundation, footings, structural slab, and during backfilling and grading of the site. Testing bearing surfaces prior to the installation of the backfill and foundations. Sampling and compaction testing of fill materials.
   a. Chemical testing of fill materials.
   b. Proctor tests for compaction.
5. Section 32 12 16 - Asphalt Paving: Field and lab tests for asphalt paving.

D. Concrete slabs and floors: Relative Humidity, Moisture Vapor Emission and acidity/alkalinity (pH)Testing:
   1. General Contractor shall employ and pay for services of an independent testing laboratory to perform relative humidity, moisture vapor emission, and pH tests on concrete slabs as follows. The test shall be witnessed by the Contractor, flooring subcontractors and Owner's Project Representative.
      a. Relative Humidity, Moisture Vapor Emission and pH Testing on all concrete slabs over-which a finished floor is to be installed. This includes, but is not limited to:
         1) Resilient sheet flooring, including (but not limited to) linoleum, rubber and vinyl flooring.
         2) Resilient tile and plank flooring, including (but not limited to) linoleum, rubber, solid vinyl and composite flooring.
         3) Static dissipative flooring.

4) Resinous flooring and seamless flooring of all types.
5) Painted floors and concrete sealers.
6) Carpet.
7) Wood flooring of all types.
8) Terrazzo (excluding sand-bed terrazzo systems).

b. Perform moisture and pH tests on all concrete floors over-which stone flooring is to be applied.

2. Requirements: As specified under Part 3 of this Section.

a. Submit 1 copy of test data to the installers of all flooring materials or coating materials scheduled to be installed.

b. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products. Perform such additional testing, at no additional cost to the Owner, after procedures have been performed to reduce moisture content to ratings acceptable to the various flooring and coating manufacturers.

E. Massachusetts Energy Code Witness Testing: The Construction Manager shall engage the services of Massachusetts registered professional mechanical and electrical engineers who shall perform witness testing of all HVAC, lighting and power distribution systems in accordance with the requirements of the Massachusetts Energy Code. The registered professional engineer shall prepare a final performance acceptance report in accordance with the code requirements and in a form acceptable to the local code official. The actual testing shall be performed by the Construction Manager, his designated Trade Contractors or authorized manufacturers' representatives. All costs associated with the testing, witnessing of the testing and preparation of reports shall be part of the base contract bid.

F. Special Tests and Inspections: Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.

1. Testing agency will notify Architect, Construction Manager, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.

2. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to Architect, through Construction Manager, with copy to Contractor and to authorities having jurisdiction.

3. Testing agency will submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.

4. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

5. Testing agency will retest and re-inspect corrected work.

1.11 SCHEDULE OF TESTING AND LABORATORIES BY CONSTRUCTION MANAGER

A. Construction Manager shall employ and pay for services of an approved independent testing laboratory to perform inspection and testing specified under this Article and as additionally in individual specification sections

1. Submit to Architect/Engineer a minimum of three independent testing laboratories for each type of testing specified by individual specification sections and those required by the referenced applicable codes, regulations and standards.
2. Employment of testing laboratory shall in no way relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents.

B. Earthwork: Lab tests to determine suitability of all fill materials shall be paid for by Contractor.
   1. Owner reserves the right to retain and pay for his own testing for checking purposes

C. Concrete Paving and General Concrete Work: Concrete mix design testing shall be paid for by Contractor. Owner reserves the right to retain and pay for his own testing for checking purposes.

D. Moisture content testing of interior and exterior wood prior to application of field painted coatings.

E. Local Authority Inspections: The Construction Manager is also responsible for coordinating and cooperating with local requirements for inspections by local Authorities.

1.12 SCHEDULE OF TESTING AND LABORATORIES BY TRADE CONTRACTORS

A. Respective Trade Contractors shall employ and pay for services of an approved independent testing laboratory to perform inspection and testing specified under this Article and as additionally in individual specification sections
   1. Submit to Architect/Engineer a minimum of three independent testing laboratories for each type of testing specified by individual specification sections and those required by the referenced applicable codes, regulations and standards.
   2. Employment of testing laboratory shall in no way relieve Construction Manager and Trade Contractors of obligations to perform work in accordance with requirements of Contract Documents.

B. Fire Protection System: At least the following tests shall be performed. Conform to requirements specified in individual Division 21 Specification Sections. The test shall be performed and paid for by the subcontractor and witnessed by the Construction Manager, Owner's Project Manager (OPM) and authorities having jurisdiction:
   1. Fire protection system flushed and pressure tested.

C. Plumbing: At least the following tests shall be performed. Conform to requirements specified in individual Division 22 Specification Sections. The test shall be performed and paid for by the subcontractor and witnessed by the Contractor, Resident Project Representative and authorities having jurisdiction:
   1. Water supply piping hydrostatic pressure test.
   2. Sanitary piping test before fixture installation: Cap pipes and fill to highest point in system.

3. Plumbing fixture operation.

D. HVAC Testing: All HVAC work shall be tested by an independent testing and balancing agency, approved by Owner. Conform to requirements specified in individual Division 23 Specification Sections. The tests shall be performed and paid for by the subcontractor and witnessed by the Contractor, Resident Project Representative and authorities having jurisdiction. Adjustments shall be made by the subcontractors directed by the Owner. At least the following tests shall be performed:

1. Piping hydrostatic tests.
2. Air and water balancing.
3. Thermostat control monitoring and testing.
4. Boiler efficiency testing.
5. Energy Management System operation.

E. Electrical Power System Testing: At least the following tests shall be performed. Conform to requirements specified in individual Division 26 Specification Sections. The tests shall be performed and paid for by the subcontractor and witnessed by the Contractor, Resident Project Representative and authorities having jurisdiction:

1. Polarity tests.
2. Operation of all circuits.
3. Testing of emergency system.
4. Security systems.
5. Generation system.
6. Grounding systems.
7. Voice/Video/Data networking testing.

F. Electrical Lighting System Testing: Conform to requirements specified in individual Division 26 Specification Sections. At least the following tests shall be performed and paid for by the Filed-subcontractor:

1. Operation of every component of entire system.

G. Fire Alarm System Testing: At least the following tests will be performed. Conform to requirements specified in individual Division 26 Specification Sections. The test shall be performed and paid for by the subcontractor and witnessed by the Contractor, and Resident Project Representative:

1. All smoke and heat detectors.
2. Proper operation as required by authorities having jurisdiction.

H. Where no testing requirements are described but the Owner or Architect/Engineer decides that testing is required, testing will be performed under current pertinent standards for testing.

1.13 FOLLOW-UP AND CORRECTIVE ACTION

A. The Contractor and the Owner will note the test record on the Testing Log to acknowledge test procedures and results. If follow-up or corrective action is needed, the Contractor shall submit to the Owner two written copies of proposed

follow-up or corrective plans and obtain the Owner's written approval before proceeding.

1. Cost of Testing: If tests indicate that materials or work do not comply with requirements, the Contractor shall pay for all retesting, and shall remove and replace non-complying work at no additional cost to the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONCRETE IN SITU RELATIVE HUMIDITY, CALCIUM CHLORIDE AND ACIDITY/ALKALINITY TESTING

A. Scope:

1. Provide in situ concrete relative humidity and surface pH testing to all concrete slabs specified to be covered with floor coverings or resinous coatings. Includes concrete placed as part of this Work which occurs below grade, above grade (suspended slabs), and slabs on grade.
    a. Existing building suspended slabs may be excluded from this requirement.

B. Scheduling:

1. Testing shall take place after allowing concrete to dry for a minimum of 90 days. Testing to be scheduled no less than one, nor more than three weeks prior to scheduled flooring installation.
    a. DO NOT conduct testing unless the slab environment is identical to that In which the finished flooring Is to be installed.
2. In the event new flooring is to be installed over existing resilient flooring, remove the portion of the existing flooring and adhesive directly under the area where testing will be conducted. Patch flooring to match existing construction after completion of testing.

C. Test result submittals:

1. Report all test results in chart form listing test dates, time, depth of test well, in situ temperature, relative humidity, moisture vapor and pH levels.
2. List test locations on chart and show same on marked up Floor Plan Drawings.
3. Submit results In duplicate. Deliver copies directly to Architect, Owner's Project Representative and General Contractor.

D. Testing equipment: shall be equal to the following

1. For relative humidity testing:
    a. Digital Meter and Calibrated Humidity and Temperature probe kits.
        1) Wagner Meters, Rogue River, OR.
        2) Delmhorst Instrument Company, Towaco NJ.
        3) Lignomat USA, Portland OR.
        4) Vaisala Inc., Helsinki Finland.
2. For calcium chloride testing:

a. Anhydrous calcium chloride testing in accordance with Rubber Manufacturer's Association (RMA) Test requirements.

b. Test kits:

1) American Moisture Test Inc., Reno NV.

2) Wagner Meters, Rogue River, OR.

3) Vaprecision, Inc., Fountain Valley, CA.

3. For pH testing:

a. pH test paper by

1) American Moisture Test Inc., Reno NV.

2) Wagner Meters, Rogue River, OR.

3) Micro Essential Laboratory, Inc., Brooklyn, NY.

b. Distilled or de ionized water.

E. Testing Procedures - Quantification of Relative Humidity

1. The test site should be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperature and humidity levels should be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions should be 75 degrees F (plus or minus 10 degrees F), and 50 percent (plus or minus 10 percent) relative humidity. When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be Included with the test report.

2. The number of In situ relative humidity test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 in the first 1,000 square feet and 1 per each additional 1,000 square feet.

3. Drill test holes utilizing a roto hammer drill. Hole diameter shall not exceed outside diameter of the insertabie test sleeve by more than 0.04 inch. Drilling operation must be dry. Determine the thickness of the concrete slab from Construction Documents. Depths of test holes shall be as follows:

a. For elevated slabs (not poured in pans): Drill test holes to a depth equal to 20 percent of the concrete thickness.

b. For slabs on grade and elevated slabs in pans: Drill test holes to a depth equal to 40 percent of the concrete thickness.

4. Vacuum all concrete dust from test hole.

5. Insert a hole liner, or sleeve, to the full depth of test hole, assuring that the liner is capped or plugged at the end protruding from the concrete surface.

6. Permit the test site to acclimate, or equilibrate, for 72 hours prior to taking relative humidity readings.

7. Remove the sleeve plug and place a probe into the sleeve assuring that it reaches the bottom of the test hole.

8. Allow the probe to sit in the test sleeve for 30 minutes before taking readings.

9. Read and record temperature and relative humidity at the test site.

F. Testing Procedures - Quantification of Concrete Moisture Vapor Emission through Calcium Chloride Testing.

1. The test site should be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperature and humidity levels should be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions should be 75 degrees F (plus or minus 10 degrees F) and 50 percent relative humidity (plus or minus 10 percent). When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be included with the test report.
2. The number of vapor emission test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 In the first 1.000 square feet and I per each additional 1,000 square feet.
3. Tests sites are to be cleaned of all adhesive residue, curing compounds, paints, sealers, floor coverings, and similar materials. 24 hours prior to the placement of test kits.
4. Weigh test dish on site prior to start of test. Scale must report weight to 0.1 grams. Record weight and start time.
5. Expose Calcium Chloride and set dish on concrete surface.
6. Install test containment dome and allow test to proceed for 60 to 72 hours.
7. Retrieve test dish by carefully cutting through containment dome. Close and reseal test dish.
8. Weigh test dish on site recording weight and stop time.
9. Calculate and report results as pounds of emission per 1,000 square feet per 24 hours."

G. Testing Procedures - Quantification of Acidity/Alkalinity (pH) Level

1. At or near the relative humidity test site and each vapor emission (calcium chloride) test site, perform pH test.
    a. At each testing site, lay down a loose 2 foot by 2 foot sheet of rubber flooring or non perforated polyethelene sheet backed by plywood. Leave in place for 48 hours.
    b. Remove rubber sheet/polyethelene and place several drops of distilled or de ionized water onto the concrete surface to form a puddle approximately 1 inches in diameter.
    c. Allow the water to set for approximately 60 seconds.
    d. Dip the pH paper into the water and remove immediately, compare color to chart provided by paper supplier to determine pH reading
2. Record and report results.

H. Testing Procedures:

1. Initial testing: Provide 3 tests for the first 1,000 square feet.
2. Add one test for each additional 1,000 square feet.
3. Concrete surface area to be tested shall be completely clean. Remove all adhesives, residue, debris and sealing compounds. Remove all dust by vacuum or other methods. Do not use chemicals of any kind to clean concrete.

4. Perform moisture tests in strict accordance with the kit manufacturer's Instructions. Moisture tests shall remain undisturbed for 60 to 72 hours.
5. Immediately after moisture test has been removed from test area, conduct pH test in area previously covered by plastic dome of moisture test kit.
6. After completion of tests submit 2 copies of test data to the Architect. Submit a copy of the test data to all installers of flooring materials and resinous flooring materials scheduled to be installed.
7. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products. Perform such additional testing, at no additional cost to the Owner, after procedures have been performed to reduce moisture content to ratings acceptable to the various flooring and coating manufacturers.

End of Section

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Section 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. General requirements for temporary facilities and controls.

B. Temporary utilities.

C. Temporary construction.

D. Construction aids.

E. Vehicular access and parking.

F. Temporary barriers and enclosures.

G. Site and environment controls.

H. Fire prevention measures.

I. Security measures.

J. Project identification and temporary signage.

K. Removal of temporary utilities, controls, and facilities.

1.2 RELATED REQUIREMENTS

A. Section 01 52 00 – CONSTRUCTION FACILITIES.

B. Division 31 – EARTHWORK: erosion and sedimentation control.

1.3 GENERAL REQUIREMENTS

A. The Construction Manager shall provide and maintain all temporary facilities, controls, and construction aids as specified herein until they are replaced by permanent work, or until Project Substantial Completion, as appropriate.

1. Additional temporary facilities and controls which may be specified under individual Trade Contract sections are the responsibility of the respective Trade Contractors.
2. Temporary facilities removed from the Project shall remain the property of the Construction Manager, except as otherwise specified.

B. Except where specifically noted otherwise, cost or use charges for temporary facilities, utility services, controls, and construction aids and similar items specified in this Section or as required to perform the Work, are not chargeable to the Owner's Project Manager, or Architect, and will not be accepted as a basis of claims for a Change Order.

C. Establish and initiate use of each temporary facility at time first reasonably required for proper performance of the Work. Terminate use and remove facilities at earliest

reasonable time when they are no longer needed, or when permanent facilities have, with authorized use, replaced the temporary facilities.

1. Locate temporary facilities where they will serve Project adequately and result in minimum interference with performance of the Work.

1.4 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Reports of tests, inspections, meter readings and similar procedures performed on temporary utilities.
2. Schedule showing implementation and termination of each temporary utility within 15 days of commencement of the Work.
3. Shop drawings:
    a. Temporary signage.
    b. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.5 REFERENCES

A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. ANSI A 10 - Safety Requirements for Construction and Demolition.
2. NFPA 70 - National Electrical Code.
3. NFPA 241 - Building Construction and Demolition Operations.

1.6 TEMPORARY WEATHER PROTECTION

A. Weather Protection Standards: The following weather protection standards pursuant to Sections 44F and G of Chapter 149 of the General Laws, are hereby incorporated into this specification, and shall be considered supplementary to the temporary heating and temporary enclosure requirements specified elsewhere in this Section and in individual specification Sections.

1. Limitation of Weather Protection Standards: Under the provisions of Chapter 149, Section 44F(1) and Section 44G, Para. D, of the Massachusetts General Laws (MGL), Construction Managers are required to provide weather protection to allow building construction to be carried on between the dates of November 1 to March 31 (inclusive).
    a. These standards do not require enclosures for heat for operations that are not economically feasible to protect in the judgment of the Awarding Authority; including for example, site work, excavation, pile driving, steel erection, erection of certain exterior panels, roofing and the similar construction elements.
2. Definition of Weather Protection: “Weather Protection” means temporary protection of work which may be adversely affected by moisture, cold, heat, and wind by the use of temporary covers, enclosures, and heat. Maintain at

least the minimum temperatures specific. Comply with specific requirements which are specified within individual Specification Sections.

a. Temperature at the working surface shall be at least forty degrees Fahrenheit (40 degrees F). This provision does not supersede any specific greater requirements for methods of construction of curing of materials.

3. Construction Managers Responsibilities:

a. The Construction Manager shall furnish and install all “weather protection” Both (exterior and interior) during the time period from November 1 to March 31 (inclusive). The Construction Manager is responsible to ensure that protection is provided for the building INTERIOR and all materials and equipment from weather at all times (year round).

b. At completion of work, the Construction Manager shall remove temporary weather protection and restore all surfaces to first class condition.

4. Trade Contractors Responsibilities: Individual Trade Contractors are responsible for all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions during NON-WINTER months. NON-WINTER period is from April 1 to October 31 (inclusive).

5. Proposed Plan: The Construction Manager shall within 30 calendar days after Award of Contract, submit three copies of a typewritten proposed plan for “Weather Protection” and obtain the Architect’s and Owner’s written approval.

6. Reporting Requirements:

a. Within thirty calendar days after Contract award, the Construction Manager shall submit in writing to the Owner for approval, three copies of its proposed plan for weather protection.

b. The Construction Manager shall furnish and install accurate Fahrenheit thermometers at places designated by the Owner to determine whether the required temperature is being maintained.

7. Weather protection materials, equipment, and the installation thereof, shall comply with all the safety rules and regulations including provisions for adequate ventilation and fire protection devices.

8. Use of Permanent Heating System(s): The Construction Manager may choose, if the Owner approves, to use the permanent heating system for temporary heat after the building is enclosed and the system has been tested and is ready to operate.

a. The Construction Manager shall thoroughly clean and restore to first class condition, acceptable to the Owner, all portions of the permanent heating system that are used for heating during construction.

b. Use of the permanent heating system for weather protection shall not affect any heating system guarantee that may be due to the Owner; such guarantee shall begin to run only when the Owner accepts the building.

B. Additional weather protection requirements: The Construction Manager is responsible to ensure that the protection is provided by for the building interior and all materials and equipment from weather at all times (year round).

1. Where removal of existing roofing, roof sheathing, windows, doors, and other items is necessary to accomplish work, have materials and workmen ready to provide adequate and approve temporary covering of exposed areas.
2. Temporary coverings shall be attended as necessary to insure effectiveness and to prevent displacement.
3. Construction Manager shall repair or replace all elements of the building damaged by failure to properly protect them from the weather to the satisfaction of the Architect at no additional cost to the Owner.

1.7 TEMPORARY UTILITIES, GENERAL REQUIREMENTS

A. General Installation: Install temporary utility service(s), or connect to existing service(s) as indicated, and as specified. Comply with all applicable laws, regulations, and requirements of authorities having jurisdiction.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.8 TEMPORARY UTILITIES, ELECTRICITY

A. Temporary electricity: The Construction Manager will pay for and furnish electrical energy required for temporary light and power, for the Project while under construction. Additional requirements are specified under Division 26 - ELECTRICAL, and as follows:

1. Electric power service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics. Include meters, transformers, overload protected disconnects, automatic ground-fault interrupters and main distribution switch gear.
    a. Heavy electrical loads: Notify the power company if heavy loads will be connected, such as welding and other equipment with similar special power requirements.
        1) Except as otherwise specifically provided, all additional costs resulting from such use shall be borne by the Construction Manager.
2. Distribution: A grounded receptacle (outlet) for an extension cord shall be provided by the Electrical Trade Contractor within one hundred (100) feet of any part of the building. Individual users are responsible for their own work lamps and extension cords.

1.9 TEMPORARY UTILITIES, LIGHTING

A. Temporary lighting: The Electrical Trade Contractor shall provide lighting with local switching to fulfill security requirements and provide illumination for construction operations and traffic conditions. Maintain lighting, replace broken lamps and provide routine repairs.

1. Temporary lighting shall be based on the following requirements:
    a. Rooms or spaces under 250 square feet: Two 100 watt lamps.
    b. Rooms or spaces over 250 square feet and under 500 square feet: Four 100 watt lamps.

c. Rooms or spaces 500 square feet and over: Two 200 watt lamps for spaces 500 to 1000 square feet, and two 200-watt lamps for every additional 1000 square feet or fraction thereof.

d. Provide sufficient additional fixtures and lamps to insure proper lighting in stairwells, corridors and passage areas.

2. Lamps: The Electrical Subcontractor shall furnish and install all lamps, both initial and all required replacements until the date of Substantial Completion.

3. Use of Permanent lighting fixtures.

a. Permanent building lighting may be utilized during construction.

b. Permanent lighting fixtures which have been used during Construction shall be thoroughly cleaned by the Electrical Subcontractor.

c. Immediately prior to the Architect's inspection for Substantial Completion the Electrical Sub-Construction Manager is required to replace all lamps, which are broken, burned out or are producing reduced light output.

B. Protective night lighting is required at all times (24 hours a day, seven days a week). Construction Manager is required to arrange for adequate outdoor lighting to illuminate staging, stockpiles, trenches, dangerous projections, excavations and similar conditions and as additionally required to protect the safety of workmen, other personnel, and the public and as an aid in the protection against theft and vandalism.

1. Shield lighting to protect overflow beyond Contract limits, protect neighbors from night light overflow.

1.10 TEMPORARY UTILITIES, WATER

A. Temporary water: The Construction Manager shall provide and maintain water service and distribution piping of sizes and pressures adequate for construction, including water meter and hose bib(s) at location(s) to be determined by Construction Manager so that water is available throughout the construction by the use of hoses.

1. Protect piping and fittings against freezing.

1.11 TEMPORARY UTILITIES, FUEL OIL

A. Provide all fuel oil for temporary heating systems at no additional cost to the Owner.

1.12 TEMPORARY HEATING AND COOLING

A. General, Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

B. Temporary heat: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Heating Units: UL Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
    a. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
    b. Vent heaters directly to outside air, in areas where concrete is less than 15 days old.
2. In enclosed areas, maintain a minimum temperature of 50 degrees Fahrenheit; provide higher temperatures where required by individual specification sections. Construction Manager is required to provide enclosures necessary to maintain specified temporary heat.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system. Coordinate with work of Division 23, Heating Ventilating and Air Conditioning (HVAC). Replace all air filters immediately prior to occupancy.

1.13 TEMPORARY VENTILATION AND HUMIDITY CONTROL

A. General:
1. Humidity Control: Monitor and regulate relative humidity as required for the installation of all interior products. Relative humidity shall be maintained within the limits set by manufacturers of all interior materials and equipment. Refer to individual specification sections in Divisions 6, 8, 9, 10, 11 and 12 for additional environmental requirements.
    a. Construction Manager shall enclose interior work areas, protect from weather, and maintain specified temperature and humidity prior to commencement of construction activities relating to interior finishes.
2. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases. Extend and supplement equipment with temporary fan units as required to maintain clean air for construction operations.

B. Monitor Humidity: Provide Hygrometer to measure temperature and relative humidity in each construction area.
1. Provide dehumidifier(s), as required to maintain humidity of enclosed areas below 70 percent. Humidity level shall be maintained in all areas where interior finish work is being performed, and all areas where interior finishes has been completed.
2. Provide fans as specified herein, and as required to eliminate significant variation in humidity levels within enclosed spaces.

C. Temporary Construction Ventilation: Construction Manager shall maintain sufficient temporary ventilation of areas where materials are being used that emit VOC’s and maintain ventilation continuously during installation and until emissions dissipate after installation. If continuous ventilation is not possible via the building’s HVAC system(s) then Construction Manager shall supply ventilation via open windows and temporary fans.

1. Vent all areas directly to outside. Areas shall not be vented to other enclosed areas.
2. During dust producing activities (e.g. drywall installation and finishing) Construction Manager shall turn off ventilation system and protect openings in supply and return HVAC system from dust infiltration. Provide temporary ventilation as required.

D. Preconditioning: Prior to installation, Construction Manager shall allow products which have odors and VOC emissions to off-gas in dry, well-ventilated space outside of building for 14 calendar days, in order to allow for reasonable dissipation of odors and emissions.

1.14 CANTEEN SERVICES

A. Canteen vehicles must access the worksite at predetermined times coordinated with the Owner, and are limited to service within the construction site only.

1.15 CONSTRUCTION AIDS - USE OF PERMANENT ELEVATORS

A. Temporary use of elevator(s): Use of permanent elevators during construction for the transportation of personnel and material shall not be permitted.

1.16 CONSTRUCTION AIDS - TEMPORARY HOISTS AND CRANES

A. Hoisting equipment and machinery: Furnish all hoisting equipment, crane services and lift machinery required to perform the Work of this Contract, except that required by Trade Contractors. Install, operate and maintain in safe condition.
1. Do not charge applicators and installers for these services during normal working hours.
2. Trade Contractors are responsible for their own hoisting equipment, crane services and lift machinery required to perform the Work of their respective trade.

1.17 CONSTRUCTION AIDS - SCAFFOLDING, PLATFORMS, STAGING, CHUTES

A. General: Construction Manager is responsible for built-in-place ladders, ramps, runways, platforms, railings, chutes, and other mounted or installed construction aids which may be required to facilitate the Work. Furnish and erect construction aids and maintain in safe condition for the use of all subcontractors, installers and applicators.
1. Ladders, temporary stairs, platforms and railings, shall comply with OSHA guidelines.
a. Provide and maintain temporary stairs until permanent stairs are in place and functional. When permanent stairs are erected, provide temporary railings and guards. Protect permanent stairs with temporary covers and protective treads.
b. Portable ladders and mobile platforms of all required heights, shall be provided by individual users.

B. Scaffolding: Each Trade Contractor and subcontractor is responsible to furnish and erect scaffolds and scaffolds, staging, and other similar raised mobile and fixed

platforms, required to access their respective work, and to maintain in safe condition, and dismantle when no longer required.

1. Mobile (portable) scaffolding, rolling staging. scissor-lift platforms, and similar mobile lifts required for used by Trade Contractors and subcontractors, shall be provided and maintained, by individual Trade requiring the same.
    a. Portable (non-permanent) ladders of all heights required by individual Trade Contractors and 'non-trade' subcontractors to access their own work shall be provided by individual requiring the same.
    b. Obtaining and paying for scaffolding permits are the responsibility of the Trade requiring the same..
2. Construction Manager is responsible to provide, maintain and remove when no longer required, all tarpaulins and enclosures necessary to cover scaffolding (including that furnished by Trade Contractors) to maintain specified temporary heat and weather protection as specified herein under Article entitled "TEMPORARY WEATHER PROTECTION" from the dates of November 1 to March 31.
    a. Trade Contractors are each individually responsible, relative to their own work, to provide all tarpaulins and enclosures necessary to cover scaffolding for temporary heat and weather protection from the dates of April 1 through October 31.

C. Temporary chutes: Except as otherwise specified in individual sections, Construction Manager is responsible to provide, erect, and maintain properly supported and covered chutes from openings in exterior walls of each building level in convenient and accessible locations for use of all trades, that will permit direct disposal of rubbish and debris directly into trucks or disposal units.
    1. Do not drop or throw any materials, rubbish, or debris from openings in the exterior walls of the project, or from roof.

1.18 VEHICULAR ACCESS AND PARKING

A. Provide and maintain access to fire hydrants free of obstructions. Provide unimpeded access for emergency vehicles. Maintain 20 foot width driveways with turning space between and around combustible materials.

B. Snow and ice removal: Maintain all vehicular and pedestrian access roads and walkways free from ice and snow during the winter season for the duration of the Project.

C. Vehicular Parking: Some on-site parking may be available for the Construction Manager's use, however on-site parking may not be sufficient for all of the Construction Manager's and subcontractor's employees.
    1. As necessary arrange for off-site parking areas to accommodate construction personnel.
    2. Parking on public streets: Limited On-street parking is available. The Construction Manager's personnel are fully responsible to abide by all Municipal Laws and Regulations for on street and public parking. The Construction Manager and its personnel are additionally fully responsible for all costs incurred by the Construction Manager or its personnel for parking.

3. The Owner is not responsible for any costs incurred by the Construction Manager, Trade Contractors, subcontractors, vendors, and their personnel for parking.

D. Prior to Substantial Completion, the installed base for permanent roads and parking areas may be used for construction traffic.

1.19 VEHICULAR TRAFFIC CONTROL

A. The Construction Manager shall not close or obstruct any portion of any street public or private, without obtaining permits therefore from the proper authorities.

1. Provide and pay for police traffic details at anytime that construction takes place in a public street (right of way). The Construction Manager is responsible for coordinating, requesting. and paying the prevailing rate of wage for police traffic details directly with the City of Framingham Police Department.

B. Construction parking control: Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, Owner's operations, or construction operations.

1. Monitor parking of construction personnel private vehicles in existing facilities. Maintain free vehicular access to and through parking areas. Prohibit parking on or adjacent to access roads, or in non-designated areas.

C. Vehicle and Equipment Security: Lock all unattended vehicles including construction machinery and equipment. Do not leave vehicles or equipment unattended accessible to public with the motor running, or with keys easily accessible.

D. Haul routes: Consult with governing authorities and establish public thoroughfares which will be used as haul routes and site access. Confine construction traffic to designated haul routes.

1. Confine construction traffic to designated haul routes.
2. Provide traffic control at critical areas of haul routes to expedite traffic flow and to minimize interference with normal public traffic.

E. Traffic signals and signs: Provide, operate and maintain temporary equipment, services, and personnel, with traffic control and protective devices, as required to direct and maintain an orderly flow of traffic in all areas under Contractors control, or affected by Contractors operations, including but not limited to haul routes, at site entrances, at on-site access roads, and parking areas during construction.

1. Provide traffic control and directional signs as needed to direct construction and public traffic.
2. Provide warning signs for public traffic and "STOP" signs for entrance onto public roads.
3. Comply with signage and traffic control requirements of authorities having jurisdiction.

1.20 DUST CONTROL

A. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

1. Take all necessary measures and provide equipment and materials to minimize dust from rising and blowing across the site and also to control surface water throughout the operation so that it does not run onto paved ways without being filtered. Control all dust created by construction operations and movement of construction vehicles, both on site and on paved ways.
2. During the progress of the work, maintain the areas of construction activities including sweeping and sprinkling of streets as necessary. Provide and use calcium chloride for more effective dust control, when deemed necessary by regulatory agencies, without additional cost to the Owner.

B. Prevent air-borne dust from dispersing into ducts (air supply and return) during construction. Seal all open ends of completed ductwork, and overnight work-in-progress. Inspect ducts on daily basis to ensure seals are intact. Protect ductwork waiting to be installed with surface wrapping.
   1. Ductwork protection during construction is a joint responsibility between the Construction Manager and HVAC Trade Contractor.
   2. HVAC Trade Contractor is responsible to wipe down internal surfaces of ductwork immediately prior to installation to remove all dust and debris.

C. Prevent air-borne dust from dispersing into occupied spaces (after partial Owner-occupancy, if occurs). Provide interior dust-tight temporary partitions as specified under the Article entitled “Interior enclosures”.
   1. Provide air-filters over openings and grilles in air-return ducts occurring within construction areas.
   2. Provide openings in temporary partitions where air-return grilles occur outside of work areas. In each opening, provide standard 2 inch thick, throw-away type filter having a rated efficiency of 35 percent. Review with Architect size requirements of filtered openings, locations of openings and how many are required.
   3. Replace air filters as required to maintain their efficiency.

1.21 NOISE CONTROL

A. Develop and maintain a noise-abatement program and enforce strict discipline over all personnel to keep noise to a minimum.

B. Execute construction work by methods and by use of equipment which will reduce excess noise.
   1. Equip air compressors with silencers, and power equipment with mufflers.
   2. Manage vehicular traffic and scheduling to reduce noise

C. Interior work involving cutting, drilling, hammering or noise generating procedures shall be completed during times scheduled with the User Agency Owner in advance.

1.22 TEMPORARY BARRICADES

A. Provide barriers and barricades to prevent unauthorized entry to construction areas.
   1. Comply with standards and code requirements for erection of barricades, where required provide lighting, including flashing lights.

2. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against.
3. Provide special barriers necessary to protect entrances and areas around building and to prevent persons from coming in contact with material or construction operations.

B. Provide temporary enclosures, as required, for protection of existing facilities and new construction from exposure to weather, other construction operations and similar activities. Where heat is needed and the building envelope is incomplete, provide enclosures where there is no other provision for containment of heat.
1. Provide doors with self-closing hardware and locks.
2. Provide barricades and protective entrances at least 48 inches high around openings in floors, escalators and elevators.

C. Provide temporary roofing as needed to maintain the building water tight.

1.23 TEMPORARY FENCES

A. Construction fence: Provide a 8 foot high commercial grade chain link fence around construction site; equip with vehicular and pedestrian gates and locks.
1. Relocation of all fences and gates as required due to construction phasing. Relocations shall be provided at no additional cost to the Owner.

B. Emergency Key Cabinet: Provide emergency access key cabinet (“Knox Box”): medium duty, surface mounted. Locate emergency key cabinet in readily-accessible location outside of fence line. Provide keys for emergency key cabinet to Owner’s Project Manager and Framingham Police and Fire department designated representatives.

C. Fence, General: Fence shall be industrial-grade, heavy-duty construction: Galvanized fabric with galvanized frame.
1. Chain link fabric shall be made of coated-steel, 9 gage (0.148 inch) core wire woven in 2-inch uniform mesh, height (roll width) to suit fence height, with bottom selvage knuckled, top selvage twisted, with woven fabric having a minimum breaking strength of 1290 pounds.
a. Construction privacy and containment mesh: 80 to 85 percent privacy (15 to 20 percent open) 100 percent polyethylene mesh having weight of approximately 5.1 ounces per square yard, color green. Provide with four-ply sewn hems, reinforced with 2 inch wide 18 ounce vinyl-coated UV resistant polyester tape. Finish hem width is 1 inch. Furnish with number 2 size brass grommets at 12 to 18 inches on-center, along hemmed edges.
2. Framework: Type 1 seamless steel pipe, ASTM A-120, standard weight schedule 40, hydrostatic testing waived.
3. Gate Posts: Standard weight pipe 2-7/8 inches OD nominal weight, 5.79 pounds per foot.
4. Gate Frames: 2 inches OD standard weight pipe, 2.73 pounds. per foot with heavy malleable iron or pressed steel corner fittings securely riveted. Fabric to match the fence shall be installed in the frame by means of tension bars and

hook bolts. Each frame to be equipped with 3/8 inches diameter adjustable truss rods.

5. Bottom hinges to be ball and socket type designed to carry the weight of the gate on the post footing. Upper hinge to be wrap around adjustable type. All gates to be equipped for padlocking and with semi-automatic outer catches to secure gates in opened position.
6. Fittings: Pressed steel or malleable iron, hot-dipped galvanized conforming to the requirements of ASTM A153. Tie wires shall be minimum nine-gage galvanized wire,. Attachment bolts shall be galvanized.
7. Post Settings: Driven into ground. Temporary concrete bases may be considered where fencing is scheduled for relocation.

1.24 POLLUTION CONTROL

A. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by, the discharge of noxious substances from construction operations.
   1. Comply with all applicable Federal, State, County, and municipal laws regarding pollution.
   2. Prevent pollution of streams, lakes, or reservoirs with fuels, oils, bitumens, calcium chloride, acids, waste products, effluents, chemicals or other harmful substances. Prevent from such substances from entering storm drains and sanitary sewers.

B. Provide equipment and personnel, perform emergency measures required to contain any spillage and to remove contaminated soils or liquids.
   1. Excavate and legally dispose of any contaminated earth off-site, and replace with suitable compacted fill and topsoil.

1.25 EROSION AND SEDIMENT CONTROL

A. General: Comply with requirements with Division 31 – EARTHWORK and as specified herein. The more stringent requirements shall apply.
   1. Obtain all required permits from authorities having jurisdiction regarding erosion control and silt fence.

B. Erosion and sediment control: Provide an erosion and sediment control program for minimizing erosion and siltation during the term of construction. The following minimum erosion control principles shall apply to the land grading and construction phases:
   1. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
      a. Stripping of vegetation, grading, or other soil disturbance shall done in a manner which will minimize amount of bare soil exposed at one time. Whenever feasible, natural vegetation shall be retained and protected.
      b. Erosion control devices shall be installed as early as possible in the construction sequence prior to start of clearing and grubbing operations and excavation work.

c. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

2. Sediment shall be retained on-site. Temporary erosion protection shall be accomplished by covering land with erosion protection materials, as appropriate for prevailing conditions.
   a. Use baled hay or straw to trap sediment and prevent sediment from clogging drainage systems. Handle baled units in manner to prevent from breaking apart.
   b. Locate baled hay or straw where required and as directed by the Architect and stake bales to prevent overturning, flotation, or displacement.
   c. Remove deposited sediment periodically.
   d. Temporary seeding, mulching, or other suitable stabilization measures, shall be used to protect exposed critical areas during prolonged construction or other land disturbance, where the period of exposure will be greater than two (2) months.
3. Drainage provisions shall accommodate increased runoff resulting from modifications of soil and surface conditions during and after development or disturbance. Such provisions shall be in addition to existing requirements.
   a. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
4. Cut and fill slopes and stockpiled materials shall be protected to prevent erosion. Slopes shall be protected with permanent erosion protection when erosion exposure period is expected to be greater than or equal to six months, and temporary erosion protection when erosion exposure period is expected to be less than six months.
   a. Except where specified slope is indicated on Drawings, fill slopes shall be limited to a grade of 2:1 (horizontal:vertical) cut slopes shall be limited to a grade of 1-1/2:1.
   b. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
5. Inspect and adjust erosion and sediment control devices twice each month and after each heavy rain. Remove silt if greater than 6 inches deep. Replace damaged or deteriorated items devices.
   a. Hay bales shall be inspected frequently and maintained or replaced as required to maintain both their effectiveness and essentially their original condition. Underside of bales shall be kept in close contact with the earth below at all times, as required to prevent water from washing beneath bales.
   b. Sediment deposits shall be disposed to off-site, in a location and manner which will not cause sediment nuisance elsewhere.

1.26 PEST CONTROL

A. Provide rodent control as necessary to prevent infestation of construction and storage areas. Employ methods and use materials which will not adversely affect conditions at the site or on adjoining properties.

B. Provide marked metal containers with lids for all edible rubbish and enforce their use by all employees. Empty containers and legally dispose of contents off site as required to maintain rodent control.

C. If the Construction Manager's basic rodent control program proves to be ineffective, obtain the services of a professional exterminator, at no additional cost to the Awarding Authority Owner.

D. Should rodenticides be considered necessary, submit copies of proposed program to Awarding Authority Owner and Architect. Use of rodenticide shall comply with manufacturer's published instructions and recommendations. Clearly indicate:

1. Area or areas to be treated.
2. Rodenticides to be used.
3. Manufacture's printed instructions.
4. Pollution preventive measures to be employed.

1.27 FIRE PREVENTION MEASURES

A. Prior to commencement of work at the site, the Owner's Representative, Construction Manager, and Construction Manager shall meet with the Local Fire Marshal to plan site and building access in the event of fire.

1. Access paths for heavy fire fighting equipment shall be laid out and maintained.
2. Free access from streets to fire hydrants and to outside connections for standpipes, sprinklers or other fire extinguishing equipment shall be provided and maintained.

B. The Construction Manager shall take all necessary precautions for the prevention of fire during construction. Install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes. Ascertain and comply with requirements of Project insurance carrier, local fire department and the state fire marshal.

1. Maintain the area within contract limits orderly and clean.
   a. Remove combustible rubbish promptly from the site and when required, store combustible materials in containers in fire-safe locations.
2. Maintain clear access to exits from within the building.
3. Smoking is not permitted on site.

C. Establish procedures for fire protection for welding, cutting and open torch work, and other potentially hazardous operations. Obtain permission from local authorities having jurisdiction for such work as required by law. Provide special fire extinguishers at welding and torch cutting work.

1. After Owner occupancy or partial occupancy: Maintain a fire watch when fire protection and warning systems have been temporarily de-activated. Maintain watch during all working hours for full period of de-activation.
2. The Construction Manager will assign personnel to inspect all construction areas at the end of each day's work for fire hazards prior to lock-up.

D. Provide for outside storage of gas tanks, sufficiently clear of any structure. Promptly remove welding and cutting equipment from the building when no longer required. Do not store welding or cutting materials within the building when work is not being performed.

E. Permanent fire protection system may be activated to meet these requirements. Replace fusible link heads and other expended or discharged components at time of Substantial Completion.

1.28 SECURITY MEASURES

A. Protect Work, existing premises and Owner's operations from theft, vandalism, and unauthorized entry. Maintain security program throughout construction period until Owner occupancy precludes the need for Construction Manager security.

1. Construction Manager is responsible for security of site during construction, including prevention of illegal trespassing, unauthorized entry, theft and vandalism. All losses and damages which occur are the full responsibility of the Construction Manager, who shall bear all costs incurred.

B. Provide entry control:

1. Restrict entrance of persons and vehicles into Project Site.
2. Allow entrance only to authorized persons with proper identification.
3. Maintain log of workmen and visitors, make available to OPM on request.
4. Construction Manager shall control entrance of persons and vehicles.

1.29 PROJECT IDENTIFICATION AND TEMPORARY SIGNAGE

A. General: Signs other than those specified herein are not permitted, except those required by law or expressly authorized by the Awarding Authority .

1. At all times during the project, signage must clearly direct occupants and the general public in the safe use of the building. Signs must clearly indicate areas of no admittance, and further must clearly define and direct users to building entries, exits, and other important destinations.

a. All such interim signage must be painted by a professional sign painter on 3/4-inch medium density overlay plywood with letters no less than 3 inches in height.

b. Coordinate required signage with Architect/Engineer.

B. Project sign:

1. Provide 8 foot wide by 4 foot high foot project sign of exterior grade MDO plywood and wood frame construction, painted, with self-adhesive color printed text with reproduction of building rendering. Architect will provide signage design.

a. Color prints for rendering shall be 3M Scotch print marking film series 8640 or equal, 4 mil thickness, "ControlTac" vinyl film as manufactured by 3M company having a position able pressure activated pigmented adhesive.

b. Overlay protecting film, Scotchprint Film, clear over laminating film, as manufactured by 3M company.

2. List title of project, names of MSBA, Owner, Architect/Engineer, professional sub-consultants, Construction Manager.
3. Erect on site at location established by Architect/Engineer.

C. Signage at perimeter of construction site: Provide clear and visible warning signage with appropriate language such as: “Prohibited Access – Hard Hat Only – No Admittance – Authorized Personnel Only”.

D. Conservation sign: Provide painted white sign not less than two square feet or more than three square feet in size bearing the words “MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION, FILE NUMBER 000-000”. Locate sign where directed.

1.30 REMOVAL OF TEMPORARY UTILITIES, CONTROLS, AND FACILITIES

A. Remove temporary materials and construction prior to Substantial Completion.
1. Do not remove erosion control devices until after all disturbed earth has been paved or vegetated.

B. Remove underground work and compacted materials to a depth of 2 feet; fill and grade site as specified.

C. Restore existing facilities used during construction to original conditions. Restore permanent facilities used during construction to specified condition.

D. Clean and repair damage caused by installation or use of temporary work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

Section 01 52 00
CONSTRUCTION FACILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. General requirements for temporary construction facilities, including:
   1. Field Offices and Sheds.
      a. Construction Manager's Field Office.
      b. Owner's Project Manager's Field Office.
      c. Architect's Field Office.
      d. Utility services for field offices.
      e. Internet and telephone service.
   2. Sanitary Facilities.
      a. Toilet facilities for field offices.
      b. Self-contained single-occupant chemical toilet units for Site use.
   3. First Aid Facilities.

1.2 RELATED REQUIREMENTS

A. Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

1.3 GENERAL REQUIREMENTS

A. The Construction Manager shall provide and maintain all temporary construction facilities as specified herein until they are replaced by permanent work, or until Project Substantial Completion, as appropriate.
   1. Temporary facilities removed from the Project shall remain the property of the Construction Manager, except as otherwise specified.

B. Except where specifically noted otherwise, cost or use charges for temporary facilities, utility services, controls, and construction aids and similar items specified in this Section or as required to perform the Work, are not chargeable to the Owner, Owner's Project Manager, or Architect, and will not be accepted as a basis of claims for a Change Order.

C. Establish and initiate use of each temporary facility at time first reasonably required for proper performance of the Work. Terminate use and remove facilities at earliest reasonable time when they are no longer needed, or when permanent facilities have, with authorized use, replaced the temporary facilities.
   1. Locate temporary facilities where they will serve Project adequately and result in minimum interference with performance of the Work.

1.4 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Schedule showing implementation and termination of each temporary construction facilities within 15 days of commencement of the Work.
2. Product Data: catalogs and vendors data for trailers and for the additional equipment and furnishings for review and approval by the Owner's Project Manager.
3. Shop drawings:
    a. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.5 REFERENCES

A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
    1. ANSI A 10 - Safety Requirements for Construction and Demolition.
    2. NFPA 70 - National Electrical Code.
    3. NFPA 241 - Building Construction and Demolition Operations.

PART 2 - PRODUCTS

2.1 FIELD OFFICES - GENERAL

A. General: Existing facilities shall not be used for field offices and for storage.
    1. Availability: Provide two trailers minimum. One for the Construction Manager's Field Office and one for the Architect and Owner's Project Manager. Provide offices ready for occupancy within 15 days after date fixed in Notice to Proceed.
    2. Field offices: Provide furnished, insulated, weathertight, office(s) which shall be portable or mobile building(s), or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.
        a. Securely support trailers on temporary masonry or preservative treated wood piers and not on trailer wheels. Anchor trailers to prevent overturning due to wind or other causes.
        b. Construction of offices shall have sound insulation adequate to exclude sounds of routine construction activities and reduce server noise to less than 70 dB.
        c. Interior Materials in Offices: Sheet type materials for walls and ceilings, prefinished or painted; resilient floors and bases.
        d. Exterior Materials: Weather resistant, finished in one color.
    3. Location: The location of the field office(s) and storage areas for equipment and materials shall be upon cleared portions of the job site or areas to be cleared, and shall require review and written acceptance of the Owner's Project Manager. Submit plans showing field office and storage facilities for equipment and materials for acceptance by the Owner's Project Manager.

a. Offices and sheds located within the construction area, or within 30 feet of building lines shall be of noncombustible construction. Comply with requirements of NFPA 241.

b. Access to trailer shall conform to Massachusetts Regulation 521 CMR - Architectural Access Board.

4. Excluding computer, computer software and related equipment; all other non-consumed furnishings and equipment, will be returned to Construction Manager upon project completion.

5. Office environmental requirements:

a. Provide air conditioning and heating to maintain a temperature range of 65 to 78 degrees F.

b. Provide sufficient lighting for 50 foot candles at desk top level over 100 percent of floor area.

2.2 CONSTRUCTION MANAGER'S FIELD OFFICE

A. Construction Manager's field office(s): Provide habitable office(s) or space, of size to accommodate personnel, include as a minimum the following:

1. Size: Construction Manager field office shall be not less double wide office trailer, approximately 1600 square feet. Sectioning of trailer shall be as required by Construction Manager. Each section of trailer shall have direct access to an exterior locking door and a communicating door.

2. Furnishings:

a. Conference table of sufficient size with seating to accommodate personnel and anticipated visitors for specified conferences and weekly progress meetings. Minimum seating for 12.

b. Racks and files for Contract Documents, submittals and Project Record Documents.

3. Outdoor weather thermometer.

4. Not less than 15 hard-hats, vests, and personal protective equipment (PPE) for site visitors.

5. Duplex convenience outlets, at least one per wall.

6. Telephone service as specified herein.

7. 54 inch flat screen monitor with digital touchscreen or equivalent technology, or as mutually agreed upon prior to the execution of GMP Amendment.

8. Other equipment and furniture as the Construction Manager deems necessary.

2.3 OWNER'S PROJECT MANAGER'S (OPM) AND ARCHITECT'S FIELD OFFICES

A. OPM field offices: Provide separate lockable space, for sole use of Owner, Owner's Project Manager, and Owner's on-site representatives. Provide with two separate entrance doors having new lock and three keys.

1. Size: OPM field office shall be not less than 800 square feet, equipped with four offices. Each office shall have a locking communicating door.

2. Provide office furnished, insulated, weathertight, and habitable, with the following equipment and furniture.

a. Chairs: Provide four desk chairs with swivel base and casters.

b. Desks: Provide three lockable desks, each 30 by 60 inches.

c. Folding Tables: Provide four folding tables 30 inches width, by 8 feet length.

d. Desk Lights: Provide four spring-mounted desk task lights.

e. Drawing reference (Plan) table: Provide plan table at least 32 by 84 inches. Provide with 2 high chairs. Provide 12 -inch wide shelf above for full length of tables.

f. Conference Table: Provide one 4 by 12 feet conference table with plastic laminated oak finish with oak edging and double tee chrome leg base. Also provide 14 padded folding chairs.

g. Drafting Chairs: Provide two drafting chairs with casters and adjustable height and back.

h. Drawing Racks: Provide three drawing racks, (one rack for half-sized sets) capable of handling all bid documents, shop and other drawings.

i. File Cabinets: Provide three four-drawer metal file cabinets with locks and keys.

j. Fire Proof Cabinets: Provide one two-drawer fire proof file cabinet

k. Wall Mounted Shelving: Provide wall shelving, suitably attached to the walls a minimum of 12 feet in aggregate length, not counting wall shelving above plan tables.

l. Bulletin Boards: Provide bulletin boards, wall mounted, with at least 65 square feet of tack surface and white board with at least 32 square feet of writing surface.

m. One recording thermometer, outdoor type, in weatherproof metal enclosure; eight-inch circular chart temperature recorder, capable of recording -20 degrees F to +120 degrees F with a seven-day duration. Mount at Office window.

n. Water: Provide drinkable bottled water in a dispenser, which furnishes instant hot water, as well as cold water. Provide water service for the duration of the project.

o. Coffee Maker: Provide one Keurig Office PRO Brewing System or equal, with three selectable serving sizes. Provide K-cup type supplies including regular and decaffeinated coffee for the duration of the project, replenishing supplies on a regular basis.

p. Refrigerator: Provide one undercounter refrigerator with freezer compartment, nominal six cubic feet.

q. Microwave Oven: Provide one 1000 watt microwave oven.

r. Construction Hard Hats and Safety Goggles: Provide 12 construction hard hats with adjustable dials and 12 sets of safety goggles.

s. Waste Paper Baskets: Provide five waste paper baskets.

t. Electronic labeling system: desktop model, Brother Model #PT2700 or equal. Furnish tape and other supplies for duration of Project.

u. First Aid Kits: Provide two first aid kits of size and type suitable or recommended for construction sites.

v. Printers, Copiers, and consumables: Provide the following printers, copiers, fax machines and consumables. Provide necessary maintenance and support for the following equipment for the duration of the project
   1) Printer/Scanner/Copy Machine: Provide one networked color copy machine, complete with wheeled stand, with 50 page top mounted automatic document feeder, and separate feeder trays for 8-1/2" x 11", 8-1/2" x 14" and 11" x 17" paper.
      a) Machine shall be capable of copying, scanning to USB, email or desktop, printing reducing, enlarging, double sided copying, stack loading, sorting, and stapling, and be supported by a three year on-site Service Plan with 24 hour response.
   2) Tablet, WiFi capable. Obtain tablet requirements from OPM prior to providing.

w. Minimum 3 Hardhats for use by Clerk, OPM's and Architect's representatives.

x. Other furnishings and equipment as required by OPM.

3. Provide fully functional restroom in trailer with plumbing service, and septic utility services.

B. When permanent facilities are enclosed with operable utilities, relocate offices and storage into building, with written agreement of Owner's Project Manager, and remove temporary buildings.

2.4 STORAGE SHEDS

A. Storage and fabrication sheds: Provide as required storage sheds, temporary buildings, and trailers, equipped to accommodate materials and equipment involved.

1. Storage of construction materials in the new school building shall be permitted, depending on the type of materials and the duration of expected storage, as determined by the Architect and OPM.

2. Trade Contractor's are responsible for their own storage facilities, coordinate locations.

2.5 FIELD OFFICE UTILITIES

A. All electric services shall be continuously connected. Electric lights and adequate electric power, proper heat, hot water and satisfactorily cooled drinking water. A sufficient number of electrical outlets shall be provided and suitably located in the trailer for the equipment and desks specified in this section of the specifications.

B. Provide facilities with hot and cold running water.

C. Provide facilities with sanitary waste services. Chemical toilets are not permitted.

2.6 INTERNET AND TELEPHONE SERVICES

A. Temporary telephone service:

1. Provide telephone service at time of project mobilization, and pay all costs for installation, maintenance, and removal. The Construction Manager shall pay

service charges for local calls; toll charges shall be paid by party who places call. Service and equipment required includes the following:

2. For Construction Manager's Field Office .
    a. Provide direct two line service dedicated for use by the Construction Manager, Trade Contractor, and personnel engaged in construction.
    b. One answering machine or phone service with messaging.
    c. One (direct) separate line for facsimile (FAX) machine.
    d. Cellular (mobile) phone service for Construction Manager's Superintendent, continuously maintained until Project Substantial Completion.
    e. Other instruments at the option of the Construction Manager, or as additionally required by Authorities having jurisdiction.
3. For Owner's Project Manager's Field Office; Construction Manager shall provide:
    a. Direct, linked two line telephone service with local and long distance service.
        1) Coordinate Location of phone jacks with OPM.
        2) Provide voice mail connected to all voice lines; equipped with remote message retrieval, separate incoming and outgoing messages, time and date message stamp, call monitoring and automated call attendant.
    b. Provide touch tone phones having hands-free speaker (teleconference) capability with privacy and mute features. 25 foot length coiled cords connecting instrument base with receiver, and 10 feet length cords connecting instrument base with wall receptacle.
    c. Provide two two-line cordless phones with½ mile range. Connect phone base unit to wall-mounted jacks with cords not less than 10 feet long.
4. For Architect's Field Office; Construction Manager shall provide:
    a. Direct, linked two line telephone service with local and long distance service.
        1) Coordinate Location of phone jacks with Architect.
        2) Provide voice mail connected to all voice lines; equipped with remote message retrieval, separate incoming and outgoing messages, time and date message stamp, call monitoring and automated call attendant.
    b. One touch tone phone having hands-free speaker (teleconference) capability, 25 foot length coiled cords connecting instrument base with receiver, and 10 feet length cords connecting instrument base with wall receptacle.

B. Temporary internet service:
1. Provide and maintain internet service starting at project mobilization, and pay all costs for installation, maintenance, and removal. The Construction Manager shall pay service charges through date of Substantial Completion.
2. High Speed Internet Service: Provide the following High Speed Internet Connection and related equipment:

a. Cable Business Service, Fiber-Optic Service (FiOS) services, or Broadband Business Service at 15 mb/sec, upstream and downstream with modem and router compatible with and approved by the approved local Service Provider), ISP choice coordinated and approved by the Architect and OPM.

b. Determine the available internet service providers (ISP) for the jobsite location and report the options to the Architect for review and approval.

c. Internet connection shall be dedicated for the use of the occupants of this trailer only, and shall not be shared with other trailers, or outside users without permission of the Architect.

d. High Speed Internet Connection to be fully configured and operational on all computer workstations specified in this Section.

e. Dynamic IP is acceptable, static IP is not required.

f. Confirm that the ISP permits the use of Cisco VPN Client using port 10000 (Virtual Private Network) connections thru their network/internet access service.

g. Provide multi-port 10/100 switch in trailer for networking equipment and internet access.

h. Routers with built-in wireless must have WEP encryption configured and turned on. WEP key information shall be provided to the Architect.

i. The high speed data connection shall terminate in the Construction Manager's trailer in a locked room or closet. If no such room is available, coordinate the location with the Owner's Representative Project Manager. Network equipment and high speed modem shall be located so that it is hidden from immediate sight and located where it cannot be easily tampered with.

j. Provide surge protectors for all internet access, network equipment and phones.

k. Provide both OPM and Architect with all account numbers, user names, and passwords applicable to the ISP agreement, as well as support contact information (including emergency toll-free and 24/7 support phone numbers).

l. High Speed internet access service shall commence within 7 calendar days after trailer occupancy or one week following activation of electrical service to the Field Offices; whichever comes first. Service shall remain activated and financial account status in good standing with ISP until such lime that the Architect and OPM agree to terminate service. Construction Manager shall plan to keep internet service active for at lease one month following current project completion date or one month after scheduled removal of field trailer, whichever is the later of the two.

m. Construction Manager shall advise it's Trade Contractors of the location of any wires or cables associated with high-speed internet and power connections to the Owner's Field Office to avoid disruption of service during construction or site work.

3. Data Cabling: Provide data cabling as follows:

a. Provide adequate data cabling within the Owner's site office so that there is a minimum of three data connections (Cat 5e or Cat 6) in each office at each planned workstation/desk.

b. Provide cabling from the ISP entry point of the trailer to each wall jack.

c. The exact location and quantity of data drops shall be coordinated and approved by the Architect prior to implementation.

d. The use of a wireless network within the trailer is NOT an acceptable alternative (wireless capabilities are acceptable, but are NOT to be used in lieu of data cabling).

2.7 SANITARY FACILITIES

A. Sanitary facilities for Offices: Provide fully working restroom facilities for all Field offices. Facilities may be shared by Construction Manager, OPM and Architect.

B. Sanitary facilities for Site: Provide self-contained single-occupant chemical toilet units, wash facilities and drinking water fixtures.

1. Locate sanitary facilities within the fenced construction zone.

2. Permanent facilities located in completed work may not be used by the Construction Manager's personnel.

C. Provide toilet tissue, paper towels, paper cups, cleaning compounds and similar materials.

D. Maintain facilities, through-out term of construction, and keep clean, provide covered waste containers for used material.

2.8 FIRST AID AND FIRE EXTINGUISHERS

A. First aid supplies: Comply with governing regulations.

B. Fire extinguishers: Provide and maintain on site, adequate fire extinguishers UL rated for A-B-C type fires. Provide red-painted plywood standards for each extinguisher. Additionally, provide a dry chemical fire extinguisher at each location where welding, torch cutting and other similar hazardous work is in progress.

1. At welding and heat cutting work: Provide not less than a Multi-purpose dry chemical type (mono amonium phosphate) fire extinguisher, 20-pound capacity, multi-purpose rated "2A, 120 B:C".

PART 3 - EXECUTION

3.1 LOCATION AND ACCESS

A. Prior to installation of offices and sheds, consult with Owner's Project Manager on location, access and related facilities.

3.2 PREPARATION

A. Fill and grade sites for temporary structures to provide drainage away from buildings.

3.3 INSTALLATION

A. Install office spaces ready for occupancy 15 days after date fixed in Notice to Proceed.

B. Parking: Two hard surfaced parking spaces for use by Owner's Project Manager and Architect, connected to office by hard surfaced walk.

C. Install office furnishings and equipment ready for use.

D. Interconnect the Architect's computer and the OPM's computer to printers, copiers, scanners, and Fax and to the laser printer.

E. Connect and test the video conferencing equipment. Consult Architect to arrange connectivity testing of both of the Architect's offices to the site equipment.

3.4 MAINTENANCE AND CLEANING

A. Provide weekly janitorial services for offices; periodic cleaning and maintenance for offices.

B. Maintain approach walks to field office and storage/fabrication sheds free of mud, water, and snow.

3.5 REMOVAL OF TEMPORARY CONSTRUCTION FACILITIES

A. Restore existing facilities used during construction to original conditions. Restore permanent facilities used during construction to specified condition.

B. Clean and repair damage caused by installation or use of temporary work.

End of Section

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Section 01 60 00
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Definition of Terms

B. Basic product requirements.

C. General environmental requirements for products.

D. Owner furnished products.

E. Owner's proprietary products.

F. Product delivery and handling requirements.

G. Product storage and protection requirements.

1.2 RELATED REQUIREMENTS

A. Section 01 25 13 - PRODUCT SUBSTITUTION PROCEDURES:

B. Section 01 81 13 - SUSTAINABILITY REQUIREMENTS SUMMARY.

C. Section 01 81 19 - CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT.

D. Section 01 81 23 - VOLATILE ORGANIC COMPOUND LIMITS.

E. Section 01 91 13 - BUILDING COMMISSIONING REQUIREMENTS.

F. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction recycling.

1.3 DEFINITION OF TERMS

A. "Products" is defined as new material, machinery, components, equipment, fixtures, and systems used in the Work. Products do not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work.

B. "Materials" are products that are shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.

C. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

D. "Fasteners" include all products required for mechanical connections and include, but are not limited to: nails, screws, bolts, expansion bolts, chemical bolts, epoxy anchors, pins, powder-actuated devices, and similar fasteners, anchors, and connections.

E. Definitions in this article are not intended to negate the meaning of other terms used in Contract Documents, including "specialties", "systems", "structure",

"finishes", "accessories", "furnishings", "special construction", and similar terms, which are self-explanatory and have recognized meanings in the construction industry.

1.4 BASIC PRODUCT REQUIREMENTS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

1. Where possible utilize materials harvested and manufactured regionally, within a 500-mile radius of the project site.

B. To the fullest extent possible, provide products of the same kind, from a single source.

C. Provide interchangeable components of the same manufacturer, for similar components.

D. When the Contractor has the option of selecting two or more products, ensure that products selected shall be compatible with products previously installed or approved.

E. Provide all products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.

F. Galvanic Corrosion: Install materials in manner which will effectively isolate dissimilar metals which may potential for galvanic corrosion. Use non-absorptive dielectric material, isolation coatings, or other protective isolator approved by Architect.

1. For non-humidity controlled environments, and all building shell components, the following applies:

a. For all fasteners, anchors, and connections, provide types of metal to prevent galvanic corrosion. Small anodic areas (fasteners) relative to the cathodic areas (field) should be avoided. Utilize same metal or more noble metals (cathodic) for fasteners and bolts.

1) Apply corrosion-inhibiting pastes or compounds under heads of screws or bolts inserted into dissimilar metal surfaces whether or not the fasteners had been previously plated.

b. Use non-absorptive dielectric material, isolation coatings, or other protective isolator approved by Architect.

c. Seal faying edges to preclude the entrance of liquids.

G. Fasteners, Anchors, and Connections: Provide all fasteners, anchors, and connections needed to safely, securely, and appropriately secure all Work permanently in place.

1. General: The Contractor is solely responsible for the capacity, suitability, adequacy, and safety of all welded, fastened and anchored connections.

a. Comply with applicable code requirements regarding fastener selection and installation.

b. Provide at least two fasteners for each individual item being fastened.

c. Utilize fastener manufacturer's published load tables for working loads to assist in determining fastener size and space. Do not use ultimate load capacity in determining fastener selections.

d. Provide a minimum safety factor of 4.

e. Select and utilize fasteners having minimum galvanic corrosion factor (refer to above Paragraph F.)

f. Hydrogen embrittlement prevention:

1) Do not use high-strength and low-alloy fasteners which have been subjected to an acid pre-treatment (because they can become brittle and fail), utilize instead equivalent capacity and size bi-metal, stainless steel or high strength aluminum fasteners, as appropriate to the conditions and materials where being used.

2) Utilize low-hydrogen electrodes for welding high-strength steels to prevent hydrogen embrittlement.

2. To permit the Contractor control over means and methods, some fastener conditions may not be fully defined in the Contract Documents. In particular, individual specification sections that require delegated independent engineering. In such instances the Contractor is fully responsible to determine method of fastening appropriate for each condition. The Contractor shall take into consideration substrate material(s) and product(s) being fastened, live and dead loading, and both atmospheric and visual exposure considerations. Contractor is responsible to determine fastener type, material, finish, size, diameter, length and spacing.

3. Torque structural fasteners as recommended by fastener manufacturer, or as otherwise specified in the Contract Documents.

H. Permanent Labels and Nameplates:

1. Restrictions:

a. Do not provide exposed-to-view labels, nameplates, or trademarks which are not required by code, or regulations.

b. Do not expose manufacturers, suppliers, or installer's name, logo, or trade names on normally visible surfaces.

c. Do not provide labels, nameplates or trademarks when individual specification sections specifically exclude them.

d. All exposed-to-view advertising and name-brand labels shall be fully removed without damage to substrate finish.

2. Location for required labels: Required labels, approval plates and stamps shall be located on a concealed surface, or where required for observation after installation on accessible non-conspicuous surface.

3. Data Plates: Provide permanent data plate on each item of service-connected or power-operated equipment.

a. Data Plate Information: Include manufacturer, model, serial number, date of manufacture, capacity, ratings, power requirements, and all other similar essential data.

b. Locate data plates on easily accessible surface that is inconspicuous in occupied spaces.

1.5 GENERAL ENVIRONMENTAL REQUIREMENTS FOR PRODUCTS

A. General: Comply with LEED Certification requirements and as specified herein. Prohibit the use of or incorporation into the work of materials which contain toxic, hazardous and harmful materials.

1. Hazardous materials: Defined as pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA), the International Agency for Research on Cancer (IARC) or regulated under OSHA Hazard Communication Standard, 29 CFR 1910.1200.
2. Harmful materials: Defined as materials which contain the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade the utility of the environment for aesthetic, cultural, or historical purposes.
3. Owner restricted materials: Defined as all products to which the Owner has a reasonable objection because of its content, composition, properties, or characteristics.

B. Vapors, Gases, Fumes, Odors:

1. General: Comply with all state and federal VOC requirements. Where ever possible use non-VOC materials.
   a. Limit use of products to the greatest extent possible which have "off-gassing", fumes, flammability, and other harmful characteristics.
      1) Prohibit use of products which contain substances that contribute significantly to the production of photochemical smog, tropospheric ozone, or poor indoor-air quality.
   b. Limit use of ozone-depleting compounds to the greatest extent possible. An ozone-depleting compound is any compound with an ozone-depletion potential greater than 0.01 (CFC 11 = 1).
   c. Use organic and biodegradable cleaners to the greatest extent possible.
2. Do not install, use for installation, and use for cleaning those materials which may produce objectionable (to Owner and public) vapors, gases, fumes, odors, or similar conditions.
3. Do not install or use products which may have possible chemical or biological reactions with other on-site materials.

C. Toxicity of prefabricated wood products (composite wood and agrifiber products): Products shall contain no added urea-formaldehyde resins.

1. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.

D. Adhesives: Provide adhesives approved by the manufacturer's of the products being adhered which are Low-VOC or non-VOC, non-flammable, water-proof after cured, odor free and comply with LEED certification requirements.

1. Comply with requirements of Section 018123 – VOLATILE ORGANIC COMPOUND LIMITS.

E. Carpet systems: Provide products that comply with specified VOC limits specified under Section 018123 – VOLATILE ORGANIC COMPOUND LIMITS, and additional Requirements specified under Section 09 68 00 - Carpeting

F. Interior Paints: Provide products that comply with specified VOC limits specified under Section 018123 – VOLATILE ORGANIC COMPOUND LIMITS, and additional requirements 09 91 00 – PAINTING.

G. Sealants: Provide products that comply with regulated VOC limits. Refer to Section 07 92 00 – JOINT SEALANTS, and as specified herein for additional requirements.

H. Safety Data Sheets (SDS) {formerly Material Safety Data Sheets, MSDS: Obtain and maintain on-site record data sheets for each product brought onto the Site.

1. Maintain an organized file of Material Safety Data Sheets at the job-site for quick reference.
2. Furnish SDS for all finishes, paints, coatings, curing compounds, sealers, adhesives, mastics, waterproofing, dampproofing, sealants, cleaning chemicals, carpets, upholstery, fabrics and all similar products.

I. Cleaning and maintenance products:

1. Provide data on manufacturers' recommended maintenance, cleaning, refinishing and disposal procedures for materials and products utilized. These procedures are for final Contractor cleaning of the project prior to substantial completion and for provided materials and products as required by the specific specification sections.
    a. Where chemical products are recommended for these procedures, provide documentation to indicate that no component present in the cleaning product at more than 1% of the total mass of the cleaning product is a carcinogen or reproductive toxicant as defined in the lists in this specification section.
    b. For purposes of reporting, identification of product VOC contents shall not be limited to those regulated.
2. Avoid cleaning products containing alpha-pinene, d-limonene or other unsaturated carbon double bond alkenes due to chemical reactions with ozone to form aldehydes, acidic aerosols, and ultra fine particulate matter in indoor air.

J. Establish written Contractor's safety and emergency response procedures for safety precautions, accidents, emergency conditions, and clean-up methods.

1.6 OWNER'S PROPRIETARY PRODUCTS

A. Owner's proprietary products: Under provisions of Massachusetts General Laws, Chapter 30, Section 39M(b) the Owner has determined that specific products shall be proprietary for 'sound reasons in the public interest'. This determination has been made under vote of the Owner, and has been recorded in writing for public record. The following products are designated as proprietary, equipment and fixture references are included in the individual specification sections:

1. Door Hardware keying system and lock cylinders.
2. Classroom door hardware.

3. Laminated security glass, and security glazing films.
4. Automatic Temperature Controls.
5. Network Switches.
6. Access Control.
7. Closed Circuit TV.

1.7 OWNER FURNISHED PRODUCTS

A. Owner Furnished Products: As provided in the General Conditions, the Owner will provide products by others under a separate agreements.
   1. Owner's responsibilities regarding Owner furnished products:
      a. Arrange for and deliver Owner reviewed shop drawings, product data, and samples to Contractor.
      b. Arrange and pay for product delivery to site.
      c. On delivery, inspect products jointly with Contractor.
      d. Submit claims for transportation damage, and replace damaged, defective, or deficient items.
      e. Arrange for manufacturers' warranties, inspections, and service agreements.
   2. Contractor's responsibilities regarding Owner furnished products:
      a. Review Owner reviewed shop drawings, product data, and samples to Contractor.
      b. For Owner-Furnished, Contractor Installed (OFCI) Products: Receive and unload products at site, inspect for completeness or damage, jointly with Owner.
      c. Handle, store, and provide temporary protection.
      d. Repair or replace items damaged after receipt.
      e. As required by this Contract, finish, install, and clean products.
      f. Provide protection of installed work.
      g. When not installed under this Contract, the Contractor shall coordinate Owner installed work with interfacing work of this Contract. The Contractor shall provide temporary protection and final cleaning of Owner installed products, except as directed otherwise.
   3. Items noted in Drawings as "Not in Contract" or "N.I.C.", identify work or products which either exist, or are furnished by Owner; such work requires coordination with the Work of this Contract and may even require installation by this Contractor.

B. The Contractor has coordinating responsibility for Testing laboratory services as identified under Section 01 45 29 - TESTING LABORATORY SERVICES and as specified under individual specification sections.

1.8 PRODUCT DELIVERY AND HANDLING REQUIREMENTS

A. Transport and handle products in accordance with manufacturer's instructions and as specified in individual specification sections.

1. Packing: Arrange for the return of packing materials, such as wood pallets, where economically feasible.
2. Ductwork: All ductwork shall be sealed from time of manufacture, with seals intact upon delivery to construction site, and remain so, until ready for installation. Contractor is jointly responsible with HVAC subcontractor to ensure ducts are properly sealed and maintained.
    a. Store ductwork in clean dry conditions and keep sealed while it is stored.

B. Packaging: Deliver materials in recyclable or in reusable packaging such as cardboard, wood, paper, or reusable blankets, which will be reclaimed by supplier or manufacturer for recycling.
1. General: Minimize packaging materials to maximum extent possible while still ensuring protection of materials during delivery, storage, and handling.
    a. Unacceptable Packaging Materials: Polyurethane, polyisocyanurate, polystyrene, polyethylene, and similar plastic materials such as “foam” plastics and “shrink-fit” plastics.
    b. Reusable Blankets: Deliver and store materials in reusable blankets and mats reclaimed by manufacturers or suppliers for reuse where program exists or where program can be developed for such reuse.
        1) Non-returnable containers should be donated to local and community organizations to the greatest extent possible to reduce quantity of disposed materials.
    c. Pallets: Where pallets are used, suppliers shall be responsible to ensure pallets are removed from site for reuse or for recycling. Avoid use of virgin wood pallets whenever possible. It is preferable that pallets be manufactured from recycled wood and recycled plastic.
    d. Corrugated Cardboard and Paper: Where paper products are used, recycle as part of construction waste management recycling program, or return to material’s manufacturer for use by manufacturer or supplier.
    e. Sealants, Paint, Primers, Adhesives, and Coating Containers: Return to supplier or manufacturer for reuse where such program is available.
2. Purchase materials in bulk where possible. Take measures to avoid individual packaging for volume purchases.

C. Labeling of plastics used for packaging: Plastic is marked by manufacturers for type of plastic material in accordance with the Society of Plastic resin codes. Maintain marks, or sort by manufacturer’s resin codes for recycling purposes.
1. Type 1: Polyethylene Terephthalate (PET, PETE).
2. Type 2: High Density Polyethylene (HDPE).
3. Type 3: Vinyl (Polyvinyl Chloride or PVC).
4. Type 4: Low Density Polyethylene (LDPE).
5. Type 5: Polypropylene (PP).
6. Type 6: Polystyrene (PS).
7. Type 7: Other. Use of this code indicates that the package in question is made with a resin other than the six listed above, or is made of more than one resin listed above, and used in a multi-layer combination.

D. Schedule deliveries to avoid delays in installation of products, to minimize long-term storage, to prevent overcrowding of construction spaces and to limit potential damage to stored materials. Coordinate with installation to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.

E. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

F. Provide equipment and personnel to handle and store products by methods to prevent soiling, disfigurement, or damage.

1.9 PRODUCT STORAGE AND PROTECTION REQUIREMENTS

A. Store and protect products in accordance with manufacturer's instructions and as specified in individual specification sections.
   1. Provide all necessary equipment and personnel to store products by methods to prevent soiling, disfigurement and damage.
   2. Avoid excessive material handling and potential product damage, locate storage areas convenient to work areas.
   3. Store and protect products with seals and labels intact and legible.
   4. Store and handle materials in a manner as to prevent loss from weather and other damage.

B. For exterior storage of fabricated products, place on sloped supports, above ground.

C. Provide off-site storage and protection when site does not permit on-site storage or protection.
   1. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
   2. Store sensitive products in weather-tight, climate controlled enclosures.
   3. Prevent contact with material that may cause corrosion, discoloration, or staining.

D. Store loose granular materials on solid flat surfaces in a well-drained area; prevent mixing with foreign matter.

E. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

F. Store heavy materials in locations and in a manner that will not damage or disfigure existing, or new construction.

1.10 MOLD PROTECTION OF PRODUCTS PRIOR TO INSTALLATION

A. General:
   1. Keep building materials dry to prevent the growth of mold and bacteria, including, but not limited to: gypsum wallboard, wood, porous insulation, paper, and fabric.

2. Cover materials to prevent rain damage, and if resting on the ground, use spacers to allow air to circulate between the ground and the materials.
3. Thoroughly dry all water damaged materials within 24 hours from time of moisture damage. Materials that have been damp or wet for more than 24 hours shall not be incorporated into the Work.
    a. Review moisture damaged materials for signs of mold and mildew, including any with moisture stains, from the site and properly dispose of them.
    b. Replace water damaged and moldy materials with new, undamaged materials.

1.11 CONSTRUCTION WASTE MANAGEMENT

A. Source separation: Separate, store, protect, and handle at the site identified recyclable and salvageable waste products in order to prevent contamination of materials and to maximize recyclability and salvaging of identified materials. Refer to the Waste Management Requirements Plan specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

B. Return: Set aside and protect misdelivered and substandard products and materials and return to supplier for credit.

C. Reuse and Salvage: Set aside, sort, and protect separated products and materials for collection, re-use by Owner, as designed for re-use on-site, or designated for salvage by Owner's separate waste recycling contractor.

D. Recycling: Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials. Refer to the Waste Management Requirements and Plan specified under Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

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Section 01 73 00
EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Examination of existing conditions and acceptance of conditions.

B. Project preparation.

C. Surveying and field engineering.

D. Execution of the Work.

E. Cutting and patching of in-place work

F. Cleaning.

G. Protecting installed work.

1.2 RELATED REQUIREMENTS

A. Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Special administrative and procedural requirements for the Project waste management and recycling activities

1.3 EXAMINATION OF AND ACCEPTANCE OF EXISTING CONDITIONS

A. The Construction Manager, Trade Contractors and subcontractors shall inform themselves of existing conditions before submitting his bid, and shall be fully responsible for carrying out all work required to completely and properly execute the work of the Contract, regardless of the conditions encountered in the actual work. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed, except those conditions described in the General Conditions.

B. Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing damage to structure surfaces, equipment, or to surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with Architect prior to starting work.

1.4 SURVEYING AND FIELD ENGINEERING

A. Employ a Land Surveyor or Professional Engineer registered in the Commonwealth of Massachusetts and acceptable to the Architect.

1. Submit evidence of Surveyor's Errors and Omissions (E&O) Insurance coverage in the form of an Insurance Certificate.

B. Examination.

1. Verify locations of survey control points prior to starting work.
2. Promptly notify Architect/Engineer of any discrepancies discovered.

C. Survey Reference Points.

1. Construction Manager shall locate and protect survey control and reference points.
2. Control datum for survey is that established by Owner provided Survey.
3. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
4. Promptly report to Architect/Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
5. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to the Architect.

D. Survey Requirements.

1. Provide field engineering services. Utilize recognized engineering survey practices.
2. Prior to construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer and water service piping.
    a. The existence and location of underground utilities and construction indicated on Drawings as existing are not guaranteed. Before beginning sitework, verify the existence and location of underground utilities and other construction.
3. Establish a minimum of 2 permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on Project Record Documents.
4. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
    a. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
    b. Grid or axis for structures.
    c. Building foundation, column locations, and ground floor elevations.
5. Periodically verify layouts by same means.

E. Surveys for Measurement and Payment

1. Perform surveys to determine quantities of unit cost work, including control surveys to establish measurement reference lines. Notify Architect prior to starting work.

F. Project Record Documents.

1. As-built survey, progress submissions: Surveyor shall develop an as-built survey for the work-in-place. Copies of survey shall be submitted along with request for payments for foundation work, site utilities and paving work.
2. Surveyor's log: Maintain a complete and accurate surveyor's log of control and other surveys, as required by Owner and authorities having jurisdiction. Make this log available for reference.
3. Submit Final Property Survey and log under the provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1.5 PROTECTION OF ADJACENT ELEMENTS

A. Protect installed Work and provide special protection where called for in individual specification Sections.

B. Protect existing facilities and adjacent properties from damage from construction and demolition operations. Provide temporary and removable protection for installed products and occupied areas.

C. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials. Coordinate with requirements under individual specification sections.

D. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

E. Protect all existing landscape areas [not indicated to be cleared]. Do not deface, injure, or destroy trees or other plant life. Do not remove or cut trees or other plant life, without authorization from the Owner. Do not attach any anchorages, ropes, cables or guys to any trees scheduled to remain.

1. Prohibit traffic from landscaped areas.

F. Protect non-owned vehicles, stored materials, site and structures from damage.

G. Refer to respective Sections for other particular protection requirements.

1.6 PROTECTION OF INTERIOR CONCRETE SLABS

A. No satisfactory chemical or cleaning procedure is available to remove petroleum stains from the concrete surface. Prevention is therefore essential for areas scheduled to receive concrete stains and sealers, specified under Division 3.

1. All hydraulic powered equipment must be diapered to avoid staining of in-place concrete.
2. No trade will park vehicles on the inside slab. If necessary to complete their scope of work, drop cloths will be placed under vehicles at all times.
3. No pipe cutting machine will be used on the inside floor slabs.
4. Steel will not be placed on interior slabs to avoid rust staining.

1.7 EXECUTION REQUIREMENTS FOR INSTALLATION, APPLICATION AND ERECTION

A. Inspection of conditions: The Installer of each component shall inspect the substrate and conditions under which Work is performed. Do not proceed until unsatisfactory conditions have been corrected.

B. Resource Efficiency of Materials:

1. Use construction practices such as material reduction and dimensional planning that maximize efficient use of resources and materials.
    a. Recheck measurements and dimensions, before starting installation.
2. Provide materials that utilize recycled content to maximum degree possible without being detrimental to product performance or indoor air quality.

3. Where possible and feasible, provide for non-destructive removal and re-use of materials after their service life in this building.

C. Manufacturer's instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that they are more stringent than requirements in Contract Documents.

D. Inspect material immediately upon delivery and again prior to installation Reject damaged and defective items.

E. Install each component during weather conditions and project status that will ensure the best results. Isolate each part from incompatible material as necessary to prevent deterioration.

F. Coordinate temporary enclosures with inspections and tests, to minimize uncovering completed construction for that purpose.

G. Limiting exposures: Supervise operations to ensure that no part of construction, completed or in progress, is subject to harmful or deleterious exposure.

1. Such exposures include, but are not limited to the following:
    a. Excessive static or dynamic loading.
    b. Excessive internal or external pressures.
    c. Excessive weathering.
    d. Excessively high or low temperatures or humidity.
    e. Air contamination or pollution.
    f. Water or ice.
    g. Chemicals or solvents.
    h. Heavy traffic, soiling, staining and corrosion.
    i. Rodent and insect infestation.
    j. Unusual wear or other misuse.
    k. Contact between incompatible materials.
    l. Theft or vandalism.

H. Provide attachment and connection devices and methods necessary for securing each construction element. Secure each construction element true to line and level. Allow for expansion and building movement.

I. Visual effects: Provide uniform joint widths in exposed Work. Arrange joints to obtain the best effect. Refer questionable choices to the Architect for decision.

J. Mounting heights: Where mounting heights are not indicated, review heights with Architect, prior to commencement of Work.

K. Cleaning and protection: During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

L. Clean and maintain completed construction as often as necessary through the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

1.8 CUTTING AND PATCHING OF IN-PLACE WORK

A. Scope: Construction Manager is responsible for coordination and quality of all cutting and patching work. Cutting and patching of the Work includes, but is not limited to:

1. All cutting, altering, patching, and fitting as necessary for the Work to comply with the Contract Documents.
    a. Make all products and their components of the Work fit together properly.
    b. Fully integrate all cutting and patching, to present the visual appearance of an entire, completed, and unified project in compliance with the Contract Documents.
2. Provide openings in elements of the Work, and the patching of same, for penetrations required by all trades, including but not limited to mechanical, plumbing, fire protection and electrical work.
    a. Individual Trade Contractors are responsible for designated types of coring and drilling penetrations for piping, conduit, ducts and other penetrations.
3. Uncover work to provide for installing, inspecting, or both, of ill-timed work;
4. Remove and replace work not conforming to requirements of the Contract Documents or as otherwise determined to be defective.
5. Patch and match all surfaces and products disturbed or damaged.
6. Remove samples of in-place construction as specified for testing.

B. Structural elements: Do not cut and patch structural elements in a manner that would reduce the load-carrying capacity or load deflection ratio. Always obtain written approval of the cutting and patching proposal before cutting and patching structural elements.

1. Do not drill through structural beams, slabs or columns. Core drilling through concrete block walls and stair platforms must be approved by the Architect.
2. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the structure.

C. Exposed elements: Employ appropriate tradesperson to perform cutting and patching for weather exposed and moisture resistant elements, and sight exposed surfaces.

D. Penetrating elements: Fit work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. At penetrations of fire rated walls, partitions, ceiling or floor construction, completely seal voids with fire rated materials in accordance to applicable codes and regulations, and compatible to surrounding construction.

E. Visual requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

F. Operational and safety limitations: Do not cut and patch operating elements or safety components in a manner that would reduce their capacity to perform as intended, or would increase maintenance, or decrease operational life safety of the building when occupied.

G. General requirements of cutting and patching:

1. Submit written proposals to perform cutting and patching when cutting work affects the following:
   a. Structural integrity of any element in the project.
   b. Integrity of weather-exposed or moisture-resistant elements.
   c. Aesthetic and visual qualities of exposed-to-view elements.
   d. Work of Owner or work performed under separate Contract.
2. Cutting: Cut in-place construction using methods least likely to damage elements of as-built construction.
3. Coring and Drilling of holes incidental to work of individual sections shall be performed by the trade requiring the penetration, except as follows. The Construction Manager is responsible for performing the following:
   a. Coring and Drilling of holes greater than 8 inches in diameter in concrete decks and slabs.
   b. Core drilling in exterior wall and roof surfaces leading to, or from, the outside of the Building.
   c. Coordination of all coring and drilling and resultant patches necessary for the completion of this Contract and for the quality and appearance of all patch Work in exposed-to-view finished materials.
4. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break; for assemblies, refinish entire unit.

1.9 PROGRESS CLEANING AND DISPOSAL OF WASTE MATERIALS

A. General: Maintain site in a clean and orderly condition. Maintain work and surrounding areas free of waste materials, debris, and rubbish; remove from site on a on-going basis through-out the term of construction.

1. Adjacent Areas: Keep adjacent areas, neighboring properties, public ways, and all nearby areas clean and free of construction debris and dirt including wind blown debris.
2. Trade Contractors are responsible for clean-up and removal of their own rubbish, debris, shipping materials and waste materials through-out the term of their work.
   a. Trade Contractors are responsible to comply with requirements of Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
3. Construction Manager shall furnish dumpsters and provide general site cleaning services, except as explicitly specified otherwise under individual Sections of the Specifications.

B. Control accumulation of waste materials and rubbish; periodically dispose of off-site. The Construction Manager shall bear all costs, including fees resulting from such disposal.

C. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws. Comply with the requirements of Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

1. Do not burn or bury rubbish and waste materials on site.
2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
3. Do not dispose of wastes into streams or waterways.
4. Comply with requirements of authorities having jurisdiction including, without limitation, requirements related to fire prevention, rodents, pests, vermin, waste storage, waste trucking, waste removal, waste disposal, street cleaning, truck tire cleaning, and other requirements.

D. Clean interior areas prior to start of finish work and maintain areas free of dust and other contaminants during finishing operations.

E. Maintain project in accordance with all local, Commonwealth of Massachusetts, and Federal Regulatory Requirements.

F. Store volatile wastes in covered metal containers, and remove from premises daily.

G. Prevent accumulation of wastes which create hazardous conditions.

H. Provide adequate ventilation during use of volatile or noxious substances.

1. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
2. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

I. Use only those materials which will not create hazards to health or property and which will not damage surfaces.

J. Use only those cleaning materials and methods recommended by manufacturer of surface material to be cleaned.

K. Execute cleaning to ensure that the buildings, the sites, and adjacent properties are maintained free from accumulations of waste materials and rubbish and windblown debris, resulting from construction operations.

L. Provide on-site containers (dumpsters) for collection and containment of, waste materials, debris and rubbish.

M. Construction Manager shall provide on-site containers (dumpsters) for collection and containment of, waste materials, debris and rubbish.

1. Trash Barrels and Containers: Use containers with tightly fitting lids. Use only steel containers and lids when there is any evidence of rodent or pest activity.

N. Remove waste materials, debris, and rubbish from site at least once weekly, and dispose off-site. Comply with NFPA 241 for removal of combustible waste.

O. Handle material in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.

P. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not damage surrounding surfaces.

1.10 SITE MAINTENANCE AND CLEANING

A. Maintain traffic and parking areas in a sound condition, free of excavated material, construction equipment, products, mud, snow, and ice.

1. Provide means of removing mud from vehicle wheels before entering public streets and Owner's parking areas and access.

B. Maintain existing and permanent paved areas used for construction.

1. If any street or private way shall be rendered unsafe by the Construction Managers operations, the Construction Manager shall make such repairs or provide such temporary ways or guards as shall be acceptable to the governing authority.

2. Promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

1.11 FINAL CLEANING

A. Scheduling: Perform final cleaning immediately prior to the Architect's review of the project for issue of the Certificate of Substantial Completion.

1. Re-clean all surfaces, materials and products of the Work immediately prior to Owner's occupancy of the Project.

a. Should the Owner occupy any portion of the Work prior to completion of the Contract, the responsibilities for interim and final cleaning shall be in accordance with the General Conditions.

B. Qualifications: Commercial cleaning firm, with a minimum of 3 years experience specializing in the post-construction cleaning of facilities.

C. Protection: During the operation of final cleaning, protect surrounding materials and finishes against undue damage by the exercise of reasonable care and precautions. Clean, or repair all products and surfaces which are soiled or otherwise damaged by Work of this Section, to match original profiles and finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.

D. General cleaning requirements:

1. Control accumulation of waste materials and trash. Recycle or dispose of off-site at intervals approved by the Owner and in compliance with waste management procedures specified in Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

2. Remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste.

3. Remove all advertising matter and temporary instructional material from exposed surfaces throughout.

4. Use only methods and cleaning materials which are compatible with and as recommended by the manufacturer of the material being cleaned.

5. Finished surfaces: Remove paint smears, spots, marks, dirt, mud and dust and similar disfigurement created by the Work, from all exposed to view existing or new interior and exterior finished surfaces.
6. Polished surfaces: Apply the polish recommended by the manufacturer of the material being polished.
7. Cleaning Materials: Only non-hazardous cleaning materials shall be used in the final cleanup.

E. Waste Management and Recycling during Final Cleaning:

1. Recycle, salvage, and return construction and demolition waste from Project in accordance with requirements in Section 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
2. Arrange for pick-up of salvageable materials in accordance with the Waste Management Plan.
3. Disposal Operations: Promptly and legally transport and dispose of all trash. Do not burn, bury, or otherwise dispose of trash on the Project site.

F. Exterior building surfaces:

1. Visually inspect exterior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
2. Remove all traces of splashed materials from adjacent surfaces.
3. If necessary to achieve a uniform degree of cleanliness, hose down the exterior of the structure.
4. In the event of stubborn stains not removable with water, the Architect may require light sandblasting or other cleaning at no additional cost to the Owner.
5. Concrete: Clean exposed concrete free of all foreign matter. If, in the opinion of the Architect, further cleaning of specific areas is required, they shall be scrubbed with water or other cleaning agents. Acid cleaners shall not be used, except as may otherwise specifically permitted in the trade sections.

G. Bright metal: Clean metal surfaces, hardware, fixtures, appliances, equipment, and similar items free of all foreign matter. As required, lightly scrub specific stains with clean water, mild soap, and soft rags, thoroughly rinsed and wiped with clean, soft white rags. Do not use abrasive cleaners.

H. Glass: Replace broken, chipped and defective glass. Remove from glass: stains, spots, marks, paint smears; dirt and foreign materials. Clean and polish both surfaces of all interior and exterior glass. Clean and polish mirrors.

I. Carpet: Vacuum clean carpet and remove all spots and stains.

J. Hardware: Clean and polish finished hardware, remove marks, stains, scratches and blemishes.

K. Tile: Clean and polish floor and wall tile, remove grout film and excess grout.

L. Woodwork: Dust and clean architectural millwork, and finish woodwork items, remove all stains, spots, and foreign matter using methods and cleaning agents which will not harm the various finishes.

M. Site: Sweep exterior paved surfaces broom clean; rake clean unpaved surfaces.

N. Equipment: Thoroughly clean all items of mechanical and electrical equipment; remove excess oils and grease from exposed surfaces.

1. Clean permanent filters and replace disposable filters if ventilating units were operated during construction.
2. Clean ducts, blowers and coils, if units were operated without filters during construction.

1.12 BUILDING FLUSH-OUT

A. Sequencing: Complete all interior finish material installation no less than 14 calendar days prior to Substantial Completion to allow for building flush out. Construction Manager shall submit notification to the Architect when all interior finish material installation is complete, highlighting the date of completion.

B. Building Flush-Out: Comply with Commissioning and LEED requirements.

1. At completion of construction (per LEED IEQc3.2, Option 1, Path 1), perform building flush-out by supplying a total air volume of 14,000 cubic feet of outdoor air per square foot of floor area while maintaining an internal temperature of at least 60º F and relative humidity no higher than 60%.
   a. When touch-up work is performed, Construction Manager shall provide temporary construction ventilation during installation and extend building flush-out by a minimum of 4 days after touch-up installation is complete.
   b. Construction Manager shall return ventilation system to normal operation following flush-out period to minimize energy consumption.
   c. Construction Manager shall replace all outside air filtration media prior to occupancy. Filtration media shall have a MERV of 13 as determined by ASHRAE 52.2-1999.
2. If occupancy is desired prior to completion of the flush-out, (per LEED IEQc3.2, Option 1, Path 2) for designated spaces to be occupied: supply a minimum 3,500 cubic feet of outdoor air per square foot of floor area to be occupied. Once the space is occupied, it must be ventilated at a minimum rate of 0.30 cubic feet per minute (cfm) per square foot of outside air or the design minimum outside air rate determined in LEED IEQ Prerequisite 1: *Minimum IAQ Performance*, whichever is greater. During each day of the flush-out period, ventilation must begin a minimum of 3 hours prior to occupancy and continue during occupancy, while maintaining an internal temperature of at least 60º F and relative humidity no higher than 60%. These conditions must be maintained until a total of 14,000 cubic feet per square foot of outside air has been delivered to the space.

C. Construction Manager's option to building flush out shall be to Conduct IAQ testing per LEED IEQc3.2, Option 2 after construction ends and prior to occupancy. Use testing protocols consistent with the EPA *Compendium of Methods for the Determination of Air Pollutants in Indoor Air* and as additionally detailed in the LEED Reference Guide for Green Interior Design and Construction, 2009 Edition.

1. Conduct air sample testing:
   a. All measurements must be conducted prior to occupancy, but during normal occupied hours, with the building ventilation system started at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the test.

b. All interior finishes must be installed, including but not limited to millwork, doors, paint, carpet and acoustic tiles. Movable furnishings such as workstations and partitions must be in place.

c. The number of sampling locations will depend on the size of the building and number of ventilation systems. For each portion of the building served by a separate ventilation system, the number of sampling points must not be less than 1 per 25,000 square feet or for each contiguous floor area, whichever is larger. Include areas with the least ventilation and greatest presumed source strength.

d. Air samples must be collected between 3 and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum 4-hour period.

2. Contaminant Concentration Levels: For each sampling point where the maximum concentration limits specified herein below are exceeded, conduct an additional flush-out with outside air and retest the noncompliant concentrations. Repeat until all requirements have been met. When retesting noncompliant building areas, take samples from the same locations as in the first test.

a. The following contaminant concentration levels shall not be exceeded.

1) Formaldehyde: 27 parts per billion.

2) Particulates (PM10): 50 micrograms per cubic meter.

3) Total volatile organic compounds: 500 micrograms per cubic meter.

4) 4-Phenlcyclohexene (4-PCH): 6.5 micrograms per cubic meter.

5) Carbon monoxide: 9 parts per million, and no greater than 2 parts per million above outdoor levels.

1.13 PROTECTING INSTALLED WORK

A. Protect all built, and in-place Work. In addition to requirements specified elsewhere, the Construction Manager shall protect all installed work from subsequent damage or deterioration from construction activities, and atmospheric damage until Owner's Substantial Completion and occupancy precludes the need for protection activities. No attempt is made in this Section to list all elements requiring protection or to describe how each element will be protected. It is the responsibility of the Construction Manager to determine for itself the scope and nature of protection required.

1. Protection of some products/building elements may be required to remain in place for a large portion duration of the project. As such, materials should be installed to provide adequate protection throughout the full extent of construction activities. Repair or reinstall protection throughout the duration of construction as required.

B. Finish Products: Some finishes may need to be physically isolated from construction operations by means of protective barriers and coverings.

1. General: After installation, provide coverings to protect products from damage due to traffic and construction operations. Replace protective coverings which may become wet, torn, or ineffective. Remove coverings when no longer needed.

2. Doors, door frames and hardware: Protect from damage due to traffic and construction operations.

3. Floor and Finished Surfaces Protection: Protect against construction traffic, rolling loads, static loads, damage from material movement and storage, or similar causes of damage.
4. Walls: Protect from impact, dents, marks, water damage, and similar damage.
5. Glass: Protect from damage including etching and staining. Keep glass clean.
6. Protect products sensitive to water damage from becoming wet.
7. Protect products sensitive to ultra-violet exposure and atmospheric exposure by limiting exposure to within limits recommended by respective product manufacturer.
8. Protect products from biological growth, molds and mildew.
9. Protect products from rodents and other animals, birds and insect damage.

C. Roofing and waterproofing systems: Protect and isolate from traffic and construction operations. Protect from chemicals. Work and traffic directly upon roofing and waterproofing is prohibited, provide temporary walkways and platforms.

D. General Protection from chemicals:

1. Cover adjacent surfaces with materials that are proven to resist chemical cleaners selected for Project unless chemicals being used will not damage adjacent surfaces. Use covering materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
2. Do not clean surfaces during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
3. Neutralize and collect alkaline and acid wastes and dispose of off-site.
4. Dispose of runoff from chemical operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

E. Save plastic coverings. At completion of Project, reuse if practical; if not, then recycle if local market exists.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

Section 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

A. The Conditions of the Contract and Division 1, General Requirements, apply to the work under this Section.

B. Attention of the Contractor and this Subcontractor is drawn to provisions of the Contract Documents regarding the responsibility of all bidders to visit and inspect the site, including the existing building, and to base all bids on conclusions drawn from such inspections.

1.02 SCOPE OF WORK

A. This Section specifies administrative and procedural requirements for the Contractor's implementation of waste management controls and systems for the duration of the Work.

1. Masonry subcontractor is responsible for waste management of masonry work.
2. Roofing and flashing subcontractor is to be responsible for waste management of roofing and flashing work.

B. Develop and implement a waste management plan compliant with the requirements of LEED-NC v4 MR prerequisite Construction and Demolition Waste Management Planning and MR credit Construction and Demolition Waste Management.

1.03 INTENT

A. Sustainable Design Intent: Comply with project requirements intended to achieve certification, measured and documented according to the LEED v4 Green Building Rating System, of the US Green Building Council.

B. The Owner and Architect have established that this Project shall generate the least amount of waste practical and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors shall be employed.

C. Of the waste that is generated, as many of the waste materials as economically feasible shall be reused, salvaged, or recycled. Waste disposal in landfills shall be minimized to the greatest extent practical.

D. With regard to these goals the Contractor shall develop, for the Architect's review, a Waste Management Plan for this Project.

1. Each Subcontractor shall be responsible for segregating his own waste into different dumpsters as directed by the Contractor. OR C + D waste materials will be collected on site in commingled containers and sorted off site.

2. Contractor shall be responsible for ensuring that debris will be disposed of at appropriately designated licensed solid waste disposal facilities, as defined by MGL Chapter 111, Section 150A.

1.04 SUBMITTALS

A. Waste Management Plan: Within 21 calendar days after receipt of Notice to Proceed, the Contractor shall provide a compliant Construction Waste Management Plan including:

- Identify a minimum of five materials target for diversion, (structural and non-structural).
- Determine and document the estimated percentage of the overall waste that these materials represent. Divert 75% and Four Material Streams REQUIRED.
- Document if these materials will be site separated or commingled and sorted off site.
- Describe the diversion strategies.
- Identify the locations as to where the materials will be taken include recycling facilities, sorting facilities and landfills. Include the following:
- Landfill Options: The name of the landfills where the non-recyclable Construction and Demolition waste will be taken to be disposed of, applicable tipping fees and the projected cost of disposing of the Project waste in landfills
- Off-Site Sorting: The name of off site sorting facilities to receive commingled demolition and construction debris collected in mixed materials containers on site.
- If sorted off site identify the sorting facilities and how the materials will be processed

NOTE: Alternative daily cover (ADC) does not qualify as material diverted from disposal. Land-clearing debris is not considered construction, demolition, or renovation waste that can contribute to waste diversion.

B. Landfill Certification: Provide a statement of verification that the landfills proposed for use are licensed for types of waste to be deposited and have sufficient capacity to receive the estimated waste from this project

C. For co-mingled materials collected in mixed containers on site and sorted off-site the following documentation must be provided:

1. For each container: A detailed breakdown of the weight of each material after sorting, including materials diverted to landfills
2. AND/OR Provide the sorting facilities annual average recycling rate for EACH facility where off-site sorting takes place. Additionally, provide documentation that the facility is State regulated.

NOTE: Co-mingled waste may be considered only one material stream unless the facility can provide diversion rates for specific materials.

D. Recycled, and Salvaged Materials: Provide a list of each materials proposed to be recycled, salvaged or diverted from landfill during the course of the Project. Include anticipated volumes for a minimum of five of the following and any additional items:

1. Cardboard and paper

2. Clean dimensional Wood (free from nails and screws, etc)
3. Concrete and slurry wall materials
4. Brick/Masonry
5. Asphalt
6. Metals including framing, banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
7. Gypsum Board
8. Mechanical and Electrical equipment
9. Building components that are removed intact during demolition
10. Glass
11. Packing materials
12. Beverage Containers

E. Meetings: A description of the regular meetings to be held to address waste management

F. Procedures for Materials Handling: Provide a description of the means by which any waste materials and/or collection containers identified above will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.

G. Transportation: Provide a description of the means of transportation of the recyclable materials identify if materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site for off-site sorting

H. Waste Management Progress Reports to be submitted concurrent with each monthly Application for Payment. Provide a written Waste Management Progress Report and updated tracking spreadsheet

I. Waste Management Final Report: Prior to Substantial Completion, submit a written Waste Management Final Report summarizing the types and quantities of materials recycled and disposed of under the Waste Management Plan. Include the name and location of disposal facilities. Quantity may be measured by either weight or volume; be consistent in calculations. Include the following:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste, by weight.
4. Quantity of waste salvaged, both estimated and actual.
5. Quantity of waste recycled, both estimated and actual.
6. Total quantity of waste recovered (salvaged plus recycled).
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

J. Other Submittals:

1. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

2. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

3. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

4. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.05 CONTRACTORS

A. Contractor may subcontract work of this Section to a sub-contractor specializing in recycling and salvaging of construction waste.

1. Institution Recycling Network, 7 South State Street, Suite 2, Concord, NH 03301; tel. 866-229-1962
2. Waste Solutions, Inc., 965 Plain Street, Marshfield, MA 02050; tel. 781-844-1476
3. Eco-One Solutions, 18 Glenwood Street, Natick MA, 01760; tel. 978.270.8950
4. Or equal as approved by the Architect.

B. Gypsum Wallboard Recycling: New, paper-faced gypsum wallboard scrap (cuts from construction - not demolition waste) generated at project shall be recycled by Gypsum Recycling America, LLC. Keep scrap dry. Contact Gypsum Recycling America at 1.866.9.GYPSUM (1.866.949.7786) or jw@gypsumrecycling.us, to coordinate recycling efforts.

C. Acoustical Ceiling Panel Recycling: Demolition and construction waste pulpable mineral fiber ceiling panels may be recycled by Armstrong World Industries. Contact Armstrong at 1-877-ARMSTRONG (1-877-276-7876) or visit www.armstrong.com to coordinate recycling efforts, apply for product approvals, and receive reclamation procedure requirements.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 RECYCLING

A. Metal, including but not limited to aluminum stairs, structural beams and sections, and reinforcing steel shall be recycled.

B. Wood that is not painted and does not contain preservatives (i.e. creosote, arsenic, and chromium-containing preservatives) shall be segregated and recycled.

C. Refer to the Massachusetts Recycling Directory available at the Massachusetts State Bookstore (617-727-2834) in the State Capitol Building for recycling operations within the State.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: The Contractor shall designate an on-site person responsible for instructing workers and overseeing and documenting results of the Waste Management Plan for the Project

B. Distribution: The Contractor shall distribute copies of the Waste Management Plan to the Job Site Foreman, each Subcontractor, the Owner and the Architect.

C. Instruction: The Contractor shall provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the Project

D. Separation Facilities: The Contractor shall lay out and label a specific area to facilitate separation of materials for recycling, salvage, reuse, and return. Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials. Location shall be acceptable to the Architect.

E. Hazardous Wastes: Any unforeseen hazardous wastes shall be separated, stored, and disposed of according to local regulations and as directed by the Owner.

End of Section

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Section 01 75 00
STARTING AND ADJUSTING

PART 1 - GENERAL

1.1 SUMMARY

A. Testing, adjusting, and balancing.

B. Operation, maintenance, and service.

1.2 TESTING, ADJUSTING, AND BALANCING

A. General: Adjust operating products and equipment to ensure smooth and unhindered operation.

1. Contractor is advised that testing and balancing agents may be required during commissioning activities or as may be additionally directed by Architect/Engineer.

B. Contractor will employ services of an independent firm to perform testing, adjusting and balancing. Submit to Owner at least three qualified testing firms for Owner's review and acceptance.

C. Trade Contractors under Division 21 – Fire Suppression, Division 22 – Plumbing and Division 23 – Heating, Ventilating and Air Conditioning are all responsible for primary system testing and balancing as specified under their respective Sections. General Contractor will be required to coordinate these services.

D. The independent firm will perform services specified under Division 21 - Fire Suppression, Division 22 - Plumbing, and Division 23 - Heating, Ventilating, and Air Conditioning.

E. Reports will be submitted by the independent firm to the Architect/Engineer indicating observations and results of tests and indicating compliance or non-compliance with specified requirements and with the requirements of the Contract Documents.

1.3 AIR QUALITY TESTING

A. Air quality testing: The Owner reserves the right to employ the services of an independent testing agency to perform air quality testing. Testing will occur prior to Contractor's request for inspection for Substantial Completion. The intent of testing is to certify that the building is "Clear" of airborne contaminants.

1.4 OPERATION, MAINTENANCE, AND SERVICE

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect/Engineer and Owner 7 days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions which may cause damage.

D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of responsible Contractors' personnel in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report in accordance with Section 01 77 00 - CLOSEOUT PROCEDURES that equipment or system has been properly installed and is functioning correctly.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

Section 01 77 00
CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Closeout of incomplete work (punch list) requirements.

B. Closeout procedures.

C. Conferences occurring after Substantial Completion.

1.2 RELATED REQUIREMENTS

A. Section 01 78 00 - CLOSEOUT SUBMITTALS: Requirements for project record documents.

B. Section 01 78 36 - WARRANTIES: Administrative and procedural requirements for warranties, guarantees and bonds.

1.3 PUNCH LIST REQUIREMENTS AND PROCEDURES

A. Definitions:

1. Contractor's Punch List: Complete list of incomplete and incorrect Work prepared by the Contractor prior to request of Architect's inspection for Certification of Substantial Completion. As a minimum the List shall include the following information for each work item:
    a. Location identification organized by Building, Area, Room Number, or combination thereof as appropriate to project.
    b. Clear identification of each incomplete work item, including all subcontractor's work.
    c. Estimated value of each incomplete work item.
    d. A short statement of why work is not complete.
    e. Identify subcontract responsibility, as appropriate to each item.
2. Architect's Punch List: A list of incomplete and incorrect Work prepared by the Architect, which modifies the Contractor's Punch List, following review and acceptance of the Contractor's Punch List.

B. Pre-Closeout requirements: Prior to requesting initial Architect's inspection for Certification of Substantial Completion, submit to the Architect a full and complete list of all incomplete work items (Contractor's Punch List).

C. Punch list procedures at Substantial Completion:

1. Architect will review submitted Contractor's Punch List and determine whether it is suitable to proceed with the Substantial Completion Process.
    a. If the Architect determines that the amount of completed work is insufficient to be considered for Substantial Completion, the Architect will not proceed with the Punch List process until sufficient completion of the Project is achieved.

b. The Architect will review the Contractor's Punch List and if the Architect determines that it does not reflect proper identification of the incomplete and incorrect work, he/she will request a revision and resubmission of the Contractor's Punch List.

c. If the Architect determines that the amount of work indicated on the Contractor's Punch List is excessive, the Architect will suspend its review until the scope of work identified in the Contractor's Punch List is reduced to a level satisfactory to the Architect.

d. When the Architect reviews and accepts the Contractor's Punch List as being an accurate reflection of incomplete and incorrect work; the Architect will prepare and issue to the Contractor the "Architect's Punch List".

1) The "Architect's Punch List" will be based on the Contractor's Punch List with modifications and additions as may be required.

2) The "Architect's Punch List" includes work which must be completed and corrected prior to final completion.

2. Upon receipt of the "Architect's Punch List", the Contractor shall immediately distribute the list to all subcontractors.

D. Completion of Punch List Work: Make reasonable efforts to ensure that all "Architect's Punch List" items are completed or corrected within 14 calendar days from the date of the Architect's Punch List" or within the Contract Time, whichever comes first.

E. Architect's Final Inspection and review of Punch List Work:

1. After Contractor certification that all Punch List Work has been properly completed the Architect will then perform the Final Inspection.

a. Incomplete Items: If the Architect discovers any incomplete or incorrect "Architect's Punch List" items or any other deficiency in the work, the Architect will prepare a "Revised Punch List" which may also include other incomplete Contract requirements such as record documents, owner's operation and maintenance manuals, warranties, and other Contract requirements. Architect's site reviews of the Work for this "Revised Punch List" and any subsequent revised Punch Lists shall be performed as additional service to Owner, back-charged to the Contractor.

b. The Architect may assign a dollar value for each item of incomplete or incorrect work remaining.

F. Additional Inspections and related additional services fee: The Architect and the Architect's consultants will provide two site inspections, one at Substantial Completion, and one to confirm that the "Architect's Punch List" has been completed.

1. "Revised Punch List: If the Architect prepares and issues a "Revised Punch List: because of the Contractor's failure to complete the Work, then the Owner shall compensate the Architect and the Architect's consultants for their additional services and additional inspections. The payment for additional services and inspections will be back-charged to Contractor. The Owner will deduct the amount of the Architect's additional services fee from final payment to the Contractor by Change Order.

1.4 CLOSEOUT PROCEDURES - SUBSTANTIAL COMPLETION

A. Prior to requesting inspection for certification of Substantial Completion, complete the following:

1. On Application for Payment, show 100 percent completion for portions of work claimed as substantially complete.
    a. Submit list of incomplete items (Punch List), value of incomplete work, and reasons work is not complete.
2. Obtain evidence of compliance with requirements of governmental agencies having jurisdiction including, but not necessarily limited to:
    a. Certificate of Final Inspections, “signed off” by authorities having jurisdiction.
    b. Certificate of Occupancy.
3. Submission of product and installation warranties, workmanship bonds, maintenance agreements, installer certifications and similar documents specified in individual sections.
4. Submission of test/adjust/balance reports.
5. Change-over permanent locks and transmit keys to the Owner.
6. Remove temporary facilities and services that are no longer required.
7. Remove mock-ups, field samples and similar items.
8. Complete final cleaning, including repair and restoration, or replacement of damaged Work.
9. Remove surplus materials, rubbish and similar elements.
10. Application for reduction of retainage.
11. Consent of Surety.
12. Advise the Owner of the change-over in security provisions.
13. Notification of shifting insurance coverage.
14. Final progress photographs.

B. Within 2 weeks after receipt of the notice of Substantial Completion from the Construction Manager , the Architect will inspect to determine status of completion.

1. Should the Architect determine that the Work is not substantially complete:
    a. The Architect will notify the Construction Manager in writing, stating the reasons therefore.
    b. The Contractor shall remedy the deficiencies and send a second written notice of Substantial Completion to the Architect, requesting re-inspection.

C. When the Architect concurs that the Work is substantially complete:

1. The Architect will prepare AIA Document G 704 - CERTIFICATE OF SUBSTANTIAL COMPLETION, in accordance with the requirements of the GENERAL CONDITIONS and SUPPLEMENTARY CONDITIONS, accompanied by the Contractor's list of items to be completed or corrected, as verified by the Architect.
2. The Architect will submit the Certificate to the Owner, and to the Contractor, for their written acceptance of the responsibilities assigned to them in the Certificate.

1.5 CLOSEOUT PROCEDURES - FINAL ACCEPTANCE

A. Prior to requesting inspection for certification of Final Acceptance and final payment, perform the following:

1. Completion of incomplete Work. Submit a copy of the final inspection list stating that each item has been completed or otherwise resolved for acceptance.
2. Prove that all taxes, fees and similar legal obligations have been paid.
3. Submit final payment requests with release of all liens, and supporting documentation.
4. Provide written assurances that all unsettled claims are in the process of and will be resolved.
5. Submit final meter readings for utilities, a record of stored fuel, and similar data, taken on date of Substantial Completion.
6. Submit updated final statement, including accounting for final additional changes to the Contract Sum. Show additional Contract Sum, additions and deductions, previous Change Orders, total adjusted Contract Sum, previous payments and Contract Sum due.
7. Submit consent of surety to Final Payment.
8. Submit evidence of continuing insurance coverage complying with insurance requirements.
9. Transmit certified property survey.
10. Remove remaining temporary facilities and services.
11. Deliver to Owner and obtain receipts for:
    a. Operation and Maintenance Manuals for items so listed in individual Sections of the Specifications, and for other items when so directed by the Architect.
    b. Project Record Documents (as-builts), including CAD format drawings.
    c. Warranties and bonds specified in individual Sections of the Specifications.
    d. Keys and keying schedule.
    e. Spare parts and materials extra stock.
    f. Pest Control Inspection Report.
    g. List of subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reached for emergency service at all times including nights weekends, and holidays.
12. Submit Certification stating Work has been inspected for compliance with the Contract Documents.
13. Submit Certification stating equipment and systems have been tested in presence of Owner’s representative and are fully operational.
14. Submit Certification stating that Work is 100 percent complete and ready for final inspection.

B. Within 2 weeks after receipt of the request for Final Acceptance from the Contractor, the Architect will inspect to determine status of completion.

1. Should the Architect determine that the Work is incomplete or defective:
    a. The Architect will notify the Contractor in writing, stating the reasons listing the incomplete or defective work.
    b. The Contractor shall take immediate steps to remedy the deficiencies and send a second written notice of request for Final Acceptance to the Architect.
    c. Costs relative to the Architects re-inspection due to failure of Work to comply with claims made by the Contractor, will be compensated by the Owner, who will deduct the amount of such compensation from the Final Payment due to the Contractor.

C. After the Architect finds the Work acceptable, the Architect will review the Final Close-out submittals.

D. Application for Final Payment: Submit Application for Final Payment in accordance with procedures and requirements of the General Conditions and Supplementary Conditions.
    1. The Architect will prepare a Final Change Order, reflecting approved adjustments to the Contract Sum not previously made by other Change Orders.

1.6 CONFERENCES AFTER SUBSTANTIAL COMPLETION

A. The Owner reserves the right to call for conferences commencing with the date of Substantial Completion and continuing for one year thereafter, for purposes of inspecting the Work and to plan correction of any deficiencies or failures discovered during this period.
    1. Attendance is required by Construction Manager's Project Manager, Architect, and each applicator, installer, and supplier as the Owner may direct or the Construction Manager may wish to have present. All representatives attending such meetings shall be the same persons, or shall have the same powers and authority, as those attending progress meetings occurring prior to the Date of Substantial Completion.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

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Section 01 78 00
CLOSEOUT SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

A. Project record documents.

B. Record Project Manual.

C. Project Record Drawings (As built drawings).

D. Final Site Survey.

E. Emergency Manuals.

F. Operation and maintenance data, preventive maintenance instructions.

G. Materials and finishes manual.

H. Pest control inspection and report.

I. Maintenance contracts.

J. Spare parts and maintenance materials.

1.2 RELATED REQUIREMENTS

A. Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION:
   1. Coordination Drawing Requirements.
   2. Electronic file requirements for base sheets to prepare Project Record Drawings.

B. Section 01 78 36 – WARRANTIES: Administrative and procedural requirements for warranties, guarantees and bonds.

1.3 PROJECT RECORD DOCUMENTS

A. General: Record documents shall reflect actual “as-built” condition and the products installed. Include all changes and deviations from original Contract Documents, and incorporate information from:
   1. Original Contract Documents.
   2. Addenda.
   3. Change orders.
   4. Construction change directives.
   5. Field directives, and instructions from the Owner, Architect or regulatory authorities having jurisdiction.

B. Project Record Documents include, but are not limited to:
   1. Record Project Manual.
   2. Project record drawings (as built drawings).

3. Final Site Survey.
4. Operation and maintenance data, preventive maintenance instructions.
5. Materials and finishes manual.
6. Product warranties and bonds.
7. Maintenance contracts.
8. Record of all test reports and inspections.
9. Wall charts and data such as valve diagrams, electrical panel board directories, and similar information.

C. Labeling and identification of Record Documents

1. Clearly label all record documents with name of Project and the words “Record Document”.
2. Date progressive entries of information as appropriate.
3. Date Record Documents with the final submission date.

1.4 SUBMITTAL QUANTITY REQUIREMENTS

A. Furnish Architect with the following quantities of each submittal:

1. Record Project Manual:
   a. 2 electronic (PDF) copies.
   b. 2 bound hard copies (paper).
2. Project record drawings (as-builts):
   a. 2 sets of Drawings in Autocad™ format. Verify release version and disc type with Owner prior to submittal.
   b. 2 “blackline print” sets of Drawings.
3. Final Site Survey:
   a. 2 electronic (PDF) copies.
   b. 2 “blackline print” sets of Drawings.
4. Operation and maintenance data, preventive maintenance instructions:
   a. 2 electronic (PDF) copies.
   b. 2 bound hard copies (paper).
5. Materials and finishes manual:
   a. 2 electronic (PDF) copies.
   b. 2 bound hard copies (paper).
6. Product warranties and bonds:
   a. 2 electronic (PDF) copies.
   b. 2 bound hard copies (paper).
7. Maintenance contracts:
   a. 2 electronic (PDF) copies.
   b. 2 bound hard copies (paper).
8. Record of all test reports and inspections:
   a. 2 electronic (PDF) copies.

b. 2 bound hard copies (paper).

1.5 RECORD PROJECT MANUAL

A. The Construction Manager is responsible to maintain a Project Manual reflecting revisions and changes to the Original Issue Project Manual.

1. Clearly label the Record Project Manual as “Record Document Specifications, in a three ring binder.
2. Do not use Record Project Manual for construction purposes; protect from loss in a secure location.
3. Record all variations and deviations to the Contract Documents, including changes made by Addenda, Bulletin, Change Order, Change Directive and other modifications to the Contract.
   a. Cut and paste revisions into their applicable specification section.
   b. Identify all changes with cross-reference to appropriate Addendum Number, Modification Number, Change Order Number
4. In each individual Specification Section, under “*Part 2 – Products*”, identify all manufacturers and products which are actually used as part of the Work.
5. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

B. Record Project Manual: Provide prior to request for Final Acceptance.

1. Manuals shall be in 8-1/2 by 11 inch pages and bound in 3-ring (D-shape) binders with durable plastic covers. Internally subdivide the binder contents by Division with permanent page dividers.
2. Label front cover and spine of each binder with laser printed titles, dates, and project information.
3. All information from “in-progress” manual shall be clearly and completely transferred.
4. Pages shall be undamaged.

1.6 PROJECT RECORD DRAWINGS

A. The Construction Manager is responsible to maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and shop drawings for preparing the record drawings.

1. Where shop drawings are used, record a cross-reference at the corresponding location on the Contract Documents.

B. Do not use Record Documents for construction purposes; protect from loss in a secure location. Mark-up these drawings to show clearly and completely the actual installation reflecting all changes made in the Work during construction.

1. Mark whichever drawing is most capable of showing conditions accurately.
2. Record all variations and deviations to the Contract Documents, including changes made to schedules, details, and all architectural changes to structure, exterior enclosure, interior partitions and ceilings.
3. Record new information that is important to the Owner, but was not shown on the Contract Drawings or shop drawings.

4. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

C. The food service, fire protection, plumbing, mechanical and electrical trades shall be responsible to the Contractor to keep the record documents for their portions of the work marked currently to record all changes in the mechanical and electrical work made during construction.

D. The Architect may periodically inspect these record drawings, and their proper maintenance may be a condition precedent to approval of applications for periodic payments.

E. Deliver all Project Record Documents, shop drawings, product data, and samples to the Architect for the Owner's use, upon completion of the Work and prior to request for Final Acceptance of the Work.

F. In addition at the completion of the work, the Construction Manager is responsible for the preparation and submittal of neat, clean well drafted, and complete record drawings, at no additional costs to the Owner. These reproducible Project Record Documents shall be transmitted to the Architect as a condition precedent to final payment, and include documents prepared by the food service, fire protection, plumbing, mechanical and electrical trades.

1.7 FINAL SITE SURVEY

A. Under provisions of Section 01 73 00 - EXECUTION, Surveyor shall provide final corrected submission of Final Site Survey (As-built Property Survey) after work has been completed.

1. Final site survey shall show significant features for the Project. Include a certification, signed by the Surveyor, to the effect that metes, bounds, lines and levels of the Project are accurately positioned as shown on the survey.

B. Survey format shall be in accordance with requirements of the authorities having jurisdiction, and show the following as a minimum:

1. Property boundaries.
2. All required legal descriptions.
3. Bench marks.
4. Completed foundation work.
5. Building extremities.
6. Pad mounted equipment.
7. All paving work.
8. Revisions to wetland areas.
9. Easements and modifications to easements.
10. Underground utilities and all changes in existing utilities.

C. Record deviations from required lines and levels. Advise the Architect when deviations that exceed indicated or recognized tolerances are detected. On Final Site Survey, record deviations that are accepted and not corrected.

D. Submit signed, sealed and certified copies shall be provided to the architect's office for review prior to filing with authorities having jurisdiction. Ensure information is complete, accurate submitted in a timely fashion.

1. Recording: At Substantial Completion, have the final survey recorded by or with local authorities as the official "Property Survey".

1.8 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

1.9 OPERATION AND MAINTENANCE MANUALS

A. General: Coordinate content and submission requirements of operation and maintenance manuals with Owner's Commissioning Agent.

B. Prepare data in the form of an instructional manual. Furnish separate manuals for each of the following groups of equipment:

1. Food service equipment.
2. Elevators.
3. Special equipment and systems.

4. Fire protection system.
5. Utilities and plumbing systems.
6. Heating, ventilation and air conditioning system.
7. Electrical systems.

C. Furnish bound and properly identified Manuals prior to request for Final Acceptance.

1. Manuals shall be in 8-1/2 by 11 inch pages and bound in three “D ring” capacity binders with durable plastic covers. Internally subdivide the binder contents with permanent page dividers.
    a. Arrange content by section number and systems, process flow, under section numbers and sequence as listed in the Table of Contents of this Project Manual.
    b. Drawings: Preferable 11 inches in height bound in with text with reinforced punched binder tab. Fold drawings larger than 8-1/2 by 11 inches to size of text pages. Provide a drawing pocket for Drawings larger than 11 by 17 inches; locate pocket inside rear cover or bound in with text.
2. Each manual shall include the same following minimum information:
    a. Table of Contents.
    b. Directory of Contractor, subcontractors, and major equipment supplies listing addresses, phone numbers and appropriate emergency phone numbers.
        1) Include local sources of supplies and replacement parts.
    c. Directory of Architect and consultants listing addresses and phone numbers.
    d. Operation and maintenance instructions. Provide schematic diagrams of control systems, circuit directories for each electric panel and charts showing the tagging of all valves.
    e. Air and water test and balancing reports.
    f. Maintenance and cleaning instructions for finishes.
    g. Product and manufacturer's Certificates.
    h. Photocopies of all extended warranties and bonds.
3. Submit one copy of completed volume in final form 21 days prior to Final Inspection. This copy will be returned after final inspection with Architect's comments; Revise and submit all volumes to Owner.

D. For each item of equipment, include description of equipment, component parts and accessories. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts. Additionally provide the following for each item:

1. Panel board circuit directories: Provide electrical service characteristics, controls and communications.
2. Include color coded wiring diagrams as installed.

3. Operating procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
4. Maintenance requirements: Include routine procedures and guide for trouble-shooting; disassembly, repair, and re-assembly instructions; alignment, adjusting, balancing, and checking instructions.
    a. Maintenance drawings: Supplement product data to illustrate relation of component parts of equipment and systems, to show control and flow diagrams. Do not use project Record Documents as maintenance drawings.
5. Provide servicing and lubrication schedule, and list of lubricants required.
6. Include manufacturer's printed operation and maintenance instructions.
7. Include sequence of operation by controls manufacturer.
8. Provide control diagrams by controls manufacturer as installed.
9. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.
10. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
11. Provide original manufacturer's parts (OEM) list, illustrations assembly drawings, and diagrams required for maintenance.
    a. Provide list of original manufacturer's spare parts (OEM), current prices, and recommended quantities to be maintained in storage.
    b. Include local source of supplies and replacement parts, and any other data pertinent for procurement procedures.
12. Additional requirements: As specified in individual specification Sections.

E. Standards:
1. Measurements: Provide all measurements in U.S. standard units such as feet and inches, pounds, and cfm; provide additional measurements in the "International System of Units" (SI).
2. Abbreviations: Provide complete nomenclature of all parts of all equipment; include part numbers of all replaceable parts.

1.10 MATERIALS AND FINISHES MANUAL

A. Furnish bound and properly identified manuals for all materials and finishes prior to request for Substantial Completion review.
1. Manuals shall be in 8-1/2 by 11 inch pages and bound in three "D ring" capacity binders with durable plastic covers. Internally subdivide the binder contents with permanent page dividers and logically organized.
2. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.
    a. Arrange content by section number and systems, process flow, under section numbers and sequence as listed in the Table of Contents of this Project Manual.

b. Drawings: Preferable 11 inches in height bound in with text with reinforced punched binder tab. Fold drawings larger than 8-1/2 by 11 inches to size of text pages. Provide a drawing pocket for Drawings larger than 11 by 17 inches larger drawings; locate pocket inside rear cover or bound in with text.

B. Manuals shall include the following:

1. Product data, with catalog number, size, composition, and color and texture designations for all building products, applied materials, and finishes. Provide information for re-ordering custom manufactured products.
2. Instructions for care and maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
3. Moisture protection and weather exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
4. Additional requirements: As specified in individual specification Sections.

1.11 PEST CONTROL INSPECTION AND REPORT

A. Engage an experienced, licensed exterminator to make a final inspection and fully rid Project of rodents, insects, and other pests.

1. Prepare and submit report, identify:
   a. Area or areas which were treated.
   b. Rodentcides used.
   c. Manufacturer's data including MSDS, special precautions and applications instructions.
   d. Pollution preventive measures employed.

1.12 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.

B. Deliver materials to on-site location designated by the Owner; obtain receipt.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

Section 01 78 36
WARRANTIES

PART 1 - GENERAL

1.1 SUMMARY

A. General: This Section specifies general administrative and procedural requirements for warranties, guarantees and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties. Warranty, Guarantee and Bond requirements of this Section are applicable to all trades, all Divisions of the Specifications, and applies to all Work performed under this Contract.

1. Warranties required under the Contract are in addition to and not in lieu of any remedy or warranty to which the Owner is entitled under law.
2. Warranties required under the Contract are not a waiver of Owner's legal rights.

B. Contractor's Procurement Obligations: Do not purchase, subcontract for, or allow others to purchase or sub-subcontract for material or units of work for project where a special project warranty, certification or similar commitment is required, until it has been determined that entities required to countersign such commitments are willing to do so.

1.2 RELATED REQUIREMENTS

A. General provisions of the Contract, including General and Supplementary Conditions apply to this Section.

B. Section 01 78 00 – CLOSEOUT SUBMITTALS: Administrative and procedural requirements for submitting warranties.

C. Individual Specification Sections contain additional specific requirements for warranties and bonds.

D. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

1.3 DISCLAIMERS AND LIMITATIONS

A. General Limitations: It is recognized that specific warranties are intended primarily to protect Owner against failure of the work to perform as required, and against deficient, defective, and faulty materials and workmanship, regardless of sources.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Construction Manager of the warranty on the work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Construction Manager.

1. Pro-rating of warranties: Except where explicitly specified otherwise, each warranty issued shall cover the full cost of warranty-related repairs throughout the full term of the warranty.

1.4 DEFINITIONS

A. Categories of Specific Warranties: Warranties on the work are in several categories, including those of General Conditions, and including (but not necessarily limited to) the following specific categories related to individual units of work specified in sections of Divisions 2 through 50 of these Specifications:

1. Construction Manager's Comprehensive Warranty: The Construction Manager shall provide a comprehensive one-year warranty covering all labor, materials, equipment and work related to the entire Contract, and shall promptly repair or replace defective and deficient work.
2. Special Project Warranty (Guaranty): A warranty specifically written and signed by Construction Manager for a defined portion of the work; and, where required, countersigned by subcontractor, installer, manufacturer or other entity engaged by Construction Manager. Special Warranties extend time limits provided by standard warranties or to provide greater rights for the Owner.
3. Specified Product Warranty: A warranty which is required by Contract Documents, to be provided for a manufactured product incorporated into the work; regardless of whether manufacturer has published a similar warranty without regard for specific incorporation of product into the work, or has written and executed a special project warranty as a direct result of Contract Document requirements.
    a. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
4. Coincidental Product Warranty: A warranty not specifically required by Contract Documents (other than as specified in this Section), but which is available on a product incorporated into the work, by virtue of the fact that manufacturer or product has published warranty in connection with purchases and use of product without regard for specific applications except as otherwise limited by terms of warranty.

1.5 WARRANTY REQUIREMENTS

A. Warranty Period Commencement Date: Effective stating date for Warranty periods is the Date of Substantial Completion for Project.

1. Equipment and systems start-up, operation and use, occurring prior to Project Substantial Completion, will not be considered commencement of warranty period under any terms of this Contract.
2. Exceptions: Starting dates for warranties prior to the Project Date of Substantial Completion are not permitted, except for the two conditions below:
    a. Warranty requirements specified in individual specification sections explicitly specify that a required warranty or guarantee shall be effective on date of shipment, date of manufacturer, or date of installation.
    b. Warranties for Incomplete work: The effective date for warranty of work which has not been completed prior to the Date of Substantial Completion, shall be effective on the date of Final Completion and Owner’s acceptance of the Work.

B. Related Damages and Losses: In connection with Contractor's correction of warranted work which has failed, remove and replace other work of project which has been damaged as a result of such failure, or must be removed and replaced to provide access for correction of warranted work.

C. Reinstatement of Warranty Period: Except as otherwise indicated, when work covered by a special project warranty or product warranty has failed and has been corrected by replacement or restoration, reinstate warranty by written endorsement starting on date of acceptance of replaced or restored work.

1. Reinstated warranty value: The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
2. Reinstated warranty period: A period of time ending upon date original warranty would have expired, if there had been no failure, but not less than half of original warranty period of time.

D. Warranties are Irrevocable: Warranties issued to the Owner are irrevocable.

1. Non-Payment: If warrantor refuses to issue warranty, or attempts to revoke warranty due to lack of payment by any party other than the Owner, the Contractor shall resolve the payment conflict, and cause the warranty to be issued or reinstated.
2. Incomplete or incorrect Installation: If warrantor refuses to issue warranty, or attempts to revoke warranty due to improper installation or other deficiency, the Contractor shall correct the deficiency and cause the warranty to be issued or reinstated.

E. Transferable Warranties: All warranties shall permit Owner to transfer or assign warranties to future owners or other assignors at no additional cost to the Owner for the full warranty period.

F. Replacement Cost: Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of Contract Documents. The Construction Manager is responsible for the cost of replacing or rebuilding defective work regardless of whether the Owner has benefited from use of the work through a portion of its anticipated useful service life.

1. Work repairs or replaced under warranty shall be warranted for the full duration of the original warranty.

G. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

H. Rejection of Warranties:

1. Owner reserves the right, at time of substantial completion or thereafter, to reject coincidental product warranties submitted by Construction Manager , which in opinion of Owner tend to detract from or confuse interpretation of requirements of Contract Documents.

2. Owner reserves the right to reject warranties and to limit selection to products with warranties which are not in conflict with the requirements of the Contract Documents.

I. Owner's right to refuse Work: The Owner reserves the right to refuse to accept work for the project where a special warranty, certification, or similar commitment is required on such work or part of the work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.6 COMPREHENSIVE WARRANTY

A. Comprehensive Warranty: In addition to all other warranties, the Construction Manager shall issue a Comprehensive Total Contract Warranty which shall include all work of this Contract, without limitation including consequential damages.

1. Duration of Comprehensive Warranty: One full year from date of Substantial Completion.
2. Consequential damages: Warranty includes consequential damages which relate to a warranty claim, these include without limitation:
    a. All costs required to uncover and repair all work related to warranty claim.
    b. All costs relating to repair and restoration of damaged property, resulting from warranty claim.
    c. All costs resulting from failure to conform to the Contract Documents, and for required rebuilding, construction or reconstruction to correct work.
    d. Perform to the satisfaction of the Owner all repairs, reconstruction, and restoration to original condition of adjacent and related work affected by damage under a warranty claim.

B. Warranty Claims: Owner will notify Construction Manager in writing of each warranty claim. Warranty repairs shall be completed within 30 days of written notice, except as pre-approved by Owner.

1. In the event of an emergency condition, where in the reasonable opinion of the Owner an immediate repair under warranty is necessary, warranty repairs shall be completed within 14 calendar days from date of notice.
2. Owner's right to correct: In the event the Construction Manager fails to respond to a warranty claim within the specified time limits, the Owner reserves the right to make the necessary corrections or repairs and recover all costs and expenses from the Construction Manager .

C. Contractor's responsibilities under Comprehensive Warranty:

1. Notify in writing each affected warrantor and original Trade Contractor, subcontractor, installer, vendor as appropriate to the warranty claim.
2. Manage the warranty claim for the Owner.
3. Assist the Owner in obtaining warranty satisfaction.
4. Arrange and manage all warranty related work including work relating to consequential damages.

1.7 SUBMITTALS

A. Submit written warranties to the Owner prior to the date certified for Substantial Completion. In compliance with requirements specified under Section 01 77 00 – CLOSEOUT PROCEDURES and Section 01 78 00 – CLOSEOUT SUBMITTALS.

1. When a designated portion of the Work is completed and occupied, or used by the Owner by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Owner within 14 calendar days of completion of the designated portion of Work.
2. Refer to individual section of Divisions 2 through 50 for the determination of units of work which are required to be specifically or individually warranted, and for the specific requirements and terms of those warranties (or guarantees).
3. Specific Warranty Forms: Where a special project warranty (guaranty) or specified product warranty is required, prepare a written document to contain terms and appropriate identification, ready for execution by all required parties (including manufacturers, vendors, contractor(s) and subcontractors). Submit draft to Owner (through Construction Manager) for approval prior to final executions.

B. Form of Submittal: At Final Completion, compile three (3) copies of each required warranty and bond properly executed by the Construction Manager, or by the Construction Manager, subcontractor, supplier or manufacturer. Organize the warranty documents into an orderly sequence based on the Table of Contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.
2. Provide heavy paper dividers with celluloid-covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.
3. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS", the project title or name, and the name of the Construction Manager.
4. When operating and manuals are required for warrantied construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 SCHEDULE

A. Provide warranties on products and installations as specified in individual specification Sections in of the Project Manual.

End of Section

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Section 01 79 00
DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. Demonstrating equipment.

B. Instruction and training of Owner's personnel.

1.2 DEMONSTRATING EQUIPMENT

A. Demonstrate operation and maintenance of Products to Owner's personnel 2 weeks prior to date of Substantial Completion.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.

D. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at equipment location.

E. Prepare and insert additional data in operations and maintenance manuals specified under Section 01 78 00 - CLOSEOUT SUBMITTALS when need for additional data becomes apparent during instruction.

1.3 INSTRUCTION AND TRAINING OF OWNER'S PERSONNEL

A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.

B. For equipment requiring seasonal operation, perform instructions for other seasons within six months .

C. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

D. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

E. Provide sufficient formal instructional time for training Owner's personnel, so that the Owner's personnel will fully comprehend operation and maintenance of the facility's equipment and systems. Contractor's personnel designated for Owner training shall be competent and knowledgeable and have good communication skills.

1. Training sessions shall be pre-arranged directly with the Owner.

a. Instructors shall arrive at pre-scheduled training sessions on-time and be fully prepared to teach using a preplanned training program.

b. All instructors are subject to the Owner's approval. Replace unacceptable instructors and reschedule training as directed by the Owner at no increased cost to the Owner.

2. Training shall include the following:

a. General overview of Record Documents:

1) Record Drawings.
2) Record Project Manual.
3) Operation and Maintenance Manuals.
4) Finishes.
5) Warranty and maintenance agreements.
6) Test reports and inspections.

b. Fire suppression systems and equipment.

c. Fire alarm systems and equipment.

d. HVAC systems and equipment.

e. Plumbing systems and equipment.

f. Electrical systems and equipment.

F. Video Training Record: video record the instruction and training of the Owner's personnel.

1. Submit 2 DVD copies to Owner upon completion of training sessions.

G. Final payment is condition precedent on completion of Owner training (instruction). Contractor is required to submit affidavit that training and instruction of Owner’s personnel is completed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

End of Section

Section 01 81 13
SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes general requirements and procedures for compliance with certain prerequisites and credits needed for Project to obtain "LEED Version 4 for Building Design and Construction: Schools" Certified certification based on USGBC's LEED v4 BD+C: Schools.

1. Specific requirements for LEED are also included in other Sections.
2. Some LEED prerequisites and credits needed to obtain LEED certification depend on product selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.
3. A copy of the LEED Project checklist is attached at the end of this Section for information only.

    a. Some LEED prerequisites and credits needed to obtain the indicated LEED certification depend on aspects of Project that are not part of the Work of the Contract.

4. A copy of the LEED Materials Reporting Form is included at the end of this section.

5. Definitions included in the "LEED Version 4 for Building Design and Construction" (LEED v4 BD+C) Reference Guide and online amendments apply to this Section.

B. Related Requirements:
1. Section 01 32 33, "Photographic Documentation."
2. Section 01 33 00, "Submittal Procedures."
3. Section 01 50 00, "Temporary Facilities and Controls" for temporary heating and cooling requirements.
4. Section 01 74 19, "Construction Waste Management and Disposal."
5. Section 01 78 23, "Operation and Maintenance Data."
6. Section 01 81 10, "Indoor Air Quality Management."
7. Section 01 91 13, "General Commissioning Requirements.
8. Section 31 25 00, “Erosion & Sedimentation Controls
9. Divisions 02 through 49 Sections for LEED requirements specific to the work of each of these Sections. Requirements may or may not include reference to LEED.

1.03 DEFINITIONS

A. Bio-Based Materials: Materials that meet the Sustainable Agriculture Network's Sustainable Agriculture Standard. Bio-based raw materials shall be tested using ASTM D 6866 and be legally harvested, as defined by the exporting and receiving country.

B. CDPH Standard Method v1.1: California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v. 1.1–2010, for the emissions testing and requirements of products and materials.

C. Chain-of-Custody (COC): A procedure that tracks a product form the point of harvest or extraction to its end use, including all successive stage of processing, transformation, manufacturing, a distribution.

D. Chain-of-Custody Certificates: Certificates signed by manufacturers and fabricators certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001.

E. Composite Wood and Agrifiber: Products made of wood particles and/or plant material pressed and bonded with adhesive or resin such as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.

F. Corporate Sustainability Report: A third-party verified report that outlines the environmental impacts of extraction operations and activities associated with the manufacturer’s product and the product’s supply chain.

G. Environmental Product Declaration (EPD): An independently verified report based on life-cycle assessment studies that have been conducted according to a set of common rules for each product category and peer-reviewed.

1. Product-Specific Declaration: A product with a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that has at least a cradle to gate scope.
2. Industry-Wide (Generic) EPD: Provide products with third-party certification (Type III), including external verification, in which the manufacturer is explicitly recognized as a participant by the program operator. EPD must conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope.
3. Product-Specific Type III EPD: A product with a third-party certification, including external verification, in which the manufacturer is explicated recognized by the program operator. EPD must conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope.

H. Extended Producer Responsibility (EPR): Measures undertaken by the maker of a product to accept its own and sometimes other manufacturers’ products as postconsumer waste at the end of the products’ useful life.

I. Health Product Declaration Open Standard (HPD): A standard format for reporting product content and associated health information for building products and materials.

J. Indoor Air Quality (IAQ) Management Plan: Plan developed by the Contractor to provide a healthy indoor environment for workers and building occupants during construction. Plan must

meet or exceed the recommendations of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) "IAQ Guidelines for Occupied Buildings Under Construction, 2nd edition, 2007, ANSI/SMACNA 008-2008, Chapter 3."

K. Leadership Extraction Practices: Products that meet at least one of the responsible extraction criteria, which include: extended producer responsibility; bio-based materials; FSC wood products; materials reuse; recycled content; and other USGBC approved programs.

L. Material Cost: The dollar value of materials being provided to the site, after Contractor mark-ups, including transportation costs, taxes, fees, and shop labor, but excluding field equipment and field labor costs.

M. Materials Reuse: Reuse includes salvaged, refurbished, or reused products.

N. Multi-Attribute Optimization: Third party certified products that demonstrate impact reduction below industry average in at least three of the following six categories: global warming potential; stratospheric ozone depletion; acidification; eutrophication; tropospheric ozone creation; nonrenewable resource depletion.

O. Recycled Content: Recycled content is the sum of postconsumer recycled content plus one-half the preconsumer recycled content, based on cost.

1. "Postconsumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
2. "Preconsumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials, such as rework, regrind, or scrap, generated in a process and capable of being reclaimed within the same process that generated it.

P. Regional Materials: Materials that are extracted, harvested, recovered, and manufactured within a radius of 100 miles from the Project site.

Q. Volatile Organic Compounds (VOC) Emissions Test: Refer to CDPH Standard Method v1.1 definition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Work of this project includes completed building and application for LEED certification. Work is not complete until Owner has accepted USGBC's final review of LEED certification.

1. Provide documentation required by LEED and LEED review.

B. Provide materials and procedures necessary to obtain LEED prerequisites and credits required in this Section. Other Sections may specify requirements that contribute to LEED prerequisites and credits. Refer to other sections for additional materials and procedures necessary to obtain LEED prerequisites and credits.

C. Respond to questions and requests for additional information from Architect and the USGBC regarding LEED credits until the USGBC has made its determination on the project's LEED certification application.

D. LEED Online Submittals: Upload LEED documentation submittal data directly to USGBC project "LEED Online" website. Complete online forms at least monthly and as necessary to document LEED credits for submittals required in this Section.

E. LEED Conference: Schedule and conduct a conference at a time convenient to Owner and Architect within 21 days prior to commencement of the work. Advise Architect, Owner's Commissioning Authority**,** Owner's Project Manager of scheduled meeting dates.

1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Owner's Project Manager**,** Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: LEED goals for the project, Contractor's action plans, and discussion of targeted LEED Prerequisites and Credits.
3. Minutes: Record and distribute minutes to attendees and other entities with responsibilities for obtaining LEED Credits.

1.05 ACTION SUBMITTALS

A. General: Submit additional LEED submittals required by other Specification Sections.

1. Submit each LEED submittal simultaneously with applicable product submittal.

B. LEED Documentation Submittals:

1. General, LEED Materials Reporting Form: Project submittals must be accompanied by a completed LEED Materials Reporting Form. Submittal packages must also include highlighted documentation supporting the sustainability claims made on the LEED Materials Reporting Form.
2. EAp3, Building-Level Energy Metering: Product data for meters, sensors, and data collection system used to provide continuous metering of building energy-consumption performance.
3. MRp2/MRc5, Construction and Demolition Waste Management: Comply with submittal requirements of Section 01 74 19 "Construction Waste Management and Disposal."
4. MRc2, Building Product Disclosure and Optimization: Environmental Product Declarations complying with LEED requirements.

5. MRc4, Building Product Disclosure and Optimization, Material Ingredients: Option 1, Material Ingredient Reporting.

    a. Material ingredient reports for products that comply with LEED requirements for material ingredient reporting, including but not limited to the following:
        1) Manufacturer Inventory.
        2) Health Product Declaration.
        3) Cradle to Cradle certifications.
        4) Declare product labels.

6. EQp2/EQc3/EQc4, Indoor Air Quality: Comply with submittal requirements of Section 01 81 19, "Indoor Air Quality Management."

7. EQc2, Low-Emitting Materials: Product data, indicating VOC content, volume of product used, emissions testing documents, and/or other required product category evaluation criteria, showing compliance with requirements for low-emitting materials for the following products:

Product Category	VOC Content	Volume Used (budget method only)	General Emissions Compliance	Category Evaluation Compliance
a. Paints and coatings	X	X	X	
b. Adhesives and sealants	X	X	X	
c. Flooring			X	
d. Products containing composite wood or agrifiber products or wood glues				X (ULEF, NAF)
e. Ceilings, walls, thermal, and acoustic insulation			X	X (Batt Insulation)
f. Exterior applied materials.	X	X		

1.06 INFORMATIONAL SUBMITTALS

A. Qualification Data: For LEED coordinator.

B. Project Materials Cost Data: Provide statement indicating total cost for materials used for Project. Costs exclude labor, overhead, and profit. Include breakout of costs for the following categories of items:

1. Mechanical.
2. Electrical.
3. Plumbing.
4. Wood construction materials.
5. Furniture.
6. Specialty items such as elevators and equipment.
7. Earthwork and exterior improvements, hard costs.

C. LEED Action Plan Components: Provide preliminary submittals within 14 days of date established for the Notice of Award indicating how the following requirements will be met:

1. MRp2/MRc5, Waste management plan, complying with Section 01 74 19 "Construction Waste Management and Disposal."
2. EQp2/EQ3/EQ4, Indoor air quality plan, complying with Section 01 81 19, "Indoor Air Quality Management."

D. LEED Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with LEED action plans for the following:

1. MRp2/MRc5, Waste reduction progress reports complying with Section 01 74 19 "Construction Waste Management and Disposal."

2. MRc2, Building product disclosure and optimization – environmental product declarations.
   a. LEEDv4 MR BPDO Calculator or equivalent MR Tracking Sheet monitoring the project's progress towards targeted LEED MR Credits. To be presented at construction meetings.

3. MRc4, Building product disclosure and optimization – material ingredients.
   a. LEEDv4 MR BPDO Calculator or equivalent MR Tracking Sheet monitoring the project's progress towards targeted LEED MR Credits. To be presented at construction meetings.

4. EQc2, Low emitting materials.
   a. LEEDv4 Low Emitting Materials Calculator or equivalent Low Emitting Materials Tracking Sheet monitoring the project's progress towards targeted LEED Indoor Environmental Quality Credits. To be presented at construction meetings.

5. EQc3, Indoor air quality, during construction, complying with Section 01 81 19, "Indoor Air Quality Management."

6. EQc4, Indoor air quality assessment, complying with Section 01 81 19, "Indoor Air Quality Management."

1.07 QUALITY ASSURANCE

A. LEED Coordinator: Engage an experienced LEED-Accredited Professional to coordinate LEED requirements. LEED coordinator may also serve as waste management coordinator.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

A. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to LEED credits, the Contractor shall determine additional materials and procedures necessary to obtain LEED credits indicated. Contractor to determine a combination of credit options best suited for achieving credits required.

   1. Exclusions: Special equipment, such as elevators, escalators, process equipment, and fire suppression systems, is excluded from the credit calculations. Also excluded are products purchased for temporary use on the project, like formwork for concrete.

B. Unauthorized Products: Materials and products required for work of this section shall not contain asbestos, lead, mercury, polychlorinated biphenyls (PCBs), or other hazardous materials identified by the Owner.

2.02 BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION

A. MRc2, Building Product Disclosure and Optimization, Environmental Product Declarations (EPD): Option 1. Provide at least 20 permanently installed products (sourced from at least 5 different manufacturers) which meet one of the disclosure criteria.

1. Product-Specific Declaration: Valued as one quarter (1/4) of a product.
2. Industry-Wide (Generic) EPD: Valued as one half (1/2) of a product.
3. Product-Specific Type III EPD: Valued as one whole product.

B. MRc4, Building Product Disclosure and Optimization, Material Ingredients: Option 1, Material Ingredient Reporting.

1. Use at least 20 different permanently installed products from at least five different manufacturers that use any of the following programs to demonstrate the chemical inventory of the product to at least 0.1% (1000 ppm), which meet one of the following disclosure criteria:

a. Manufacturer Inventory.
b. Health Product Declarations (HPDs).
c. Cradle to Cradle (C2C) certifications.
d. Declare product labels.

C. MRc4, Building Product Disclosure and Optimization, Material Ingredients: Option 2, Material Ingredient Optimization.

1. Use products that document their material ingredient optimization using the paths below for at least 25%, by cost, of the total value of permanently installed products in the project, which meet one of the following disclosure criteria:

a. GreenScreen benchmarks.
b. Cradle to Cradle certifications.
c. REACH optimizations.

2.03 LOW-EMITTING MATERIALS

A. EQc2, Low-Emitting Materials, General Emissions Requirements: Products must demonstrate they have been tested and determined compliant in accordance with California Department of Public Health, (CDHP), Standard Method v1.1-2010, using the applicable exposure scenario. Manufacturer's documentation demonstrating compliance must state the range of total VOCs (tVOC) after 14 days measured as specified in the CDPH Standard Method v1.1 as follows:

1. 0.5mg/m3 or less,
2. between 0.5 and 5.0 mg/m3 or,
3. 0.50 mg/m3 or more.

B. EQc2, Low-Emitting Materials, Paints and Coatings, VOC content: For field applications that are inside the weatherproofing system, 100 percent of paints and coatings shall comply with the limits for VOC content when calculated according to the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, **OR** the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective June 3, 2011.

Product Type:	Allowable VOC Content (g/L):
Bond Breaker	350
Clear wood finishes - Varnish	275
Clear wood finishes – Sanding Sealer	275
Clear wood finishes - Lacquer	275
Colorant – Architectural Coatings, excluding IM coatings	50
Colorant – Solvent Based IM	600
Colorant - Waterborne IM	50
Concrete – Curing compounds	100
Concrete – Curing compounds for roadways & bridges	350
Concrete surface retarder	50
Driveway Sealer	50
Dry-fog coatings	50
Faux finishing coatings - Clear topcoat	100
Faux finishing coatings – Decorative Coatings	350
Faux finishing coatings - Glazes	350
Faux finishing coatings - Japan	350
Faux finishing coatings – Trowel applied coatings	50
Fire-proof coatings	150
Flats	50
Floor coatings	50
Form release compounds	100
Graphic arts (sign) coatings	150
Industrial maintenance coatings	100
Industrial maintenance coatings – High temperature IM coatings	420
Industrial maintenance coatings – Non-sacrificial anti-graffiti coatings	100
Industrial maintenance coatings – Zinc rich IM primers	100
Magnesite cement coatings	450
Mastic coatings	100
Metallic pigmented coatings	150
Multi-color coatings	250
Non-flat coatings	50
Pre-treatment wash primers	420
Primers, sealers and undercoaters	100
Reactive penetrating sealers	350
Recycled coatings	250
Roof coatings	50
Roof coatings, aluminum	100
Roof primers, bituminous	350
Rust preventative coatings	100
Stone consolidant	450
Sacrificial anti-graffiti coatings	50
Shellac- Clear	730
Shellac – Pigmented	550
Specialty primers	100

Stains	100
Stains, interior	250
Swimming pool coatings – repair	340
Swimming pool coatings – other	340
Traffic Coatings	100
Waterproofing sealers	100
Waterproofing concrete/masonry sealers	100
Wood preservatives	350
Low solids coatings	120

C. EQc2, Low-Emitting Materials, Paints and Coatings, General Emissions Requirement: For field applications that are inside the weatherproofing system, at least 90 percent of paints and coatings, measured by volume, shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
   1. To comply with the General Emissions Requirement, products shall meet one of the following:
      a. UL Greenguard Gold Certified
      b. SCS Indoor Advantage Gold Certified
      c. MAS Certified Green
      d. Meet California Department of Public Health (CDHP), Standard Method v1.1-2010, using the applicable exposure scenario.

D. EQc2, Low-Emitting Materials, Adhesives and Sealants, VOC content: For field applications that are inside the weatherproofing system, 100 percent of adhesives and sealants shall comply with the limits for VOC content when calculated according to South Coast Air Quality Management District (SCAQMD) Rule #1168, requirements in effect on July 1, 2005, and rule amendment date January 7, 2005:

Architectural Applications:	Allowable VOC Content (g/L):
Indoor carpet adhesives	50
Carpet pad adhesives	50
Outdoor carpet adhesives	150
Wood flooring adhesives	100
Rubber floor adhesives	60
Subfloor adhesives	50
Ceramic tile adhesives	65
VCT and asphalt tile adhesives	50
Dry wall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Single ply roof membrane adhesives	250
Specialty Applications:	
PVC welding	510
CPVC welding	490
ABS welding	325
Plastic cement welding	250
Adhesive primer for plastic	550
Computer diskette manufacturing	350

Contact adhesive	80
Special purpose contact adhesive	250
Tire retread	100
Adhesive primer for traffic marking tape	150
Structural wood member adhesive	140
Sheet applied rubber lining operations specialty	850
Top and Trim adhesive	250
Substrate Specific Applications:	
Metal to metal substrate specific adhesives	30
Plastic foam substrate specific adhesives	50
Porous material (except wood) substrate specific adhesives	50
Wood substrate specific adhesives	30
Fiberglass substrate specific adhesives	80
Sealants:	
Architectural sealant	250
Marine deck sealant	760
Nonmember roof sealant	300
Roadway sealant	250
Single-ply roof membrane sealant	450
Other sealant	420
Sealant Primers:	
Architectural non-porous sealant primer	250
Architectural porous sealant primer	775
Modified bituminous sealant primer	500
Marine deck sealant primer	760
Other sealant primer	750
Other	
Other adhesives, adhesive bonding primers, adhesive primers or any other primers	250

1. Exception: The provisions of SCAQMD Rule 1168 do not apply to adhesives and sealants subject to state or federal consumer product VOC regulations.

E. EQc2, Low-Emitting Materials, Adhesives and Sealants, General Emissions Requirement: For field applications that are inside the weatherproofing system, at least 90 percent of adhesives and sealants, measured by volume, shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
   1. To comply with the General Emissions Requirement, products shall meet one of the following:
      a. UL Greenguard Gold Certified
      b. SCS Indoor Advantage Gold Certified
      c. MAS Certified Green
      d. Meet California Department of Public Health (CDHP), Standard Method v1.1-2010, using the applicable exposure scenario.

F. EQc2, Low-Emitting Materials, Flooring, General Emissions Requirement: 100 percent of flooring shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

1. To comply with the General Emissions Requirement, products shall meet one of the following:
    a. FloorScore Certified (hard surface flooring and flooring adhesives)
    b. Green Label Plus certified (carpet, adhesive, and cushion)
    c. NSF/ANSI 332 certified (resilient flooring)
    d. Meet California Department of Public Health (CDHP), Standard Method v1.1-2010, using the applicable exposure scenario.

G. EQc2, Low-Emitting Materials, Composite Wood: 100 percent of composite wood, agrifiber products, and adhesives shall be made using ultra-low-emitting formaldehyde (ULEF) resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde (NAF).

H. EQc2, Low-Emitting Materials, Ceilings, Walls, Thermal, and Acoustic Insulation, General Emissions Requirement: 100 percent of ceilings, walls, and thermal insulation shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

I. EQc2, Low-Emitting Materials, Ceilings, Walls, Thermal, and Acoustic Insulation, Batt Insulation Requirement: 100 percent of batt insulation products may contain no added formaldehyde, including urea formaldehyde, phenol formaldehyde, and urea-extended phenol formaldehyde.

J. EQc2, Low-Emitting Materials, Exterior Applied Materials, VOC content: For field applications that are exterior applied, at least 90 percent of adhesives, sealants, coatings, roofing, and waterproofing, measured by volume, shall comply with the limits for VOC content when calculated according to the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, **AND** the South Coast Air Quality Management District (SCAQMD) Rule 1168, effective June 3, 2011 for adhesives and sealants.

1. Refer to Table under 2.01, B and D above for allowable VOC content (limits are also applicable to exetrior materials). Refer to CARB 2007 SCM and SCAQMD Rule 1168 for any products not listed.

2. The following materials are prohibited and do not count toward total percentage compliance:
    a. Hot-mopped asphalt for roofing.
    b. Coal tar sealants for parking lots and other paved surfaces.

K. EQc2, Low-Emitting Materials, Furniture: At least 90 percent of furniture, measured by cost, shall be tested in accordance with ANSI/BIFMA Standard Method M7.1-2011; comply with ANSI/BIFMA e3-2011 Furniture Sustainability Standard, Sections 7.6.1 and 7.6.2, using either the concentration modeling approach or the emissions factor approach; and model the test results using the open plan, private office, or seating scenario in ANSI/BIFMA M7.1, as appropriate.

L. Additional Low-Emitting Requirements:

1. If the applicable regulation requires subtraction of exempt compounds, any content of intentionally added exempt compounds larger than 1% weight by mass (total exempt compounds) must be disclosed.
2. If a product cannot reasonably be tested as specified above, testing of VOC content must comply with ASTM D2369-10; ISO 11890, part 1; ASTM D6886-03; or ISO 11890-2.
3. Methylene chloride and perchloroethylene may not be intentionally added in paints, coatings, adhesives, or sealants.

2.04 INDOOR WATER USE REDUCTION

A. WEp2, Indoor Water Use Reduction, Appliances: Provide ENERGY STAR or performance equivalent appliances.

B. WEp2/WEc2, Indoor Water Use Reduction, Plumbing Fixtures: Do not exceed water flow requirements indicated in Division 22 - PLUMBING. All newly installed toilets, urinals, private lavatory faucets, and showerheads that are eligible for labeling must be WaterSense labeled.

PART 3 - EXECUTION

3.01 NONSMOKING BUILDING

A. EQp2, Environmental Tobacco Smoke Control: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor-air intakes.

1. Refer to Section 01 81 19, "Indoor Air Quality Management."

3.02 CONSTRUCTION WASTE MANAGEMENT

A. MRp2 MRc5, Construction and Demolition Waste Management: Comply with Section 01 74 19 "Construction Waste Management and Disposal."

3.03 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT

A. EQc3/EQc4, Construction Indoor Air Quality Management Plan: Comply with Section 01 81 19, "Indoor Air Quality Management."

End of Section

PRODUCT DATA REPORTING FORM for LEED v4 Projects

THIS FORM IS REQUIRED TO BE SUBMITTED *WITH Product Data Submittals*

You must include backup documentation such as *SPECIFIC* Product Data Sheets, Cut Sheets, Product Specific Letter from Manufacturer, etc. DO NOT INCLUDE GENERIC MARKETING MATERIAL

LEED PROJECT NAME: Fuller Middle School
SUBCONTRACTOR:
Specification Section: Submittal Number:

Project Product Data			*Materials and Resources LEED Credits*				*Low-Emitting Materials LEED Credits*			
							Some Qualifying VOC Standards (More in Note 10): CDPH Standard Method v1.1; FloorScore: Hard Surfaces & Adhesives; Green Label Plus: Carpet, Adhesive, Cushion; UL Greenguard Gold: When Meeting CDPH Std. v1.1			
	Product	Manufacturer	Product Specific (PS) or Industry Wide (IW) Env. Product	Delclare Label with ingredient disclosure greater than 1000 ppm?	Fully Declared HPD to 1000 ppm Declaration[4] included?	C2C version (2.1.1 or 3.0) Level of Certification	CDPH Emissions[10] testing compliant?	VOC Content[11] (g/L)	Wet-Applied Products Volume Used (L)	Wood Products are ULEF or NAF[12]?
Ex.	ABC Product	ABC. Inc.	PS / IW	Yes / No	Yes / No	Yes / No	Yes / No	##	##	Yes / No
1										
2										
3										
4										
5										
6										
7										
8										
9										

NOTES / DEFINITIONS:

1. Furnish Costs include all expenses to deliver the material to the project site, including taxes, transport, fabrication and profit. Do not include site labor or installation.
2. Within 100 miles distance is defined as travel by air to the project site, not travel distance by road. http://www.distancefromto.net/
3. Environmental Product Declarations which conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope. http://productguide.ulenvironment.com/QuickSearch.aspx
4. The end use product has a published, complete Health Product Declaration with full disclosure of known hazards in compliance with the Health Product Declaration open Standard. Smith Group JJR HPD Database
5. Extended producer responsibility. Products purchased from a manufacturer (producer) that participates in an extended producer responsibility program or is directly responsible for extended producer responsibility. (e.g. Closed Loop or Take Back Program)
7. Wood products must be certified by the Forest Stewardship Council (FSC) and must be provide proof of vendor FSC Chain-of-Custody with this Product Data Submittal. http://info.fsc.org/certificate.php
8. Post-Consumer Recycled Content: Sourced from recovered Consumer Waste and used as a raw material (e.g. plastic bottles, newspaper, etc).
9. Pre-Consumer Recycled Content: Recovered Industrial Materials diverted from municipal solid waste for use in a different mfg. process, prior to use by a consumer. Note: "home scrap" from the original mfg. process that are reused / reprocessed do not qualify.
10. TVOC Emissions for Building products must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.1–2010 http://www.usgbc.org/resources/low-emitting-materials-third-party-certification-table
11. All paints and coatings wet-applied on site must meet applicable VOC limits of the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective June 3, 2011. All adhesives and sealants wet-applied on site must meet the applicable chemical content requirements of SCAQMD Rule 1168, July 1, 2005, Adhesive and Sealant Applications, as analyzed by the methods specified in Rule 1168.
12. Composite Wood Evaluation as defined by the California Air Resources Board (CARB), Airborne Toxic Measure to Reduce Formaldehyde Emissions from Composite Wood Products Regulation, must be documented to have low formaldehyde emissions that meet the CARB ATCM for formaldehyde requirements for ultra-low-emitting formaldehyde (ULEF) resins or no added formaldehyde (NAF) resins.

I, _____ a duly authorized representative of_____ hereby certify that the material information submitted here is an accurate representation of the material to be provided under our contract.

EMAIL CONTACT FOR AUTHORIZED REPRESENTATIVE: _____ Direct Phone: _____
SIGNATURE OF AUTHORIZED REPRESENTATIVE: _____ DATE: _____

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Section 018119
INDOOR AIR QUALITY REQUIREMENTS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. All of the Contract Documents, including General and Supplementary Conditions and Division 1 General Requirements, apply to the work of this section.

1.02 SUMMARY

A. Requirements for minimum indoor air quality (IAQ) performance standards during the period of construction.

B. The Contractor shall develop, for Owner and Architect review, a Construction Indoor Air Quality Management Plan for this Project.

C. Sustainable Design Intent: Comply with project requirements intended to achieve certification, measured and documented according to the LEED-NC v4 Rating System, of the US Green Building Council.

1.03 RELATED REQUIREMENTS

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Section 01 00 00, Summary.
2. Section 01 33 00, Submittal procedures.
2. Section 01 50 00, Temporary facilities and controls.
3. Section 01 74 19, Construction Waste Management.
4. Section 01 81 13, Sustainable Design Requirements.
6. Section 01 91 13, Commissioning.
7. Division 22, 23, 26
8. Divisions 3 through 16 Specification Sections; Specific requirements relating to indoor air quality for each Section.

1.04 PERFORMANCE REQUIREMENTS

A. Comply with minimum requirements of Sections 4 through 7 of ASHRAE 62.1-2010, Ventilation for Acceptable Indoor Air Quality and approved Addenda.

1. Coordinate with requirements of Section 01 91 13, Commissioning, and Division 23 – MECHANICAL.

B. Prevent exposure of building systems to environmental tobacco smoke during construction. At a minimum, take the following measures:

1. Do not allow smoking on/in the project site.
2. Locate exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows.

C. During construction meet or exceed the minimum requirements of the recommended Control Measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008–2008, Chapter 3.

D. Protect occupied portions of the building from transfer of dust and particulate matter, noise and odor emissions generated during construction in compliance with the minimum requirements of the recommended Control Measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition 2007, ANSI/SMACNA 008-2008 Chapter 3.

E. Protect absorptive materials from moisture damage when stored on-site and after installation.

F. Use materials and products in compliance with the VOC content limits as established in LEED credit IEQ credit Low-Emitting Materials.

G. During construction, comply with the following requirements, per LEED IEQ Construction Indoor Air Quality Management Plan:

1. Develop and implement a moisture control plan to ensure dry conditions will be maintained to protect absorptive materials stored on site. Include criteria for protecting the building from moisture intrusion and occupant exposure to mold spores.

2. If permanently installed air handlers are used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 shall be used at each return air grille, as determined by ASHRAE 52.2-2007. Protect active outdoor air intakes and return air grilles with applicable filtration media. Periodically inspect temporary media and replace as necessary. Replace filtration media immediately prior to occupancy with MERV 13 or higher.

3. Develop and implement a plan to reduce noise and emissions on the construction site; address the following:

   Surrounding community noise and vibration impacts. Determine which areas on and adjacent to the site will require special protection from noise.

   Construction Worker training and protective equipment. Determine construction activities that may require the use of protective gear or specialty equipment and properly train workers in their use and/or operation.

   Source Reduction. Develop and implement policies to limit truck and equipment idling on site and to limit vibration and noise from demolition and construction activities.

H. After construction ends but before occupancy, comply with one of the following requirements, per LEED IEQ credit Indoor Air Quality Assessment:

1. Perform a Building Flush-out with outside air. After construction ends, prior to occupancy and with all interior finishes and furniture installed, install new filtration media and perform a building flush-out by supplying a total air volume of 14,000 cubic feet of

outdoor air per square foot of floor area while maintaining an internal temperature of at least 60°F and no higher than 80°F and relative humidity no higher than 60%.

a. If occupancy is desired before the flush-out is completed, the following must be met:
    i. The space may be occupied only after delivery of a minimum of 3,500 cubic feet of outdoor air per square foot.
    ii. Once the space is occupied, it must be ventilated at a minimum rate of 0.30 cubic foot per minute (cfm) per square foot of outdoor air or the design minimum outdoor air rate determined in EQ Prerequisite Minimum Indoor Air Quality Performance, whichever is greater.
    iii. During each day of the flush-out period, ventilation must begin at least three hours before occupancy and continue during occupancy.
    iv. These conditions must be maintained until a total of 14,000 cubic feet per square foot of outdoor air has been delivered to the space.

2. Conduct IAQ Testing for air contaminant levels in the building. Use testing protocols consistent with the EPA Compendium of Methods for the Determination of Air Pollutants in Indoor Air and as additionally detailed in the LEED v4 Reference Guide for Building Design and Construction.
    a. Conduct all measurements before occupancy but during normal occupied hours, with the building ventilation system started at the normal daily start time and operated at the minimum outdoor airflow rate for the occupied mode throughout the test.
    b. Test at least one location per ventilation system for each occupied space type; there must be a minimum of one test per floor. Locations selected for testing must represent worst-case zones where highest concentrations of contaminants of concern are likely to occur. Test areas shall be no larger than 5,000 square feet.
        i. Projects that include identical spaces in their construction, finishes, configuration, square footage, and HVAC systems may test one in seven. If the sampled space fails the test, all seven must be tested.
    c. Laboratories that conduct the tests for chemical analysis of formaldehyde and volatile organic compounds must be accredited under ISO/IEC 17025 for the test methods they use.

1.05 SUBMITTALS

A. Construction Indoor Air Quality (IAQ) Management Plan: the Contractor shall submit a preliminary Construction IAQ Management Plan for review.

1. Within 21 calendar days after receipt of Notice to Proceed, the Contractor shall submit to the Owner a finalized Construction IAQ Management Plan.
2. The proposed Plan shall comply with Division 23 – MECHANICAL requirements.
3. The proposed Plan shall include, but not be limited to, the following:
    a. Protection of ventilation system components during construction.
    b. Cleaning and replacing contaminated ventilation system components after construction, including filtration media.
    c. Temporary ventilation.
    d. Protection of absorptive materials from moisture damage when stored on-site and after installation, including exterior wall rain protection.
    f. Noise reduction and emissions
    g. Sequence of finish installation plan.
    h. Selection of cleaning products and procedures to be used during construction and final cleaning.

i. Other items as required by SMACNA IAQ Guidelines for Occupied Buildings under Construction, 2nd edition 2007, ANSI/SMACNA 008-2008 Chapter 3.

4. Coordinate Construction IAQ Management Plan with Owner's current IAQ management plans and procedures.
5. Comply with the requirements of LEED IEQ Construction Indoor Air Quality Management Plan.

B. Material Safety Data Sheets (MSDS): Submit for materials as required, with date clearly identified. MSDS must contain specific chemical content data identifying the percent of the total product mass represented by each listed chemical.

C. Product Data: Submit for each type of filtration media used during construction and installed immediately prior to occupancy, include and highlight MERV values the documentation provided.

D. Flush-out or IAQ Testing Documentation:
1. Submit a flush-out report that includes duration calculations and a description of flush-out procedure. Include a log of dates, hours, and recorded temperature and humidity. Also include the capacity of all HVAC units used and indicate which are permanent and which are temporary.
2. Submit an IAQ testing reports that includes a narrative describing procedures and how locations were determined, dates, and results of each test.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Take special care to prevent accumulation of moisture on materials and within packaging during delivery, storage, and handling to prevent development of mold and mildew inside packaging and on products.

B. Immediately remove from site and properly dispose of materials showing signs of mold and mildew, including materials with moisture stains.

C. When not in use, store products in original sealed containers, in a designated location

PART 2 - PRODUCTS

2.01 FILTRATION MEDIA

A. Filtration Media: Comply with ASHRAE 52.2-2007 and provide filtration media with compliant MERV ratings as required.

PART 3 - EXECUTION

3.01 CONSTRUCTION IAQ MANAGEMENT PLAN IMPLEMENTATION

A. IAQ Manager: The Contractor shall designate an on-site person responsible for instructing workers and overseeing and documenting results of the Construction IAQ Management Plan for the Project.

B. Distribution: The Contractor shall distribute copies of the Construction IAQ Management Plan to the Job Site Foreman, each subcontractor, the Owner, and the Architect.

C. Instruction: The Contractor shall provide on-site instruction of appropriate procedures and methods to be used by all parties at the appropriate stages of the Project.

D. Preconditioning: Allow products, which have odors and significant VOC emissions, to off-gas in specified dry, well-ventilated space for sufficient period to dissipate odors and emissions prior to delivery to Project.

1. Remove containers and packaging from materials prior to conditioning to maximize off-gassing of VOCs.

2. Condition products in ventilated warehouse or other building.

E. Coordinate Construction IAQ Management Plan with final cleaning as indicated in 017700 - CLOSEOUT PROCEDURES.

End of Section

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Section 01 91 13

GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

B. Owner's Project Requirements, Basis of Design and Measurement and Verification Plan.

1.2 SUMMARY

A. The purpose of the Commissioning Process is to provide the Owner with independent verification that the systems to be commissioned have been constructed according to the contract documents and operate within the performance guidelines set forth in the Owner's Project Requirements, the Basis of Design, the Project construction drawings and specifications. Commissioning consists of systematically documenting that specified components and systems have been installed and started up properly and then functionally tested to verify and document proper operation through all sequences of operation and conditions. In addition, training of the Owner's Operations Personnel will be verified, and final project O&M Documents will be reviewed for completeness

B. The commissioning process does not alleviate or reduce the responsibility of the design professionals, construction managers, or installing contractors to provide a complete and finished product, installed and fully functional in accordance with the contract documents.

C. Commissioning is intended to enhance the quality of system start-up and aid in the orderly transfer of systems for use by the Owner. Quality commissioning requires participation by ALL parties involved with the project's design and construction process, including the Owner, Design Team, Construction Manager and Contractors, and the Owner's Facilities Management.

D. The Commissioning Authority will lead the commissioning team, planning and coordinating all commissioning activities in conjunction with commissioning team members.

E. Contractor shall comply with project requirements intended to achieve sustainable design, measured and documented according to the LEED Green Building Rating System. Refer to Section 018113, Sustainable Design Requirements, for certification level and certification requirements.

F. Related Divisions:

1. Division 7 Thermal and Moisture Protection

2. Division 8 Openings
3. Division 21 Fire Suppression
4. Division 22 Plumbing
5. Division 23 Heating, Ventilating and Air Conditioning
6. Division 26 Electrical
7. Division 27 Communications
8. Division 28 Security
9. Division 32 Exterior Improvements

G. Related Sections:

1. Section 01 31 00 – Project Management and Coordination
2. Section 01 32 00 – Construction Progress Documentation
3. Section 01 33 00 – Submittal Procedures
4. Section 01 45 00 – Quality Control
5. Section 01 77 00 – Closeout Procedures
6. Section 01 78 00 – Closeout Submittals
7. Section 01 78 36 – Warranties
8. Section 01 81 13 – Sustainable Design Requirements
9. Section 08 91 20 Commissioning of Building Enclosure
10. Section 21 08 00 Commissioning of Fire Suppression
11. Section 22 08 00 Commissioning of Plumbing
12. Section 23 08 00 Commissioning of HVAC
13. Section 26 08 00 Commissioning of Electrical
14. Section 27 08 00 Commissioning of Communications
15. Section 28 08 00 Commissioning of Electronic Safety and Security

1.3 SYSTEMS TO BE COMMISSIONED

A. Building Envelope:

1. Roof Systems
2. Exterior Walls

3. Exterior Windows (25% sample)
4. Exterior Doors (25% sample)
5. Louvers and Vents (25% sample)
6. Grilles and Sunscreens (25% sample)
7. Infrared Scan of Envelope

B. HVAC Systems:

1. Heating Hot Water Generation and Distribution System
2. Glycol Energy Recovery (Heat Recovery) System
3. Chilled Water Distribution System
4. Air Handling Units
5. Rooftop Units
6. Heating and Ventilating Units
7. Variable Air Volume Boxes (25% Sample)
8. Fan Coil Units (25% Sample)
9. Chilled Beams (25% Sample)
10. Exhaust Fans (25% Sample)
11. Radiant Panels/Finned Tube Radiators (25% Sample)
12. Unit Heaters (25% Sample)
13. Split AC Units
14. Make-up Air Units
15. Fume Hoods
16. Building Automation System

C. Plumbing Systems:

1. Natural Gas Systems (25% Sample)
2. Compressed Air Systems (25% Sample)
3. Backflow Preventers

4. Booster Pumps
5. Domestic Hot Water System
6. Water Closets and Sinks (25% Sample)
7. Lab Waste and Acid Neutralization System
8. Safety Shower/Eyewash Stations
9. Mixing Valves
10. Irrigation Systems
11. Grey Water Systems
12. Rain Water Reclamation Systems

D. Electrical Systems:

1. Electrical Service and Switchgear
2. Transformers
3. Motor Control Centers
4. Normal Power Distribution System (25% Sample)
5. Emergency Power System
6. Low Voltage Systems (25% Sample)
7. Grounding and Bonding Systems (25% Sample)

E. Voice Data, Video Systems

1. Cabling (10% Sample)
2. Switches (10% Sample)
3. Servers (10% Sample)
4. Routers (10% Sample)
5. Interfaces (10% Sample)
6. Terminals (10% Sample)
7. Master Clock System
8. Public Address Systems

F. Life Safety Systems:

1. Security System
2. Fire Alarm Systems
3. Fire Suppression Systems
4. Fire Pump Systems
5. Egress Lighting
6. Egress Pressurization Systems

1.4 DEFINITIONS

A. Basis of Design Document (BOD):

1. A document that records the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process and is provided by the design team.

B. Commissioning Authority (CxA):

1. An entity identified by the Owner who plans, schedules, and coordinates the Commissioning Team to implement the Commissioning Process.

C. Commissioning Plan:

1. Prepared and updated by the Commissioning Authority, the Commissioning Plan outlines the organization, schedule, allocation of resources, and documentation requirements of the Commissioning Process.

D. Commissioning Process:

1. A quality-focused process for enhancing the delivery of a project. The Process focuses on verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements.

2. Commissioning is typically abbreviated by "Cx". Commissioning and Cx have the same meaning and will be used interchangeably throughout the Contract documents.

E. Commissioning Team:

1. The individuals who through coordinated actions are responsible for implementing the Commissioning Process.

F. Corrective Issue Report (CIR):

1. A report generated by the Cx Authority during Verification Testing documenting deficiencies found during the testing procedures.

G. Functional Performance Testing (FPT):

1. The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria described in the Owner's Project Requirements.

H. Owner's Project Requirements (OPR):

1. A written document that details the functional requirements of a project and the expectations of how it will be used and operated. This includes project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information.

I. Pre-Functional Checklist (PFC):

1 Documents prepared by the Cx Authority and issued to the Contractor early in the Construction correctly installed and functional & ready for Performance Testing.

J. Sustainable Design Intent:

1. Compliance with project requirements intended to achieve sustainable design, measured and documented according to the LEED Green Building Rating System, of the US Green Building Council. Refer to Section 018113.

1.5 COMMISSIONING TEAM

A. The Commissioning Team shall consist of a minimum of one (1) Representative for each of the following:

1. Owner
2. Owner's Project Manager
3. Architect
4. Engineer
5. General Contractor/Construction Manager
6. Commissioning Authority

B. Each Commissioning Team Representative shall have at least five (5) years experience in construction administration along with a thorough understanding of construction project documentation procedures.

C. Each Cx Team Representative shall be familiar with the latest revision of ASHRAE Guideline 0 – The Commissioning Process.

PART 2 - PRODUCTS

2.1 VERIFICATION TESTING EQUIPMENT AND INSTRUMENTS

A. Contractor shall provide all tools, instruments, laptop computers, PDAs, software programs, personnel, and services required to perform system Functional Performance Testing (FPT) procedures. This includes providing the connection to systems to be tested, temporary alterations for test purposes, calibrations, operation of the test equipment & instrumentation and generating test results (as required), and the restoration of equipment/systems to original operating condition.

PART 3 - EXECUTION

3.1 PROJECT SCHEDULE

A. The Commissioning Authority will review the Contractor's Master Project Schedule and provide to the Contractor a Schedule identifying the Cx Activities for the Project along with the related events from the Contractor's Master Project Schedule. The Contractor shall incorporate these Cx Activities into the Master Project Schedule. The Cx Authority will review and update Cx Activities along with the Contractor's Master Schedule Update. Refer to Section 013200 for procedures.

B. Cx Authority to receive a copy of the regularly updated schedule when submitted to the Architect/Owner.

C. Milestones for Testing, Adjusting, and Balancing and Functional Testing shall be included in Contractor's progress schedule, arranged by system and associated with specific pre-cursor activities.

3.2 SUBMITTALS / SHOP DRAWINGS

A. The Commissioning Authority will review Product Submittals and Shop Drawings within the same review period as the Architect. The Cx Authority will review the Submittals and Shop Drawings for Cx Process related information and issue review comments directly to the Architect. Refer to Section 013300 for procedures.

B. The Contractor shall provide one (1) copy of the approved Submittal Schedule to the Cx Authority. The Cx Authority will identify which Submittals are Commissioning related.

C. Contractor shall provide one (1) copy of each Commissioning related Submittal / Shop Drawing to the Cx Authority at the time of submission to the Architect.

D. Contractor shall include approval/sign off by the Testing, Adjusting, and Balancing sub-contractor on the coordination drawings.

3.3 REQUEST FOR INFORMATION (RFI)

A. The Commissioning Authority will review each RFI for Commissioning related information and issue comments directly to the Architect.

B. Contractor shall provide one (1) copy of each Request for Information to the Cx Authority at the time of submission to the Architect.

3.4 COMMISSIONING PROGRESS MEETINGS

A. The Commissioning Authority will conduct periodic Cx Progress Meetings throughout the construction phase of the project. Commissioning Team Members are required to attend these meetings.

B. The purpose of conducting Cx Progress Meetings separate from the regular job progress meetings is to focus on the Commissioning Process activities status, schedule and issues.

C. Commissioning Team Meetings shall include, but not be limited to:

1. Commissioning Kick Off Meeting – 1 meeting

2. Commissioning Progress
   a. At a minimum, Cx Progress meetings shall commence 8 weeks prior to anticipated start of functional testing and continue weekly through the end of construction.

3. Project Closeout – 4 meetings

D. The Cx Authority will conduct these meetings, record meeting minutes and distribute the minutes to all attendees with copies to appropriate entities.

3.5 QUALITY ASSURANCE TESTING

A. Contractor Field Testing:

1. The Commissioning Authority will receive one (1) copy of ALL Test Reports from the Contractor and assemble for record into the Commissioning Systems Manual.

B. Independent Testing:

1. The Commissioning Authority will receive one (1) copy of ALL Independent Testing Reports from the Contractor and assemble for record into the Commissioning Systems Manual.

C. Witnessing of Testing by Cx Authority:

1. Commissioning Authority shall be notified in advance of any Field or Independent Testing being performed. Refer to Section 014000.

3.6 SUBSTANTIATING SYSTEM READINESS

A. The Commissioning Authority will prepare and issue to the Contractor a Pre-Functional Checklist Form for each system or major piece of equipment to be Commissioned. Reference draft Pre-Functional Checklists

B. The Contractor shall complete each Checklist as required in Section 013200.

C. The Commissioning Authority will monitor and track the completion of the Pre-Functional Checklist Forms.
   1. The Pre-Functional Checklist Forms may be entered into a project progress tracking software tool in use on the project, such as BIM360, at the discretion of the Cx Authority. The Contractor shall familiarize himself with the use of such a tool.

3.7 OPERATION & MAINTENANCE DATA

A. The Commissioning Process has special requirements on compiling and submitting Operation and Maintenance Data. O&M Data are required to be submitted to the Cx Authority 14 days after receipt of the approved submittal from the Architect.

B. Operation & Maintenance data shall be distributed to facilities personnel at each training session.

C. The Cx Authority will compile this information into the Project “Systems Manual” which may be used during Training Sessions.

D. Refer to Section 017800 for requirements.

3.8 FUNCTIONAL PERFORMANCE TESTING

A. The Commissioning Authority will develop the Functional Performance Test Procedures to be used on the systems being Commissioned. The test procedures will be submitted to the Contractor in advance of scheduled performance testing to give the Contractor and Subcontractors time to review the procedures and make comments or suggest revisions. Reference draft Functional Performance Test Procedures

B. The Commissioning Authority will oversee and document results of all Functional Performance Testing Procedures required for equipment and systems to be Commissioned.

C. The Contractor shall provide all testing instruments and all skilled labor required to conduct the Functional Test Procedures. The Commissioning Authority will attend all Functional Test Procedures and record all results on the Functional Test Procedure Form.

D. Functional Performance Testing shall be completed as a pre-requisite for Substantial Completion. Contractor shall include sufficient time in the project schedule, and shall be responsible for any costs incurred from off hours work or additional man power required to complete functional testing in a compressed time frame.

3.9 CORRECTIVE ISSUE REPORT (CIR)

A. The Commissioning Authority will document deficiencies discovered during Functional Performance Testing of systems on a Corrective Issue Report. The Cx Authority will then forward this form to the Contractor for action in correcting the deficiency.

1. If an issues tracking software is used for the project, the Cx Authority will enter deficiencies into the software.

B. When the deficiency has been corrected, the Contractor shall note action taken and return the Corrective Issue Report to the Commissioning Authority.

1. If an issues tracking software is used for the project, the Contractor shall note action taken in the software and notify the Cx Authority when deficiency has been resolved.

C. An updated CIR shall be distributed at each commissioning progress meeting, where progress to resolution will be reviewed

3.10 OWNER TRAINING

A. All training sessions shall be coordinated through the Commissioning Authority. The Cx Authority will prepare a Training Form for each Training Session required by the Contract Documents and issue to the Contractor. The Training Forms shall be used to schedule, perform and document the required training sessions.

B. A summary list of all anticipated training exercises to be provided is to be submitted for review by the Contractor and updated throughout the project as required. Initial submittal should be made no later than the mid point of construction, well in advance of any system turnover / training activities. All systems, sub-systems and equipment packages that will have manufacturer, vendor, or contractor demonstration or training exercises are to be listed with anticipated dates and duration. These events will be tracked and updated by the CxA and reported to the Commissioning Team as they are executed.

C. The Contractor shall conduct a minimum of two (2) training sessions for each required system. Training sessions will he scheduled early morning and mid-afternoon so all maintenance shifts can attend a session.

D. After each Training Session is completed, the Cx Authority will issue an Evaluation Form to each of the Attendees. This feedback information will be provided to the Owner and Architect for review.

E. Training Instructors shall be a Manufacturer’s Representative or Applications Engineer fully qualified in the operation, troubleshooting and maintenance procedures for the equipment or systems being covered. Sales Representatives or others possessing only general knowledge of the equipment or systems will not be acceptable.

F. The following format shall be used to schedule, perform, document and evaluate the required training sessions:

1. The Contractor shall submit a separate Training Form for each training session required by the Contract Documents to the Commissioning Authority. This form shall be submitted a minimum of fourteen (14) calendar days in advance of the proposed training session.

2. The Contractor shall complete the first section of the form including the proposed training session date, name of instructor(s), and proposed length (time) of the session(s). Also, attach an Agenda indicating the training session format and listing any handouts that will be provided.

3. The Commissioning Authority will then review the proposed training information with the Owner. If the submitted information is complete and the proposed dates meet the Owner's Operations Personnel schedule, the Commissioning Authority will respond to the Contractor to proceed with scheduling the subject training session.

4. During the training session, the Contractor shall have all in attendance sign in the third section of the Training Form. Attach additional pages if necessary. The Contractor shall then forward the Training Form to the Commissioning Authority.

5. Upon receipt of the Training Form, the Commissioning Authority will have each of the attendees complete the Evaluation Form to gain feedback on the value of the session

    a. If the session meets the objectives and intent of the Contract Documents, the CxA will approve the training form and return to the Contractor for Project Records.

    b. If negative feedback is received, the Evaluation Forms will be reviewed with the Commissioning Team and if necessary, re-scheduling of the training may be required.

G. Operations & Maintenance Manuals and accurate As-built Drawings shall be submitted and approved by the Architect BEFORE any training sessions will be held. The As-built Drawings and O&M information will be reviewed and used as reference during training instructions.

H. Videotaping of ALL project training is required by a professional photographer.

3.11 DEFERRED, SEASONAL, AND OCCUPANCY PHASE COMMISSIONING

A. PFCs and FPTs shall be executed and documented during the Project's Construction, Testing, and Acceptance Phases, leading up to System Acceptance. The Occupancy/Warranty Phase occurs after System Acceptance.

B. If any check or test cannot be completed due to the building structure, phasing, required occupancy condition, or other deficiency, execution of the PFCs and FPTs may be delayed upon approval from the Owner. These tests will be conducted during the Occupancy phase, in the same manner as seasonal testing and as soon as possible.

C. During the Occupancy Phase, seasonal FPTs (tests delayed until ambient or occupancy conditions are closer to the system's design) shall be completed as part of this contract. The CxA shall coordinate this work in conjunction with the Owner and the Contractor. Tests will be executed, documented and deficiencies identified and corrected in the same manner as noted for the tests conducted during the Construction and Testing Phase. Any final adjustments to the O&M manuals and as-built documents due to this testing are the responsibility of the Contractors.

D. Ten months into the typical twelve-month warranty period, the Cx Authority will reconvene the Project Team to meet with the Owner or representative and other designated Owner's personnel. This meeting is intended to solicit the user comments, suggestions, and areas of concern regarding the systems and their first year of operation. The meeting will include review of any outstanding warranty, punchlist, or Cx issues for resolution by the Design Team and/or Construction Team and assignment of responsibility for resolution.

End of Section

SECTION 02 41 13

UTILITY LINE REMOVAL

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. The work under this Section shall consist of existing underground drainage pipes and utility lines, including associated items of work, as shown on the Plans and as specified herein

1.2 Related Work: The following items are not included in this Section and will be performed under the designated Sections:

A, 1. Section 310000 - EARTH MOVING

1.2 SUBMITTALS (Not Used)

1.3 QUALITY ASSURANCE

A. The Contractor shall perform Work in accordance with The Commonwealth of Massachusetts and the City of Framingham rules, regulations, laws and ordinances, and any other authorities having jurisdiction.

PART 2 – PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 DEMOLITION

A. The known existing drainage and utility pipelines are shown on the drawings in their approximate locations. Drainage and utility pipelines include but are not limited to reinforced concrete pipe (RCP), PVC, HDPE, ductile iron, cast iron, CMP, clay, etc.

B. Locate drainage pipes and utility lines to be removed.

C. Field verify, if required, the depth of the drainage pipes and utility lines to be removed.

D. Any active pipeline lines encountered by the Contractor during the construction activities shall be isolated by a method approved by the Engineer.

E. Excavate and remove the drainage pipes and utility lines at the locations shown on the plans or as directed by the Engineer. Sawcut the pipe and lateral connections, prior to removal, if the pipe is not removed at the joint.

F. Cap all pipe openings in accordance with the City of Framingham standards.

G. All excavated materials shall be removed and disposed of off City of Framingham property unless otherwise noted on the plans.

3.2 BACKFILL

A. Backfill is not included in this section and shall be performed as required by the plans and requirements of Section 31 00 00 – EARTH MOVING.

END OF SECTION

Section 02 41 17
BUILDING DEMOLITION

PART 1 – GENERAL

1.1 GENERAL PROVISIONS

A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

1.2 SUMMARY

A. The work of this Section consists of building demolition where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following:

B. Demolition, clearing, removal and legal disposal of the following:

1. Existing designated structures, foundations and slabs-on grade.
2. Removal of unsuitable or extraneous materials not marked for salvage, such as abandoned furnishings and equipment, and debris such as rotted wood, rusted metals and deteriorated concrete.
    a. Abandoned furnishings and equipment include, but not limited to all loose and fixed furniture, tables, chairs, stools, desks, file cabinets, lockers, fixed and loose gym equipment, auditorium curtains/lighting and associated rigging, bleachers, computers, printers, copiers, shop machinery, kitchen equipment. Contractor shall assume all existing furnishings and equipment remaining in building will be required to be removed and legally disposed of. Any and all costs associated with the demolition, removal and disposal shall be included within the Contractor's base bid.
    b. The Owner will not accept any additional costs associated with the demolition, removal and disposal scope of work.

C. Identify locations of utilities for work of other sections.

1.3 RELATED REQUIREMENTS

A. Utility shutoffs by respective trades.

B. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.

C. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Special administrative and procedural requirements related to LEED VERSION 4 FOR BUILDING DESIGN AND CONSTRUCTION" (LEED V4 BD+C) certification goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

D. Division 31 - EARTHWORK:

1. Erosion and sediment control.
2. Backfilling of open pits remaining after demolition.

1.4 REFERENCES

A. Reference Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
   1. ANSI A10.6 – Safety Requirements for Demolition Operations.
   2. NFPA 241 – Standard for Safeguarding Construction, Alteration, and Demolition Operations.

B. General References The following reference materials are hereby made a part of this Section by reference thereto:
   1. Massachusetts Department of Conservation and Recreation, “Asian Longhorn Beatle Quarantine” regulatory requirements.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Comply with all requirements of this contract relative to protection, scheduling and coordination with the Owner.
   2. Hazardous materials are not expected to be encountered. If hazardous materials are encountered, the CONTRACTOR shall immediately stop work and immediately notify the owner’s representative and Architect and wait for further direction. Hazardous materials shall be handled, removed, and disposed of in accordance with all regulatory agency requirements.

B. Pre-Demolition Meeting: At least two weeks prior to commencing the work of this Section, conduct a pre-demolition conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.
   1. Required attendees: Architect, General Contractor’s project manager and on-site superintendent, demolition subcontractor’s project superintendent, and representatives of related utility trades.
   2. Agenda:
      a. Scheduling of demolition operations. Review critical demolition sequencing with other work.
      b. Coordination of utility service requirements and disconnects.
         1) Review functioning utility services which are to remain in service throughout demolition work.
         2) Review requirements for marking location of disconnected utilities, and project record (as-built) requirements.
      c. Review of site use and staging locations.
         1) Review of storage locations for salvaged materials and materials for recycling program.
      d. Procedures for processing field decisions.

e. Procedures for handing hazardous materials.

f. Procedures for protection of general public from demolition operations.

g. Establish weather and working temperature conditions to which Architect and Contractor must agree.

h. Review potentially hazardous operations and fire protection procedures.

i. Review general safety regulations and requirements for demolition work.

1.6 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Schedule: Within 7 days after receiving the Notice to Proceed and prior to commencement of work, prepare a schedule indicating proposed methods and sequence of operations for demolition work. Include coordination for shut-off, capping, together with details for dust and noise control protection.

a. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's ongoing on-site operations. Receive acceptance from Architect prior to commencing work.

2. Design Data: Submit calculations for bracing and shoring, signed and sealed by professional engineer.

3. Permits: Submit copy of permits required by regulatory agencies for demolition and sidewalk and street closings

4. Special Procedure Submittals: Submit copies of written agreements from private landowners, landfill operators, or other agencies accepting disposal of demolished materials at least two weeks prior to commencement of demolition work.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Record Documentation: Indicate actual location of capped site utilities.

2. Sustainable Design Closeout Documentation: Submit all records for material donations, recycling and landfill disposal in accordance with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable codes for demolition work, safety of structure, dust control, and disposal of debris. Conform to procedures applicable when discovering hazardous materials or contaminated substances.

1. The Contractor is directed not to disturb or attempt removal of any discovered hazardous materials or contaminated substances. Immediately notify both the Owner and the Architect upon discovery of such conditions.

2. Removal or containment of the hazardous materials or contaminated substances shall be performed by an abatement specialist under separate contract with the Owner.

B. Obtain and pay for required permits and licenses prior to commencing demolition work. Arrange and pay for legal disposal of removed materials and equipment, obtain proper disposal receipts for verification.

C. Notify affected utility companies and Owner before starting work and comply with utility company requirements.

1.8 QUALITY ASSURANCE

A. General: Conduct the work in a manner giving prime consideration to protection of the public; protection from the weather, control of noise, shocks and vibration; control of dirt and dust; orderly access for and storage of materials; protection of existing buildings; protection of adjacent surfaces and property; coordination and cooperation with the Owner at all times.

1. Comply with all requirements of this contract relative to protection, scheduling and coordination with the Owner.

B. Qualifications:

1. Demolition subcontractor: Company specializing in performing work of this section with minimum 3 years documented experience.
2. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.
3. Shoring and bracing design: Design shoring, and bracing (if deemed required), under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

1.9 SITE CONDITIONS

A. Comply with wind and weather conditions established at pre-demolition meeting.

1.10 SEQUENCING AND SCHEDULING

A. Coordinate and arrange with mechanical and electrical trades for their disconnecting, rerouting and maintenance of existing services leading to adjacent occupied buildings, as part of the work of this Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Pre-Bid Examination: It is recommended that contractors should visit the existing site prior to providing a bid for this work to fully understand the scope of demolition, removal and disposal required.

B. Verification of Conditions: Examine existing conditions and review Contract Documents prior to commencement of demolition.

1. Owner assumes no responsibility for actual condition of areas to be demolished.
   a. Notify both Owner and Architect, if any type of hazardous chemicals, gases, explosives, flammable material, unmarked containers, or similar dangerous substances are discovered. Cease work in affected areas until directed by Architect. Continue work in other areas.
2. Beginning of installation means acceptance of existing substrate and project conditions.

3.2 PREPARATION

A. Provide, erect and maintain temporary barriers as required to protect non-construction related pedestrian and vehicular traffic using the adjacent portions of the site.

1. If the structure to be demolished has been damaged by fire, flood, explosion, or some other cause, appropriate measures, including bracing and shoring of walls and floors, shall be taken to protect workers and any adjacent structures. It shall also be determined

B. Prevent movement of adjacent structures; provide required bracing and shoring.

C. Protect existing landscaping materials, structures, and appurtenances which are not to be demolished.

D. Protect and maintain conduits, drains, sewers, pipes, and similar utilities that are not to be demolished

3.3 DEMOLITION REQUIREMENTS

A. Conduct demolition to minimize interference with adjacent and occupied building areas, in compliance with governing laws and buildings, with prime consideration given to the safety, protection and convenience of the public and Owner's personnel.

B. Carefully observe existing structure during demolition operations, cease operations immediately if structure appears to be in danger. Notify Architect and do not resume operations until directed.

C. Maintain protected egress and access to the Work at all times. Provide safe passage of persons around surrounding demolition area in compliance with safety and regulatory requirements.

3.4 DUST CONTROL

A. Wet down debris to prevent air pollution by dust rising from demolition work. and to prevent fires caused by vandals. Provide hoses and water connections for this purpose.

B. Employ tarpaulins on trucks carrying debris to prevent spreading duct or debris. Clean up loose debris daily to prevent the wind spreading debris.

3.5 DEMOLITION

A. Disconnect, cap and identify designated utilities within demolition areas.

1. Cap and remove abandoned existing utilities back to locations indicated, or to limit line of Contract where terminations are not indicated.

a. Pipes to be demolished that require a connection shall be removed to the extent required to install the new connection. Remove ripe sections by saw-cutting, removing a complete pipe section to an existing joint, or other adequate means which results in a clean joint.

B. Demolish in an orderly and careful manner. Conduct demolition to minimize interference with adjacent structures

1. Blasting operations for demolition is not permitted under this Contract.
2. Cease operations immediately if adjacent structures appear to be in danger. Notify Architect, do no resume operations until directed.
3. Conduct operations with minimum interference to public or private accesses. Maintain protected egress and access at all times.
4. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon or limit access to their property.

C. Remove foundation walls and footings to a minimum of two feet beyond area of new construction.

D. Remove concrete slabs on grade.

E. Remove designated at-grade paving, curbs, gutters, sidewalks, access ramps, and driveways. Remove entirely to limits indicated, provide saw-cut where abutting existing-in-situ paving designated to remain.

1. Where adjacent pavement or concrete designated to remain is broken or deteriorated sufficiently to prohibit a sound replacement, remove the entire deteriorated section to limit determined by the Architect/Engineer.

F. As work progresses, regularly remove demolished materials from site, except salvaged materials as noted. Do not burn or bury materials on site, arrange for legal disposal of the same.

3.6 BACKFILL

A. Backfill areas excavated, open pits and holes caused as a result of demolition in accordance with Division 31 - EARTHWORK.

B. Rough grade and compact areas affected by demolition to meet adjacent site grades and contours, and to provide water flow to existing surface drainage structures, or as otherwise shown on the Drawings.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated or specified to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal, and specified waste diversion goals.
2. As work progresses, regularly remove demolished materials from site. Do not allow demolished materials to accumulate on-site, except as required for materials determined to be reused, salvaged, or as required for waste segregation and diversion for recycling.
3. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
4. Liquid Waste Management: Dispose of liquid waste in accordance with all applicable regulations. Consult all regulations (federal, provincial, state, local,.) or a qualified waste disposal firm when characterizing waste for disposal. Contact manufacturer for MSDS sheets for product information, and

recommendations for proposal disposal. Utilize licensed waste disposal companies as may be required, the following phone numbers for national companies are provided for the Contractor's convenience only.

a. Safety Kleen 1-888-217-7859.

b. Clean Harbors 1-800-444-4244.

c. Phillip Services 1-888-655-4331.

B. Do not burn or bury demolished materials on site, arrange for legal disposal of the same.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

1. Comply with waste management reporting requirements on forms acceptable to the Owner.

2. Record the amount (in tons or cubic yards) of material landfilled from the Project, the identity of the landfill, the total amount of tipping fees paid, transportation costs (if separate) and the total disposal cost. Include manifests, weight tickets, receipt, and invoices

3.8 CLEANING

A. Daily cleaning: Sweep all street and roads affected by demolition operations.

B. Upon completion of the work of this Section; remove unused tools and equipment, surplus materials, rubbish, debris, and dust. Leave area in raked or broom-clean condition, as appropriate.

C. Upon completion of the work of this Section; clean adjacent structures and facilities of dust, dirt and debris caused by demolition work to the satisfaction of Owner, owner(s) of adjacent properties, and authorities having jurisdiction.

End of Section

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SECTION 02 82 13
ASBESTOS ABATEMENT

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Remove, encapsulate, or otherwise abate asbestos-containing materials (ACM) as described herein.

B. Dispose all ACM in accordance with governing laws and regulations; pay costs of permits and disposal.

C. Caution: asbestos-containing materials quantities as presented in Section 3.09 and as detailed in Table of Asbestos-Containing Materials to be Abated are for reference purposes only. It is the explicit responsibility of the Contractor to fully review the Site Plans and determine actual quantities and base the bidding on Contractor's verified quantities. Based on the Consultant's limited survey methods, no allowances for additional materials will be granted, except for materials that are clearly hidden behind fixed walls, above fixed ceilings, under fixed floors or otherwise were not or could not have been identified, e.g.; no visible pipe or conduit penetrations into said structure giving indication of a continuation of hazardous materials.

1.03 RELATED WORK

A. Related Sections:
1. Section 028313, Hazardous Materials Handling and Removal

1.04 CODES, REGULATIONS, AND STANDARDS - ASBESTOS ABATEMENT

A. Federal Requirements that govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:

1. OSHA: U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA), including but not limited to:
   a. Respiratory Protection: Title 29, Part 1910, Section 134 of the Code of Federal Regulations
   b. Construction Industry: Title 29, Part 1926, of the Code of Federal Regulations
   c. Hazard Communication: Title 29, Part 1910, Section 1200 of the Code of Federal Regulations

2. DOT: U.S. Department of Transportation, including but not limited to:
   a. Hazardous Substances: Title 29, Part 171 and 172 of the Code of Federal Regulations

3. EPA: U.S. Environmental Protection Agency (EPA), including but not limited to:
   a. Asbestos Abatement Projects; Worker Protection Rule: Title 40 Part 763, Sub-part G of the Code of Federal Regulations

b. Asbestos Hazard Emergency Response Act (AHERA) Regulation: Asbestos Containing Materials in Schools Final Rule & Notice, Title 40, Part 763, Sub-part E of the Code of Federal Regulations
c. Training Requirements of (AHERA) Regulation: Asbestos Containing Materials in Schools Final Rule & Notice, Title 40, Part 763, Sub-part E, Appendix C of the Code of Federal Regulations
d. National Emission Standard for Hazardous Air Pollutants (NESHAPS): National Emission Standard for Asbestos, Title 40, Part 61, Sub-part A, and Sub-Part M (Revised Sub-Part B) of the Code of Federal Regulations

B. State Requirements that govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:

1. Department of Environmental Protection (310 CMR 7.00) Latest Version

2. Department of Labor Standards (453 CMR 6.00—The Removal, Containment or Encapsulations of Asbestos

3. Department of Transportation

C. Local requirements that govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:

1. Framingham Building Inspector (project notification)

2. Framingham Police Department (project notification)

3. Framingham Fire Department (project notification)

D. Standards:

1. General Applicability of Standards: Except to the extent that more explicit or more stringent requirements are written directly into the Contract Documents, all applicable standards have the same force and effect (and are made a part of the Contract Documents by reference) as if copied directly into the Contract Documents, or as if published copies are bound herewith. All work under this contract shall be done in strict accordance with all applicable Federal, State, and local regulations, standards and codes governing asbestos abatement, and any other trade work done in conjunction with the abatement. All applicable codes, regulations and standards are adopted into this specification and will have the same force and effect as this specification.

2. The most recent edition of any relevant regulation, standard, document or code shall be in effect. Where conflict among the requirements or with these specifications exists, the most stringent requirement(s) shall be utilized.

3. Contractor Responsibility: The Contractor shall assume full responsibility and liability for the compliance with all standards pertaining to work practices, hauling, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Asbestos Abatement Contractor (Contractor) shall assume full responsibility and liability for compliance with all applicable Federal, State and Local regulations related to any and all aspects of the asbestos abatement project. The Contractor is responsible for providing and maintaining training, accreditations, medical exams, medical records, personal protective equipment (PPE) including respiratory protection including respirator fit testing, as required by applicable Federal, State and Local regulations. The Contractor

shall hold the Owner and consultants harmless for any Contractor's failure to comply with any applicable work, packaging, transporting, disposal, safety, health, or environmental requirement on the part of himself, his employees, or his subcontractors.

4. Standards that apply to asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following ANSI and ASTM standards.

5. American National Standards Institute (ANSI), 1430 Broadway, New York, New York 10018, (212) 354-3300
   a. Fundamentals Governing the Design and Operation of Local Exhaust Systems, Publication Z9.2-79
   b. Practices for Respiratory Protection Publication Z88.2-80

6. American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA 19103, (215) 299-5400
   a. Safety and Health Requirements Relating to Occupational Exposure to Asbestos, ASTM E 849-82

7. Occupational Safety and Health Administration (OSHA)
   1. Title 29 CFR 1926 - Construction Standard Requirements - Demolition Work
   2. Title 29 CFR 1910.38(a);(b) - Emergency Action Plan
   3. Title 29 CFR 1910.132 - Personal Protective Equipment
   4. Title 29 CFR 1910.20 - Access to Employee Exposure and Medical Records
   5. Title 29 CFR 1910.1200 - Hazard Communication
   6. Title 29 CFR 1910.151 - Medical and First Aid

E. EPA Guidance Documents: Discuss asbestos abatement work or hauling and disposal of asbestos waste materials listed below for the Contractor's information only. These documents do not describe the work and are not a part of the work of this contract. EPA maintains an information number (800) 334-8571, publications can be ordered from (800) 424-9065 (554-1404 in Washington, DC):

1. Guidance for Controlling Asbestos-Containing Materials in Buildings (Purple Book) EPA 560/5-85-024.

2. Title 40 CFR 61 Subpart A and M (Revised Subpart B) - National Emission Standard for Hazardous Air Pollutants - Asbestos.

3. Title 40 CFR 763 - Asbestos Hazard Emergency Response Act (AHERA) and Asbestos School Hazard Abatement Reauthorization Act (ASHARA).

2. Asbestos in Buildings: Guidance for Service and Maintenance Personnel. EPA 560/5-85-018.

3. Asbestos Waste Management Guidance. EPA 530-SW-85-007.

4. A Guide to Respiratory Protection for the Asbestos Abatement Industry. EPA-560-OPTS-86-001.

F. Posting and Filing of Regulations: Post all notices required by applicable federal, state and local regulations. Maintain two (2) copies of applicable federal, state and local regulations and standard. Maintain one copy of each at job site. Keep on file in Contractor's office one copy of each.

1.05 DEFINITIONS AND STANDARDS - ASBESTOS ABATEMENT

Definitions and explanations here are neither complete nor exclusive of all terms used in the contract documents but are general for the work to the extent they are not stated more explicitly in another element of the contract documents. Drawings must be recognized as diagrammatic in nature and not completely descriptive of the requirements indicated therein.

A. Air Lock: A mechanism or system of enclosures within the decontamination facility that does not allow air movement between clean and contaminated areas. Consists of three-foot wide space between each of the sections of the decontamination chamber segregated by full polyethylene barriers.

B. Amended Water: Water to which a surfactant has been added to decrease the surface tension to 35 or less dynes.

C. Asbestos: The asbestiform varieties of serpentine (Chrysotile), riebeckite (crocidolite), cummingtonite-grunerite, anthophyllite, and actinolite-tremolite. For purposes of determining respiratory and worker protection both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered as asbestos.

D. Asbestos-Containing Material (ACM): Any material containing 1% or greater asbestos by weight of asbestos of any type or mixture of types.

E. Asbestos-Containing Waste Material: Means any ACM removed during a demolition or renovation project and anything contaminated with asbestos in the course of a demolition or renovation project including, but not limited to, asbestos waste from control devices, bags or containers that previously contained asbestos, contaminated clothing, materials used to enclose the work area during the demolition or renovation operation, and demolition or renovation debris. This definition shall also include ACM on and/or in facility components that are inoperable or have been taken out of service and any ACM that is damaged or deteriorated to the point where it is no longer attached as originally applied or is no longer serving the intended purpose for which it was originally installed.

F. Asbestos debris: Pieces of ACM or ACBM that can be identified by color, texture, or composition, or means dust, if the dust is determined by an accredited inspector to be ACM.

G. Authorized Visitor: The Owner, the Owner's Technical Representative, testing lab personnel, the Architect/Engineer, emergency personnel or a representative of any federal, state and local regulatory or other agency having authority over the project.

H. Barrier: Any surface that seals off the work area to inhibit the movement of fibers.

I. Breathing Zone: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.

J. Ceiling Concentration: The concentration of an airborne substance that shall not be exceeded.

K. Decontamination Facility: A series of interconnected chambers, typically segregated by polyethylene barriers, that is used as the only means of worker ingress/egress to the work area. Interlocking barriers prevents contamination of areas outside the work area.

L. Disposal Bag: A properly labeled 6-mil thick leak-tight plastic bags used for transporting asbestos waste from work and to disposal site.

M. Encapsulant: A material that surrounds or embeds asbestos fibers in an adhesive matrix, to prevent release of fibers.

1. Bridging Encapsulant: An encapsulant that forms a discrete layer on the surface of an in-situ asbestos matrix.

2. Penetrating Encapsulant: An encapsulant that is absorbed by the in-situ asbestos matrix without leaving a discrete surface layer.

N. Encapsulation: Treatment of asbestos-containing materials, with an encapsulant.

O. Equipment Room: A contained room or chamber positioned immediately contiguous to the contaminated work area environment used for removal of protective clothing and decontamination of equipment.

P. Friable Asbestos-Containing Material: Any ACM, that, when dry, can be crumbled, shattered, pulverized or reduced to powder by hand pressure or any non-friable ACM that has been subject to sanding, grinding, cutting, or abrading or has been crumbled, shattered or pulverized by mechanical means such as, but not limited to, the use of excavators, bull dozers, heavy equipment or power and or hand tools.

Q. HEPA Filter: A High Efficiency Particulate Air (HEPA) filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 microns in diameter.

R. HEPA Filter Vacuum Collection Equipment (or vacuum cleaner): High efficiency particulate air filtered vacuum collection equipment with a filter system capable of collecting and retaining asbestos fibers. Filters should be of 99.97% efficiency for retaining fibers of 0.3 microns or larger.

S. Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.

T. Negative Pressure Ventilation System: A pressure differential and ventilation system.

U. Personal Monitoring: Sampling of the asbestos fiber concentrations within the breathing zone of an employee.

V. Pressure Differential and Ventilation System: A local exhaust system, utilizing HEPA filtration capable of maintaining a pressure differential within the inside of the Work Area at a lower pressure than any adjacent area, and which cleans recirculated air or generates a constant air flow from adjacent areas into the Work Area.

W. Protection Factor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.

X. Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.

Y. Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

Z. Time Weighted Average (TWA): The average concentration of a contaminant in air during a specific time period.

AA. Visible Debris: Any visually detectable particulate residue such as dust, dirt, or other extraneous material that may or may not contain asbestos.

BB. Visible Emissions: Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.

CC. Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos-contaminated waste.

DD. Work Area: The area where asbestos-related work or removal operations are performed which is defined and/or isolated to prevent the spread of asbestos dust, fibers or debris, and entry by unauthorized personnel. Work area is a Regulated Area as defined by 29 CFR 1926.

1.06 STOP WORK

A. If the Owner's Technical Representative presents a written stop work order signed by the Owner, stop abatement work immediately. Do not recommence work until authorized in writing by the Owner.

1.07 SUBMITTALS

Submit the following for the Owner's Technical Representative’s Information:

A. Telephone numbers and location of emergency services.

B. Develop an Alternate Work Practices Plan for exterior vapor barrier behind brick façade and roofing.

C. The Contractor shall notify in writing, the local fire and police departments of proposed asbestos abatement work. Advise the fire department of the nature of the asbestos abatement work, and the necessity that all firefighting personnel who may enter the work site in the case of fire wear self-contained breathing apparatus (SCBA). In writing, provide one copy of the notices to the Owner prior to commencing the project.

D. Resume of Supervisor for asbestos abatement.

E. Submit to the Asbestos Project Designer required permits, site location, and arrangements for transport and disposal of ACM or asbestos-contaminated materials.

F. Submit current certifications required under MGLC.149 S 44D and 453 CMR Part 6.00 to the Asbestos Project Designer for approval at least 10 business days prior to the project start.

G. Submit a valid copy of the Contractor’s Commonwealth of Massachusetts’s Asbestos Abatement Contractor’s License.

H. Submit a copy of the written respirator program to the Asbestos Project Designer.

I. Submit manufacturer's information that vacuums, ventilation equipment, and other equipment required to contain airborne asbestos fibers conform to ANSI Z9.2.

J. Submit a detailed plan of the work procedures to be used in ACM abatement. Such plan shall include location of asbestos control areas, decontamination units, layout of decontamination units, location of access routes to asbestos control areas, interface of other trades involved in the building construction, sequencing of asbestos-related work, disposal plan, type of wetting agent and asbestos encapsulant to be used, air monitoring, and a detailed description of the method to be employed to control air or water pollution. Expand upon the use of portable HEPA ventilation system, closing out of the building’s HVAC system, method of removal to prohibit visible emissions in work area, and packaging of removed asbestos debris. This plan must obtain written approval from the Architect prior to the start of asbestos work.

K. Permit: Submit evidence that asbestos waste transporter maintains a current "Industrial waste hauler permit" specifically for asbestos-containing materials, as required for transporting of asbestos-containing materials waste to a disposal site.

L. Waste disposal: Submit name, address, telephone number and asbestos waste permit information for landfill where asbestos waste will be disposed.

M. Submit to the Asbestos Project Designer and Owner's Project Manager the design of the negative pressure system. Do not begin work until the submittal is approved by the Asbestos Project Designer. Include in the submittal at a minimum:

(a) Number of negative air machines required and the calculations necessary to determine the number of machines required to provide four air changes per hour.

(b) Description of projected airflow within the work area and methods required providing adequate airflow in all portions of the work area.

(c) Manufacturer's product data and certifications for the machines to be used.

(d) Location of machines in the work area.

N. Accreditation and Certification: submit evidence in form of training course certificate of accreditation of Supervisor as an asbestos abatement supervisor and Workers as asbestos abatement workers. Also, submit applicable Massachusetts Department of Labor Standards (MA DLS) personnel certifications. All personnel must carry certifications on-site. Personnel without such certificates may not perform any functions related to asbestos abatement. Provide proof of training compliance with requirements as specified US EPA and OSHA.

O. Submit to the Asbestos Project Designer a description of the plans for decontamination enclosure system construction and for work area isolation in compliance with this technical specification and applicable regulations.

P. Submit a copy of a valid insurance certificate to conduct asbestos abatement work in the Commonwealth of Massachusetts.

Q. Five days before removing asbestos materials, contractor shall inventory the quantity of asbestos materials in each area of work and submit the quantity for written approval to the Owner's Technical Representative. It shall include the location, date, quantity of asbestos material, and name of the authorized person conducting the quantification. The Owner's Air Monitoring Technician shall verify all asbestos material quantification before work is begun. No claims for additional materials will be considered without performing this inventory and submitting it within the proper time to the Owner's Technical Representative.

1.08 NOTIFICATIONS

A. Notify other entities at the job site of the nature of the asbestos abatement activities, location of asbestos-containing materials, requirements relative to asbestos set forth in these specifications and applicable regulations.

B. Notify emergency service agencies including fire, ambulance, police or other agency that may service the abatement work site in case of an emergency. Notification is to include methods of entering work area, emergency entry and exit locations, modifications to fire notification or fire fighting equipment, and other information needed by agencies providing emergency services.

C. Notifications of Emergency: Any individual at the job site may notify emergency service agencies if necessary, without effect on this Contract or the Contract Sum.

D. Notify federal, state, and local agencies having jurisdiction over the work including:

1. Environmental Protection Agency: In Massachusetts, the notification sent to the Massachusetts Department of Environmental Protection for asbestos removal will be sufficient to meet the EPA notification requirement under the National Emission Standards for Hazardous Air Pollutants (NESHAPS) Asbestos Regulations (40 CFR 61 Subpart M).

2. State and Local Agencies: Send written notification and pay fees, as applicable, as required by state and local regulations prior to beginning any work on asbestos-containing materials. In Massachusetts, notify the Department of Environmental Protection and MA DLS within 10 working days of beginning any asbestos abatement.

Notify the local Building Inspector, Fire Department and Police Department within 10 days of beginning any asbestos abatement.

1.09 QUALITY ASSURANCE

A. Licenses: The Contractor conducting asbestos abatement activities must maintain current licenses as required by applicable state or local jurisdictions for the removal, transporting, disposal or other regulated activity relative to the work of this contract, including a MA DLS license as an Asbestos Abatement Contractor.

B. Certifications: All personnel conducting asbestos abatement activities shall be certified by the MA DLS as Asbestos Abatement Workers and Asbestos Abatement Supervisors, as applicable, to their role on the project. AHERA Accreditation: workers who conduct asbestos abatement work on friable ACM, are to be accredited as Abatement Workers as required by the AHERA regulation 40 CFR 763 Appendix C to Subpart E, April 30, 1987.

C. Continuously monitor and record the pressure differential between the Work Area and the building outside of the Work Area with a monitoring device.

1.10 PROJECT/SITE CONDITIONS

A. The disturbance or dislocation of ACM may cause asbestos fibers to be released into the building's atmosphere, thereby creating a potential health hazard to workers and building occupants. Thus, to prevent ACM from becoming a hazard, the Contractor shall abate the ACM in the proper sequence of the project before the materials are disturbed by any renovation or demolition. Apprise all workers, supervisory personnel, subcontractors and consultants who will be at the job site of the seriousness of the hazard and of proper work procedures that must be followed.

B. Where in the performance of the work, workers, supervisory personnel, subcontractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of any identified asbestos-containing materials, take appropriate precautionary measures as necessary to protect all building occupants from the potential hazard of exposure to airborne asbestos. Do not allow asbestos or suspect asbestos materials to be disturbed or cause dust to be created. Stop work activities immediately if any suspect material is encountered and notify the Owner's Technical Representative so testing may be conducted, if necessary, to determine the material's asbestos content. Additional measures shall include the procedures and methods described herein, and compliance with regulations of applicable federal, state and local agencies.

1.11 SCHEDULING

A. Asbestos abatement schedule shall be determined at a later date. Contractor shall assume that all work will be conducted during normal business hours unless otherwise indicated.

1.12 OWNER'S TESTING

A. The Owner's Technical Representative will perform area air monitoring specified in this Article to verify that the engineering controls and work practices are not eliciting airborne asbestos fibers.

1. This Article also sets forth airborne fiber levels both inside and outside the work area as action levels, and describes the action required by the Contractor if an action level is met or exceeded.

2. Analytical Methods: The following method will be used by the Owner's Testing and Inspection Agency in analyzing filters used to collect area air samples. Sampling rates may be varied from printed standards to allow for high volume sampling.
   a. Phase Contrast Microscopy (PCM) will be performed using the NIOSH 7400 method. This analysis will be carried out at the job site.
   b. Transmission electron microscopy (TEM), if timelier.

B. Air monitoring required by OSHA is work of the Contractor and is not covered in this section.

C. Area Air Monitoring: The purpose of the Owner's Technical Representatives area air monitoring during abatement work is to detect faults in the engineering controls and or work practices.

1. Schedule of Air Samples: The number and volume of air samples taken and analytical methods used by the Owner's Technical Representative will be in accordance with the following schedule. Sample volumes given may vary depending upon the analytical instruments used. Owner's Technical Representative shall collect area air samples adjacent to the exclusion zone at roof level, 1 sample at ground level and 1 sample within the building on the upper floor directly below the work area. Samples shall be collected every 4 hours and analyzed immediately on site to determine for elevated airborne fiber concentrations.
   1) Analysis: Fibers on each filter will be measured using the NIOSH Method 7400 entitled "Fibers" published in the NIOSH Manual of Analytical Methods, 3rd Edition, Second Supplement, August 1987.
   2) Fibers referred to in this section include fibers regardless of composition as counted by the phase contrast microscopy method used.

2. Area Air Samples: If any area air sample taken outside of the Work Area exceeds 0.01 fibers/cc, immediately and automatically stop work to initiate corrective action. The Owner's Technical Representative will determine the source of the high reading and so notify the Contractor.
   a. If the high reading was the result of a failure of Work Area isolation measures initiate the following actions:
      1) Decontaminate the affected area in accordance with the requirements of Part 3.06 of this Section.
      2) Collect and package all affected polyethylene sheeting for disposal as ACM waste. Then HEPA vacuum general area and place new polyethylene sheeting at base of wall extending outward 10' to 15'
   b. If the high reading was the result of other causes initiate corrective action as determined by the Owner's Technical Representative.

PART 2 - PRODUCTS

2.01 SHEET PLASTIC

A. Polyethylene Sheet: Provide flame-resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-Resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil thick, frosted or black as indicated.

B. Reinforced Polyethylene Sheet: Where plastic sheet constitutes the only barrier between the work area and the building exterior, provide translucent, nylon reinforced or woven polyethylene, laminated, flame resistant, polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mil thick, frosted or black as indicated.

2.02 MISCELLANEOUS MATERIALS

A. Duct Tape: Provide duct tape in 2" or 3" widths as indicated, with an adhesive that is formulated to stick aggressively to sheet polyethylene.

B. Spray Glue: Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.

C. Wetting Materials: For wetting prior to disturbance of Asbestos-Containing Materials use either amended water or a removal encapsulant:

1. Amended Water: Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the Asbestos-Containing Material and retardation of fiber release during disturbance of the material equal to or greater than that provided by the use of one ounce of a surfactant consisting of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with five gallons of water.

2. Removal Encapsulant: Provide a penetrating type encapsulant designed specifically for removal of Asbestos-Containing Material. Use a material which results in wetting of the Asbestos-Containing Material and retardation of fiber release during disturbance of the material equal to or greater than that provided by water amended with a surfactant consisting of one ounce of a mixture of 50% polyoxyethylene ester and 50% polyoxyethylene ether in five gallons of water.

D. Disposal Bags: Provide 6 mil thick leak-tight polyethylene bags labeled as required by Article 3.08 of this Section.

E. Fiberboard Drums: Provide heavy-duty leak tight fiberboard drums with tight sealing locking metal tops.

F. Paper board Boxes: Provide heavy-duty corrugated paperboard boxes coated with plastic or wax to retard deterioration from moisture. Provide in sizes that will easily fit in disposal bags.

2.03 PROTECTIVE CLOTHING:

A. Coveralls: Provide disposable full-body coveralls and disposable head covers (Tyvek or approved equal) and require that workers in the Work Area wear them. Provide a sufficient number for required changes, for workers in the Work Area.

B. Boots: Provide work boots with non-skid soles, and where required by OSHA, foot protection, for workers. Provide boots at no cost to workers. Paint uppers of boots red with waterproof enamel. Do not allow boots to be removed from the Work Area for any reason, after being contaminated with asbestos-containing material. Dispose of boots as asbestos-contaminated waste at the end of the work.

C. Hard Hats: Provide head protection (hard hats) as required by OSHA for workers, and provide 4 spares for use by Owner's Technical Representative, Project Administrator, and Owner.

Label hats with same warning labels as used on disposal bags. Require hard hats to be worn at all times that work is in progress that may potentially cause head injury. Provide hard hats of type with plastic strap type suspension. Require hats to remain in the Work Area throughout the work. Thoroughly clean, decontaminate and bag hats before removing them from Work Area at the end of the work.

D. Goggles: Provide eye protection (goggles) as required by OSHA for workers involved in scraping, spraying, or any other activity which may potentially cause eye injury. Thoroughly clean, decontaminate and bag goggles before removing them from Work Area at the end of the work.

E. Gloves: Provide construction grade work gloves to workers and require that they be worn at all times in the Work Area Do not remove gloves from Work Area and dispose of as asbestos-contaminated waste at the end of the work.

2.04 AIR PURIFYING RESPIRATORS

A. Filter Cartridges: Provide, at a minimum, HEPA type filters labeled with NIOSH and MSHA Certification for "Radionuclides, Radon Daughters, Dust, Fumes, Mists including Asbestos-Containing Dusts and Mists" and color coded in accordance with ANSI Z228.2 (1980). In addition, a chemical cartridge section may be added, if required, for solvents, in use. In this case, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH/MSHA Certification.

B. Do not use single use, disposable or quarter face respirators.

2.05 ADDITIONAL PROTECTIVE EQUIPMENT

A. Respirators, disposable coveralls, head covers, and footwear covers shall be provided by the Contractor for the Owner's Technical Representative, Project Administrator, and other authorized representatives who may inspect the job site. Provide two respirators and six complete coveralls and, where applicable, six respirator filter changes per day.

2.06 FALL PROTECTION EQUIPMENT

A. All fall hazards should be identified at work sites with the potential for elevated work. Once an elevated fall hazard has been recognized, an appropriate control measure must be selected. Priority should be given to elimination of the fall hazard over the use of fall protection equipment. Approved safety harnesses and shock-absorbing lanyards or self-retracting lifelines (SRLs) shall be worn by employees whose work exposes them to falls of greater than six (6) feet. Anchorage points for lanyards or SRLs should be located at a level no lower than the employee’s waist to limit the free fall distance to a maximum of 4 feet and to not allow the employee to contact the next lower work level, where practical. All fall protection devices should be used only in accordance with manufacturer’s recommendations. All fall protection devices shall be inspected daily before use. Any lifeline, harness, or lanyard actually subjected to in-service loading (a fall) should be immediately removed from service and not used again for employee fall protection. Anchor points and lanyards capable of supporting a minimum force of 5,400 pounds should be used. Employees who are required to wear fall protection must be trained in the use of the equipment, as well as in fall protection work practices.

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PART 3 – EXECUTION

3.01 SCOPE OF WORK:

Material to be removed: materials previously-identified are located in the below table. The Contractor shall be responsible for selective demolition to locate hidden and inaccessible materials and providing unit prices for abatement of such materials prior to abatement.

3.02 MEASUREMENT AND PAYMENT

The Asbestos Project Monitor and Contractor shall record daily the ACM quantities abated. At the completion of the project, if quantities removed are less than those listed in the below table, the Contractor is to issue a credit to the Owner, based on Unit Prices listed in the Bid Form, or will be paid at the same Unit Prices should the quantities abated be greater than the quantities listed in the below table.

Material Description	NESHAP Cat.	Location	Est. Quantity	Units
Pipe Fittings and Insulation	Cat. 2 Friable ACM	Behind Walls, Crawlspace etc.	16,000	LF
Roof Drain Insulation	Cat. 2 Friable ACM	A-24, B-8, B-18, B-15A, B-20, B-22, B-28, B-46, C-8, C-27, C-22, C-09, C-15, D-31, D-16, D-29, D-33	450	LF
Gaskets	Cat I. Non Friable ACM	On Steam and Hot Water Lines and Valves, Crawlspace	250	EA
Round Light Gaskets	Suspect ACM, Not Sampled	Round Lights in Boiler Room Area	30	EA
ACM Debris on Soil	Cat. 2 Friable ACM	Dirt Floor of Crawlspace	10	CY
Vibration Isolators on HVAC	Cat. 2 Non Friable ACM	Crawlspace, HV-1, HV-2, HV-3, HV-4, HV-5, HV-6, HV-7, HV-8, HV-9, HV-10, HV-11, HV-12, HV-13, HV-14, A-21, B-1A, B-26, C-13, D-9	60	EA
9"x9" Floor Tiles and associated Mastic	Cat 1. Non Friable ACM	Throughout, Halls Outside Auditorium and Locker Rooms, Halls outside C-14, B-32, B-35, B-37, B-39, A-8, C-1, B-1, Select Classrooms	108,000	SF
12"x12" Tan With Dark Tan Mottles and Red Streaks Floor Tiles and Mastic	Cat. 1 Non Friable ACM	Library, Hallway Outside Locker Rooms, C Wing Classrooms, Main Office,	35,000	SF
Fire Curtain	Cat. 2 Non Friable ACM	Auditorium Stage	1	EA

Material Description	NESHAP Cat.	Location	Est. Quantity	Units
Fiber Reinforced Paneling	Cat. 2 Non Friable ACM	B-9 Lab Hood, D-31 Exhaust Vent, D-6 Upper Wall Vent	240	SF
Mastic Under Ceramic Floor Tile	Cat. 2 Non Friable ACM	Faculty Restroom, Boys Locker Room, Kitchen	5,800	SF
Slate Board Glue Daubs	Cat. 2 Non Friable ACM	Classrooms, Average 1 Older Per Classroom	180	EA
Interior Window Glaze	Cat . 2 Non Friable ACM	At Classrooms and Hall Intersection B Classrooms, C Classrooms, D Classrooms, 4x4 Chix Wire Windows	550	EA
Interior Window Glaze	Cat. 2 Non Friable ACM	Fancy Wood Framed Windows at Admin Offices, "A" Offices, Nurse, Library. 4x4, 8x4 and 2x4 Sections	150	EA
Black Sink Coating	Cat. 2 Non Friable ACM	Standard Sinks, B-5, Art, Nurses, Home Econmics, Science, Faculty	50	EA
Interior White-Gray Caulk	Cat. 2 Non Friable ACM	Between Steel Beams and CMU in Classrooms, Intermittent in Halls	2,800	LF
Interior Hard Yellow Caulk	Cat. 2 Non Friable ACM	Between Steel Beams and CMU 1/2 Wall Interior Side of Courtyard Near Main Office	380	LF
Black Mastic/Insulation	Suspect ACM, Not Sampled	Walk in Refrigerator and Freezer Coating	3	EA
Asbestos Board	Suspect ACM	1956 Drawing A-7 and A-25 depicts a note for ¼" asbestos board tucked between two courses of block transitioning from room to hallway at door transoms in the areas within the administration and library area and D-side locker areas and cafeteria.	1,500	SF
Exterior Gray Window Caulk	Cat. 2 Non Friable ACM	At Sides of Long Window Banks, Between Bank and Brick	400	LF
Exterior Window Glaze	Cat. 2 Non Friable ACM	Interior of Exterior Window Banks. Each Window Defined by Aluminum Frame above Solid Steel Panel. Sizes Range From 2'x2' to 10'x6'. Majority are 6'x4'. (Note Individual Panes of Glass Are Not a Window). Each Includes Interior and Exterior Glaze and any Other Components with Hidden Material.	480	Each

Material Description	NESHAP Cat.	Location	Est. Quantity	Units
Exterior Door Caulk	Cat. 2 Non Friable ACM	Exterior Doors	420	LF
Transite in Switch Gear	Cat. 2 Non Friable ACM	Switch Gear	50	SF
Remnant Foundation/Footing Coating	Cat. 2 Non Friable ACM	Subsurface	2,500	SF
Water Proofing	Suspect ACM	Under Boiler Room Floor Slab	1,800	SF
Mastic Behind Brick Facade	Suspect ACM	At Edges of Window Banks, Above Door and Window Lintels, Any Structural Steel Beams	3,500	SF
Subsurface Transite	Suspect ACM, Not Sampled	Not Seen - Contingency	500	LF

The quantities and locations of ACM as indicated on the drawings and the extent of work included in this section are estimated which are limited by the physical constraints imposed by occupancy of the buildings and accessibility to ACM. Accordingly, minor variations (+/- 5%) in quantities of ACM within the regulated area are considered as having no impact on contract price and time requirements of this contract. Where additional work is required beyond the above variation, the contractor shall provide unit prices for newly discovered ACM and those prices shall be used for additional work required under the contractor.

All quantities are approximate. The Contractor shall also be responsible for the review of the demolition drawings, notes and phasing configurations. The contractor must include in their bid the entire scope of work listed in the above table.

1. The Contractor shall provide limited demolition of walls, ceilings to access hidden spaces that may contain suspect ACM prior to abatement. This is because the survey was limited by building occupancy. The asbestos contractor shall remove identified ACM. Asbestos abatement shall be done with negative pressure enclosures. Contractor shall locate all and abate all ACM before removing containment. If Contractor fails to abate all ACM, then new containment will be set up at no cost to owner.

2. Fiberglass and non-ACM pipe insulation was identified at various locations at the Site. The Contractor shall protect the fiberglass and non-ACM insulations at no additional cost to the owner.
3. Multiple layers of floor tiles may exist, the unit price shall include floor tile, mastic, floor leveling compound, wood floor, hydraulic topping layer, carpet and carpet glue. Some floor tile is located under wood floors in select classrooms. All flooring to be removed to a clean substrate.
4. If applicable, Contractor shall remove and properly dispose the windows, curtain wall system, including, but not limited to, screens, windows, plywood, doors, metal panels, glass, glass blocks, frames, sashes, metal frames, casings, sills, louvers, unit vents grills, shims, fasteners, anchors, sealants, flashings (window wall system). Remove and properly dispose caulk/debris identified on the floor of the building exterior. A single windowpane is not a window. Windows are defined by all within the opening.
5. Residual ACM window caulk abatement shall be performed using HEPA attachments or wet removal methods. No visible emissions or residual debris shall be permitted.
6. ACM debris identified shall be abated and disposed as ACM at no additional cost to the Owner. If soil is impacted, Contractor shall remove up to 2” of soil within an area delineated by the Asbestos Project Monitor beyond depth of visible debris.
7. Dismantle, clean, remove and dispose of all boilers under full containment conditions due to likelihood of interior ACM such as millboard, packings, gaskets.
8. Contractor shall deliver the waste shipment records to the Owner within 35 days of when the waste leaves the Site, in accordance with NESHAPS.
9. The Contractor is responsible for ALL analytical testing for disposal. The analytical shall only be of the waste stream after removal from the building. No sampling of any medium for PCBs or other compounds is allowed.
10. The contractor is responsible for all containments, whether poly, wood, or other material as project conditions require.
11. Limitations during the survey prevented access to some rooms. Contractor shall investigate and locate all unforeseen ACM (behind walls or fixed ceilings) before air clearance and containment breakdown is initiated.

3.03 PREPARATION

A. Sequence of Work: Carry out work of this section sequentially. Complete each activity before proceeding to the next.

B. General:

1. The work of this part is required for the removal of all types of ACM, including both friable and nonfriable materials, unless otherwise noted.

2. Work Area: The location where asbestos-abatement work occurs. It is a variable of the extent of work of the Contract. It may be a portion of a room, a single room, or a complex of rooms. A “Work Area” is considered contaminated during the work and must be isolated from the balance of the building and decontaminated at the completion of the asbestos-control work.

3. Completely isolate the Exclusion Zone at roof level by erecting barrier warning tape and attaching asbestos warning signs every 50' to exclude unauthorized personnel from inadvertently entering the work area.

4. Erect barrier warning tape with asbestos warning signs every 50' directly below the work area. In addition, secure 6 mil polyethylene sheeting at the base of the building directly

below the work area(s) extending out 15' to catch any debris that may fall from the roof level.

5. Seal the exterior side of all windows and vents at the upper level with 6 mil polyethylene sheeting, secured with duct tape. In addition, seal any openings, vents, skylights at the roof level with 6 mil polyethylene sheeting.

6. Provide warning signs at each roof hatch or door leading to the roof reading as follows:

Legend	Notation
KEEP OUT	3" Sans Serif Gothic or Block
BEYOND THIS POINT	1" Sans Serif Gothic or Block
ASBESTOS ABATEMENT WORK	1" Sans Serif Gothic or Block
IN PROGRESS	1" Sans Serif Gothic or Block
BREATHING ASBESTOS DUST MAY BE HAZARDOUS TO YOUR HEALTH	14 Point Gothic

At exclusion zone barrier tape post an approximately 20-inch by 14-inch manufactured caution sign every 50' displaying the following legend with letter sizes and styles of a visibility required by 29 CFR 1926:

LEGEND

DANGER

ASBESTOS

CANCER AND LUNG DISEASE HAZARD
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED
IN THIS AREA

E. Alternate Methods of Enclosure: Alternate methods of containing the Work Area may be submitted to the Owner's Technical Representative for approval. Do not proceed with any such method(s) without approval of the Owner's Technical Representative.

F. Prepare Area:

1. Protect building and other surfaces in the Exclusion Zone from damage from water and high humidity and from contamination from asbestos-containing debris, slurry or high airborne fiber levels by covering with a primary barrier as described below.

2. Sheet Plastic: Utilize 6 mil reinforced fire-retardant polyethylene sheeting to cover surfaces in the exclusion zone.

   a. Cover **roof** from base of parapet wall extending out 10' with 2 layers of 6 mil reinforced fire-retardant polyethylene sheeting.

   b. Repair of Damaged Polyethylene Sheeting: Remove and replace plastic sheeting that has been damaged by removal operations or where seal has failed allowing water to seep between layers. Remove affected sheeting and wipe down entire area. Install new sheet plastic only when area is completely dry.

3.4 WORKER PROTECTION AND DECONTAMINATION PROCEDURES

A. The work of this part is required for the removal or other abatement of all types of ACM, including both friable and nonfriable materials unless otherwise noted.

B. Provide worker protection as required by the most stringent OSHA and/or EPA standards applicable to the work. The following procedures are minimums to be adhered to regardless of fiber count in the Work Area.

C. Each time Work Area is entered remove street clothes in the Changing Room of the Personnel Decontamination Unit and put on new disposable coverall, new head cover, and a clean respirator. Proceed through shower room to equipment room and put on work boots.

D. Require workers to adhere to the following personal decontamination procedures whenever they leave the Work Area:

1. When exiting area, remove disposable coveralls, disposable head covers, and disposable footwear covers or boots in the equipment room.

2. Still wearing respirators, proceed to showers. Showering is mandatory. Care must be taken to follow reasonable procedures in removing the respirator to avoid asbestos fibers while showering. The following procedure is required as a minimum:

3. Thoroughly wet body including hair and face. If using a Powered Air-Purifying Respirator (PAPR) hold blower unit above head to keep canisters dry.

4. With respirator still in place thoroughly wash body, hair, respirator face piece, and all parts of the respirator except the blower unit and battery pack on a PAPR. Pay attention to seal between face and respirator and under straps.

5. Take a deep breath, hold it and/or exhale slowly, completely wet hair, face, and respirator. While still holding breath, remove respirator and hold it away from face before starting to breath.

6. Carefully wash face piece of respirator inside and out.

7. If using PAPR, shut down in the following sequence, first cap inlets to filter cartridges, then turn off blower unit (this sequence will help keep debris which has collected on the inlet side of filter from dislodging and contaminating the outside of the unit). Thoroughly wash blower unit and hoses. Carefully wash battery pack with wet rag. Be extremely cautious of getting water in battery pack as this will short out and destroy battery.

8. Dispose of wet filters from air purifying respirator.

9. Rinse thoroughly.

10. Rinse shower room walls and floor prior to exit.

11. Proceed from shower to Changing Room and change into street clothes or into new disposable work clothes.

E. Within Work Area: Require that workers NOT eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the Work Area. To eat, chew, drink or smoke, workers shall follow the procedure

described above, and then dress in street clothes before entering the non-Work Areas of the building.

3.05 RESPIRATORY PROTECTION

A. Require that respiratory protection be used at all times that there is any possibility of disturbance of asbestos-containing materials whether intentional or accidental.

B. Require that a respirator be worn by anyone in a Work Area at all times, regardless of activity, during a period that starts with any operation which could cause airborne fibers until the area has been cleared for re-occupancy in accordance with Article 1.10 of this Section.

C. Regardless of Airborne Fiber Levels: Require that the minimum level of respiratory protection used be half-face air-purifying respirators with high efficiency filters.

D. Do not allow the use of single-use, disposable, or quarter-face respirators for any purpose.

E. Fit Testing:

1. Initial Fitting: Provide initial fitting of respiratory protection during a respiratory protection course of training set up and administered by a Certified Industrial Hygienist. Fit types of respirator to be actually worn by each individual. Allow an individual to use only those respirators for which training and fit testing has been provided.

2. On a Weekly Basis, check the fit of each worker's respirator by having irritant smoke blown onto the respirator from a smoke tube.

3. Upon Each Wearing: Require that each time an air-purifying respirator is put on it be checked for fit with a positive and negative pressure fit check in accordance with the manufacturer's instructions or ANSI Z88.2 (1980).

F. Type of Respiratory Protection Required: Provide respiratory protection as indicated in accordance with OSHA requirements. In the event that an initial exposure assessment has previously been conducted, determine the proper level of protection by dividing the expected or actual airborne fiber count in the Work Area by the appropriate "protection factors" specified by OSHA for various types of respirators. The level of respiratory protection that supplies an airborne fiber level inside the respirator, at the breathing zone of the wearer, at or below the permissible exposure limit (PEL) is the minimum level of protection allowed.

G. Permissible Exposure Limit (PEL):

1. 8-Hour Time Weighted Average (TWA) of asbestos fibers to which any worker may be exposed shall not exceed 0.1 fiber/cc.

2. 8-Hour Time Weighted Average (TWA) and Ceiling Concentration of asbestos fibers based on a 30-minute period to which any worker may be exposed shall not exceed 1.0 fiber/cc.

3. Contractor shall assess asbestos operations for their potential to generate airborne fibers. Contractor shall use exposure-monitoring data to assess worker exposures.

4. Fibers: For purposes of this section, fibers are defined as all fibers regardless of composition as counted in the OSHA Reference Method (ORM), or NIOSH 7400 procedure.

H. Air Purifying Respirators:

1. Negative pressure - half or full-face mask: Supply a sufficient quantity of respirator filters approved for asbestos, so that workers can change filters during the workday. Require that respirators be wet-rinsed, and filters discarded, each time a worker leaves the Work Area. Require that new filters be installed each time a worker re-enters the Work Area. Store respirators and filters at the job site in the changing room and protect totally from exposure to asbestos prior to their use.

2. Powered air purifying - half or full-face mask: Supply a sufficient quantity of high efficiency respirator filters approved for asbestos so that workers can change filters at any time that flow through the face piece decreases to the level at which the manufacturer recommends filter replacement. Require that regardless of flow, filter cartridges be replaced after 40 hours of use. Require that HEPA elements in filter cartridges be protected from wetting during showering. Require entire exterior housing of respirator, including blower unit, filter cartridges, hoses, battery pack, face mask, belt, and cords be washed each time a worker leaves the Work Area. Caution should be used to avoid shorting battery pack during washing. Provide an extra battery pack for each respirator so that one can be charging while one is in use.

I. Type "C" Respirator: Continuously monitor the air system operation including compressor operation, filter system operation, backup air capacity and warning and monitoring devices at all times that system is in operation. Assign an individual, trained by manufacturer of the equipment in use or by a Certified Industrial Hygienist, in the operation and maintenance of the system to provide this monitoring. Assign no other duties to this individual that will take him away from monitoring the air system.

3.06 REMOTE DECONTAMINATION UNITS

A. Remote Personnel Decontamination Unit: Provide a Remote Personnel Decontamination Unit to be constructed as close to the exclusion zone as practical and consisting of a serial arrangement of connected rooms or spaces, Clean Room, Shower Room, Equipment Room with airlocks between spaces. Require all persons without exception to pass through this Decontamination Unit for entry into and exiting from the Work Area for any purpose. Do not allow parallel routes for entry or exit. Do not remove equipment or materials through Personnel Decontamination Unit. Provide temporary lighting within Decontamination Units as necessary to reach a lighting level of 100-foot candles.

1. Changing Room (clean room): Provide a room that is physically and visually separated from the rest of the building for the purpose of changing into protective clothing.

   a. Construct using polyethylene sheeting, at least 6 mil in thickness, to provide an airtight seal between the Changing Room and the rest of the building.
   b. Locate so that access to Work Area from Changing Room is through Shower Room.
   c. Separate Changing Room from the building by a sheet plastic flapped doorway.
   d. Require workers to remove street clothes in this room, dress in clean, disposable coveralls, and don respiratory protection equipment. Do not allow asbestos-contaminated items to enter this room. Require Workers to enter this room either from outside the structure dressed in street clothes, or naked from the showers.
   e. An existing room may be utilized as the Changing Room if it is suitably located and of a configuration whereby workers may enter the Changing Room directly from the Shower Room. Protect surfaces of room with sheet plastic as set forth in

Temporary Enclosures. Authorization for this must be obtained from the Owner's Technical Representative in writing prior to start of construction.

f. Maintain floor of changing room dry and clean at all times. Do not allow overflow water from shower to wet floor in changing room.
g. Damp wipe surfaces twice after each shift change with a disinfectant solution.
h. Provide posted information for emergency phone numbers and procedures.

2. Airlocks: Provide an airlock between Clean Room and Shower Room and an airlock (3' minimum) between shower room and equipment room.

3. Shower Room: Provide a completely watertight operational shower to be used for transit by cleanly dressed workers heading for the Work Area from the Changing Room, or for showering by workers headed out of the Work Area after undressing in the Equipment Room.

a. Construct room by providing a shower pan and 2 shower walls in a configuration that will cause water running down walls to drip into pan. Install a freely draining wooden floor in shower pan at elevation of top of pan.
b. Separate this room from the rest of the building with airtight walls fabricated of two layers of 6-mil polyethylene.
c. Provide showerhead and controls.
d. Provide hot and cold water.
e. Provide temporary extensions of existing hot and cold water and drainage, as necessary for a complete and operable shower.
f. Provide a soap dish and a continuously adequate supply of soap and maintain in sanitary condition.
g. Arrange so that water from showering does not splash into the Changing or Equipment Rooms.
h. Arrange water shut off and drain pump operation controls so that a single individual can shower without assistance from either inside or outside of the Work Area.
i. Provide flexible hose shower head.
j. Pump waste water to drain or to storage for use in amended water. If pumped to drain, provide 20 micron and 5 micron wastewater filters in line to drain or waste water storage. Change filters daily or more often if necessary. Locate filters inside shower unit so that water lost during filter changes is caught by shower pan.
k. Provide hose bib.

4. Equipment Room (contaminated area): Require work equipment, footwear and additional contaminated work clothing to be left here. This is a change and transit area for workers.

a. Separate this room from the rest of the building with airtight walls fabricated of two layers of 6-mil polyethylene.
b. Provide a drop cloth layer of sheet plastic on floor in the Equipment Room for every shift change expected. Roll drop cloth layer of plastic from Equipment Room into Work Area after each shift change. Replace before next shift change. Provide a minimum of two (2) layers of plastic at all times. Use only clear plastic to cover floors.

B. Signs:

1. Post an approximately 20-inch by 14-inch manufactured caution sign at each entrance to the Exclusion Zone displaying the following legend with letter sizes and styles of a visibility required by 29 CFR 1926.1101.

LEGEND

ASBESTOS ABATEMENT

DANGER

ASBESTOS

CANCER AND LUNG DISEASE HAZARD
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED
IN THIS AREA

a. Provide signs in both English and Spanish.

b. Provide spacing between respective lines at least equal to the height of the respective upper line.

2. Post an approximately 10-inch by 14-inch manufactured sign at each entrance to each Work Area displaying the following legend with letter sizes and styles of a visibility at least equal to the following:

LEGEND	NOTATION
NO FOOD, BEVERAGES OR TOBACCO PERMITTED	3/4" Block
ALL PERSONS SHALL DON PROTECTIVE CLOTHING (COVERINGS) BEFORE ENTERING THE WORK AREA	3/4" Block
ALL PERSONS SHALL SHOWER IMMEDIATELY AFTER LEAVING WORK AREA AND BEFORE ENTERING THE CHANGING AREA	3/4" Block

3.07 ASBESTOS REMOVAL

A. Pre-work inspection

1. Do not begin any work in any abatement work area until the Owner’s Technical Representative has performed a pre-work inspection. It is the Contractor’s responsibility to notify the Owner’s Technical Representative of their schedule and anticipated dates for the pre-work inspection.

2. Inspection will be performed to assure all work area preparations are in place, as described herein. Any deficiencies in work area preparations will be corrected at this time. Work may not proceed until the Contractor receives written authorization from the on-site representative of the Owner’s Technical Representative.

B. Wet Removal:

1. Thoroughly wet to satisfaction of Owner's Technical Representative Asbestos-Containing Materials to be removed prior to stripping to reduce fiber dispersal into the air. Accomplish wetting by a fine spray (mist) of amended water or removal encapsulant. Saturate material sufficiently to wet to the substrate without causing excess dripping. Allow time for amended water or removal encapsulant to penetrate material thoroughly. If amended water is used, spray material repeatedly during the work process to maintain

a continuously wet condition. If a removal encapsulant is used, apply in strict accordance with manufacturer's written instructions.

2. Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels.

3. Remove intact, saturated Asbestos-Containing Material in small sections from all areas. Do not allow material to dry out. For roofing or ceilings, lower ACM to ground—do not drop ACM from any height. As it is removed, simultaneously package material while still wet into disposal bags or other appropriate waste container. Twist neck of bags bend over and seal with minimum three wraps of duct tape.

4. Evacuate air from disposal bags with a HEPA filtered vacuum cleaner before sealing.

C. Clean substrate from which ACM was removed by wet wiping and using a HEPA vacuum until no visible debris remains.

D. Encapsulation of Substrate: Perform encapsulation of substrate to lockdown any nonvisible fibers that may be remaining.

3.08 WORK AREA DECONTAMINATION

A. General: Decontamination of the Work Area following asbestos abatement.

1. Once the affected substrates are deemed clean by Owner's Technical Representative, Contractor shall collect all polyethylene sheeting to be disposed of as ACM waste and HEPA vacuum the general area.

2. In both cases operation of the pressure differential system is used to remove airborne fibers generated by the abatement work.

3.09 DISPOSAL OF ASBESTOS WASTE

A. Disposal Bags or Polyethylene Sheet Wrapping: Provide 12 mil thick, in total, leak-tight polyethylene bags or sheet wrapping, to contain all waste. On outermost layer, apply three labels with text as follows:

1. First Label:

CAUTION
CONTAINS ASBESTOS FIBERS
AVOID OPENING OR BREAKING CONTAINER
BREATHING ASBESTOS IS HAZARDOUS TO YOUR HEALTH

2. Second Label: Provide in accordance with 29 CFR 1910.1200(f) of OSHA's Hazard Communication standard:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD
BREATHING AIRBORNE ASBESTOS, TREMOLITE, ANTHOPHYLLITE, OR ACTINOLITE FIBERS IS HAZARDOUS TO YOUR HEALTH

3. Third Label: Provide in accordance with U.S. Department of Transportation regulation on hazardous waste marking. 49 CFR parts 171 and 172. Hazardous Substances: Final Rule. Published November 21, 1986 and revised February 17, 1987:

RQ HAZARDOUS
SUBSTANCE,
SOLID, NOS,
ORM-E, NA 9188
(ASBESTOS)

4. Fourth Label: Provide in accordance with U.S. Department of Environmental Protection Regulation of the National Emission Standards for Hazardous Air Pollutants 40 CFR Part 61.150(v) Asbestos NESHAP Revision, Final rule.

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B. Carefully load containerized waste in fully enclosed dumpsters, trucks or other appropriate fully enclosed vehicles for transport. Exercise care before and during transport, to ensure that no unauthorized persons have access to the material.

1. Do not store containerized materials outside of the Work Area. Take containers from the Work Area directly to a sealed truck or dumpster.

2. Do not transport disposal bagged materials on open trucks. Label drums with same warning labels as bags. Uncontaminated drums may be reused. Treat drums that have been contaminated as asbestos-containing waste and dispose of in accordance with this specification.

C. Employ a waste hauler with required licenses from state and local authority with jurisdiction to haul the waste form the abatement work.

D. Dispose of waste in a landfill that accepts asbestos waste materials. Advise the landfill operator or processor, at least ten days in advance of transport, of the quantity of material to be delivered. All waste shall be delivered to only **one** landfill.

E. At disposal site unload containerized waste. At a disposal site, sealed plastic bags may be carefully unloaded from the truck. If bags are broken or damaged, repair or re-bag materials. Clean entire truck and contents, as appropriate.

F. Retain receipts from landfill or processor for materials disposed.

G. At completion of hauling and disposal of each load, submit copy of waste shipment record (WSR) and landfill receipt to the Owner's Technical Representative. The WSR must be returned to the Building Owner in no more than 35 days.

3.10 REMOVAL OF WORK AREA ISOLATION:

A. Perform work specified in this article only after all requirements of this Section and Work Area Visual Clearance have been met:

B. Remove the warning barrier tape and asbestos warning signs separating the exclusion zone from adjacent spaces.

C. Remove equipment, materials, and debris from the work site.

D. Dispose of asbestos-containing waste material as specified in Article 3.07 of this Section.

3.11 SCHEDULE OF REMOVALS

A. Conduct asbestos abatement work as specified in accordance with lettered line items and Asbestos Abatement Summary Tables. Use appropriate engineering tools for exterior work such as windows, roofs, coping tar.

B. Contractor shall carefully pry up wooden floors in select classrooms prior to removing floor tile underneath.

C. Because there is no way to guarantee that all ACM were identified during the building inspection conducted by CDW and dated April and June and December 2017, it is possible that additional ACM is present other than that identified herein. If any suspect materials are uncovered during abatement activities or demolition work that are not detailed in this design, these materials shall be removed under unit pricing, after testing.

END OF SECTION 02 82 13

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SECTION 02 83 13
HAZARDOUS MATERIALS HANDLING AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Comply with the United States Environmental Protection Agency (USEPA) Renovation, Repair, and Painting (RRP) Rule Title 40 CFR, Part 745 and the Occupational Safety and Health Administration (OHSA) Demolition Involving Lead-Based Paint regulation (Title 29 CFR, Part 1926.62).

B. Comply with USEPA Resource Conservation and Recovery ACT (RCRA) regulations located at Title 40 CFR, Part 263 for disposal of hazardous wastes.

C. Conduct the work as described herein, including but not limited to, the following:

1. Handling, containerizing, packaging, re-handling, documentation, permits, health and safety, transportation and disposal of all items identified.
2. Removal, characterization and disposal of containers, drums, and unknown materials.
3. File necessary notices, obtain all permits and licenses, prepare USEPA-required PCB Abatement Work Plans, and pay all governmental taxes, fees, and other costs associated with the Work. Obtain necessary approvals of governmental departments having jurisdiction of the Work.

D. Develop and implement a Health and Safety Plan.

E. Demolition, handling, transportation, and disposal of hazardous materials and building materials which are coated with lead-based paint (LBP).

1. Personnel who disturb LBP shall be properly trained and qualified; use appropriate personal protection; use methods that do not create lead dust, chips, or fumes; and properly dispose or recycle components that are coated with LBP.
2. Dispose of LBP wastes in accordance with governing laws and regulations; pay costs of permits and disposal.

F. Identify, sample for disposal, package, label, document, remove, transport and dispose of containerized waste, refrigerants, oils, lubricants, paints, coatings, cleaners, lighting

ballasts and fluorescent lamps, mercury switches, transformers, thermostats and any discovered items behind fixed walls or buried vaults.

G. Related Sections:

1. Section 028213, Asbestos Abatement.

1.3 SUBMITTALS

A. The Contractor shall be made aware that LBP exists on painted surfaces throughout the building.

B. The Contractor is required to ensure the protection of workers performing asbestos abatement and any related demolition work that will affect surfaces coated with LBP, as well as protecting the public and the environment from exposure to lead-containing dusts.

C. Contractor is responsible to either sample and analyze painted surfaces or assume that all existing painted surfaces are coated with LBP. Contractor is responsible for costs for sampling and analysis, at no additional cost to the Owner.

D. The responsibilities of the Contractor in this Section include the furnishing of labor, materials and equipment required to remove, contain, recover, and dispose lead coatings and associated waste.

1. Removal of paint from surfaces to facilitate demolition;
2. Removal of temporary containment system structures daily, or as allowed by the Architect;
3. Hazardous waste characterization sampling and analysis and disposal of abatement or demolition debris generated as a result of LBP removal and demolition in accordance with requirements of this section and Federal and State regulations pertaining to hazardous and solid wastes;
4. Personal air sampling as required by OSHA for Contractor’s employees that have the potential for exposure to airborne lead dusts as outlined in this section.

E. The Work of this Contract shall conform to the standard set by the applicable Federal, State and Local laws, regulations, ordinance and guidelines as they exist at the time of the Work and as may be required by subsequent regulations.

F. The Contractor and their subcontractors shall, at their own cost and expense, comply with laws, ordinance, rules and regulations of Federal, State, Regional and Local authorities during demolition, work preparations, sanding, cutting, burning, scraping, painting over, grinding and regarding handling, storing, transporting and disposing LBP and lead-contaminated waste materials.

G. The Contractor shall submit to the Owner's representative prior to commencing the Work the following:

1. Written respiratory and notification program
2. Written lead compliance program in accordance with OSHA regulations including:
   a. Current training requirements, state certifications.
   b. Supervisor qualifications.
   c. Written compliance program specific to this project
   d. Current (within 12 months) respirator fit test records.
   e. Current medical monitoring and surveillance certificates.
3. Insurance certificates.

H. Work Plan: Site-specific OSHA compliant plan with sequencing with identification of temporary storage areas.

I. Permits for Transport and Disposal of Waste and Debris: Submit copies of manifests and receipts within 30 days of completion of the Work.

J. Laboratory analytical results for waste disposal characterization.

K. Personnel protection plan.

1.4 REGULATORY REQUIREMENTS

A. The following references are cited as current applicable publications. The Work is subject to compliance with all regulations including but not limited to:

1. OSHA Title 29 CFR 1910.1025 and 29 CFR Part 1926.62.
2. USEPA, Resource Conservation and Recovery Act (RCRA).
3. Commonwealth of Massachusetts, Department of Labor Standards 454 CMR 11.00, Structural Painting Safety Code, as currently amended.
4. Commonwealth of Massachusetts, Department of Labor Standards 454 CMR 22.00.
5. Commonwealth of Massachusetts, Department of Environmental Protection, Hazardous Materials Regulations at 310 CMR 30.00 as currently amended.
6. Commonwealth of Massachusetts, Department of Environmental Protection, 310 CMR 6.0-8.0.

1.5 OTHER HAZARDOUS MATERIALS

A. The Contractor is hereby informed that equipment, switches or transformers containing PCBs, and mercury-containing lamps, thermostats or switches may exist within the

building. Equipment and fixtures containing hazardous materials must remain intact for proper disposal.

B. Responsibility for Hazardous Material Identification: The Contractor shall be responsible for taking necessary measures, methods or procedures appropriate to safeguard the health and safety of workers, visitors, and members of the public with respect to identification and of previously unidentified hazardous materials during the Work.

C. Contractor shall be solely responsible for means and methods, and techniques used in the identification, sampling, collection, segregation, transportation and disposal of Hazardous Materials. Contractor is responsible for all sampling for laboratory sampling and analysis for disposal.

D. Contractor shall at their own cost and expense comply with the Federal, State, and local laws, ordinance, rules and regulations during dismantling, demolition, and cutting of equipment containing hazardous materials, and the handling, storing, transportation and disposal of hazardous materials.

E. Contractor shall be responsible for immediately notifying the Owner of evidence of a release of hazardous materials into the building or to the environment.

F. Limited sampling was conducted for poly-chlorinated biphenyls (PCBs) in building materials such as caulk, paint and expansion joint. PCBs were detected in only one room, and deemed a repair. NO sampling by the Contractor or affiliates of the Contractor (subcontractors or sub consultants) for total PCBs shall be performed at any point during the performance of the work specified herein. If disposal facilities require PCB analytical testing of the waste stream, then Contractor is responsible for said testing at no cost to owner.

PART 2 - EXECUTION

2.1 EXECUTION

A. Prior to the commencement of work that may cause employees to be exposed to an airborne concentration of lead above the Permissible Exposure Limit (PEL), isolate the work area.

B. Provide personnel monitoring, air sampling, recording and reporting in accordance with OSHA standards when work involving a potential exposure to airborne lead is in progress.

C. Dispose of hazardous wastes and materials contaminated by lead-based paint in accordance with applicable regulations and guidelines, including the requirements of the Resource Conservation and Recovery Act (RCRA). Lead containing materials must be tested for Toxicity Characteristic Leaching Procedure (TCLP) analysis to determine appropriate disposal requirements.

2.2 SCHEDULE OF REMOVALS

A. Hazardous Material Locations – Any painted surfaces to be affected during building renovation. The Contractor is responsible for verifying final quantities prior to start of work. Contractor is responsible for characterizing via laboratory analysis all materials for disposal at no cost to owner. The following areas contain LBP:

Description	Location	Lead % Weight
White Paint	Concrete Block Wall Near B-16, Near Gym	1.2, 1.4
Light Blue Paint	Concrete Block Near Gym	1.8
Blue Paint	Steel Truss and Door Frame in Cafeteria	1.1
Dark Blue over Light Blue Paint	On Steel Beams	0.49, 0.51

B. Other Materials:

Material Description	Location	Est. Quantity	Units
Compact Fluorescent Bulbs	Throughout	200	EA
Fluorescent Bulbs (Mercury) and LED Bulbs (Lead)	Throughout	18,000	Tubes
Thermostats and Switches (Mercury)	Throughout	150	Ampules
Electronic Ballasts, DHPE Ballasts	Throughout	900	EA
Older Door Retractors	Hall Assemblies, Classroom Doors, Mechanical Doors	150	EA
Emergency Light Batteries (Lead)	Throughout	60	EA

Material Description	Location	Est. Quantity	Units
Refrigerants Associated with HVAC and Water Bubblers	Associated with HVAC	150	Gallons
Exit Signs (Tritium)	Throughout	60	EA
Ash from Incinerator	Incinerator	1	55-Gallon Drum
Transformers Including Fluid	Vaults	4	EA
Air Conditioner Units	Window Mounted	25	EA
Oil from Oil and Pumps	Boiler Room	55	Gallons
Oil from Oil Water Separator	Automotive Shop	100	Gallons
PCBs in Caulk	Along Wall on Steel Beam Room A-7	20	LF

2.3 WORK PROCEDURE

A. The work practices listed below are restricted during lead paint abatement activities:
   1. Open-flame burning or torching is prohibited.
   2. Machine sanding or grinding or abrasive blasting or sandblasting is prohibited unless used with High Efficiency Particulate Air (HEPA) exhaust control which removes particles of 0.3 microns or larger from the air at 99.97 percent or greater efficiency.
   3. Dry scraping is permitted only in conjunction with heat guns or around electrical outlets or when treating defective paint spots totaling no more than 2 square feet in any one room, hallway or stairwell or totaling no more than 20 square feet on exterior surfaces.
   4. Operating a heat gun is permitted only at temperatures below 1100 degrees Fahrenheit.

2.4 WORK AREA CLEARANCE

A. The work is complete when the work area is visually clean and the Contractor is to notify the Project Monitor that the area is ready for visual inspection. The visual inspection is

performed to determine if deteriorated painted surfaces and/or visible amounts of dust or residual paint are still present.

B. The visual inspection and clearance sampling are to be conducted by the Contractor's Certified Inspector.

C. Following the visual inspection, clearance sampling for lead in dust shall be conducted. The clearance sampling shall be in accordance with 40 CFR 745.227(e)(8).

D. Upon completion of the work area clearance the Contractor shall submit to the Owner's representative an abatement report prepared by the Certified Supervisor in accordance with 40 CFR 745.227(e)(10).

END OF SECTION 02 8 313

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Section 03 05 13

CONCRETE SEALERS
(TRADE CONTRACT REQUIRED AS PART OF SECTION 09 00 09)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Trade Contract Requirements: As provided under Section 09 00 09 - PAINTING TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.

1. Work of this Trade Contract includes all individual specification sections listed in Section 09 00 09.

B. Sub-Sub Trade Requirements: NONE REQUIRED UNDER THIS SECTION.

1.2 SUMMARY

A. Furnish and install concrete sealers/coatings on exposed-to-view concrete floors where shown and as scheduled on the Drawings

1.3 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Special administrative and procedural requirements related to LEED VERSION 4 FOR BUILDING DESIGN AND CONSTRUCTION" (LEED V4 BD+C) certification goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

C. Section 03 30 00 - CAST-IN-PLACE CONCRETE:

1. Placing and finishing concrete slabs.
2. Dustproofing concrete slabs exposed to view and substrate for carpet.

D. Section 09 00 09 – PAINTING FILED SUB-BID REQUIREMENTS: Sub-Bid requirements for work of this Section.

1.4 REFERENCES

A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. ASTM C156 – Water Retention by Liquid Membrane-Forming Curing Compounds for Concrete.
2. ASTM C309 – Liquid Membrane-Forming Compounds for Curing Concrete.
3. ASTM C1315 - Liquid Membrane-Forming Compounds, having Special Properties for Curing and Sealing Concrete

4. California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda

1.5 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties, material compositions, and application instructions for all finishing products to be applied hereunder

a. Include certification of data indicating Volatile Organic Compound (VOC) content of all coatings.

2. Samples of each level of slip resistance, aggregate, and pattern available in the specified products from the proposed manufacturer.

B. Provide the following LEED submittal items:

1. All relevant supporting documentation, as required by LEED for Schools v4 and as detailed in Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS.

2. A completed LEED Materials Reporting Form, per Section 01 81 13 - Sustainable Design Requirements.

1.6 QUALITY ASSURANCE

A. Use an applicator approved by the manufacturer, experienced in the approved materials, and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.7 ENVIRONMENTAL CONDITIONS

A. Work shall be done only under optimum conditions as recommended by manufacturer. Surfaces over which sealer is to be applied shall be completely dry (minimum 30 days since concrete placement) and thoroughly clean. Maximum moisture content is 8 percent. Substrate and ambient temperature shall be between 60 and 90 degrees Fahrenheit (15 to 32 degrees Celsius).

1.8 PRODUCT HANDLING

A. Deliver materials to the job site and store in their original unopened containers with all labels intact and legible at time of use. Store in strict accordance with the manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Transparent non-yellowing water-based acrylic sealer and dustproofer having a minimum of 10 percent solids, with a maximum VOC limit of 100 g/L. Subject to compliance with ASTM C309, Type 1, Class A and B, and requirements specified herein.

1. Manufacturers offering products which may be incorporated in the work include the following, or approved equal:

a. Dayton-Superior, Miamisburg OH, product “Ultra Seal EF”.
b. Euclid Chemical Company, Cleveland OH., product “EverClear VOX.”
c. Laticrete International Inc., Bethany CT, (L&M Brand), product “Permaguard SPS”.
d. Nox-Crete Inc., Omaha NE, product “Cure & Seal 100E”.

B. Primer/bonding agent: As recommended by sealer manufacturer.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Upon acceptance of completed existing surfaces, thoroughly remove all dust and debris by sweeping or vacuum cleaning.

B. Remove laitance, curing sealers, existing adhesives and other foreign matter from concrete surfaces with necessary techniques such as shot blasting, muriatic acid etching, surface freezing and power scarification.

C. Surface preparation required if a curing compound has been applied to substrate surfaces.

1. Thoroughly etch concrete surfaces using well mixed solution consisting of two parts by volume water diluted with one part by volume 30 percent commercial grade hydrochloric acid at a rate of one quart per ten square feet. Apply evenly to thoroughly saturated areas and scrub into surfaces using stiff-bristled broom. Allow solution to activate undisturbed for not less than five minutes or for duration of boiling effect.
2. Thoroughly remove etching solution by washing down surfaces with clean water; flooded at least three separate times at a rate of two gallons per ten square feet; thoroughly remove all contaminates that may be engrained or latent in surfaces.
3. Perform a test application of a square foot in three locations, such as beneath casework. Allow to set for 72 hours, and test adhesion as recommended by the manufacturer.

3.2 APPLICATION

A. Apply sealer with manufacturer’s recommended sprayer, at recommended rate of 400 square feet per gallon. Apply second coat when sealer is dry to touch. Allow sealer to cure undisturbed for a minimum period of 6 hours. Maintain temperature at 60 degrees Fahrenheit minimum until floor surfacing has completely dry.

End of Section

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Section 03 10 01

CONCRETE FORMING AND ACCESSORIES

PART 1 – GENERAL

1.1. SUMMARY

A. Section Includes

1. Furnish, install, and remove formwork, shoring and temporary structural supports for cast-in-place concrete.
2. Installation of inserts, anchors and other embedded items.

B. Related Sections

1. 03 20 01 – Concrete Reinforcing.
2. 03 30 01 – Cast-in-Place Concrete.

1.2. REFERENCES

A. American Concrete Institute (ACI).

1. ACI 117 – “Tolerances for Concrete Construction and Materials”.
2. ACI 301 – “Specification for Structural Concrete for Buildings”.
3. ACI 318 – “Building Code Requirements for Structural Concrete”

1.3. SUBMITTALS

A. General: Review of submittals is of a general nature only, and responsibility for conformance with intent of drawings shall remain with the Contractor. Review does not imply or state that fabricator has correctly interpreted the construction documents.

B. Submit Shop Drawings to showing location and layout of construction joints, reveals, form joints, sleeves, openings, textures, locations of tie holes or plugs, and location of embedded items, and other items which will be exposed on the finish wall.

C. When a mock-up is required submit shop drawings of the mock-up.

D. Submit manufacturer’s data for formwork release agent. Indicate the form surfaces where the formwork release agent will be used.

1.4. QUALITY ASSURANCE

A. Formwork and Shoring Design:

1. Form, shoring, and reshoring design shall be the sole responsibility of the Contractor; resultant concrete to conform to required shape, line and dimensions.
2. Professional Engineer licensed in the State of Massachusetts shall design forms, falsework supports and reshoring.

1.5. PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.

PART 2 - PRODUCTS

2.1. MATERIALS

A. Forming Materials:

1. Formwork materials shall be appropriate for the specified finishes.
2. Polystyrene Foam: ASTM C 578 – Type IV
3. Chamfer Strips: rigid PVC; 3/4-inch by 3/4-inch size; maximum possible length. Material usage shall be consistent for each application
4. Form Gaskets (for sealing form panel joints) Gaskets shall be closed cell, completely skinned, foam rubber or neoprene, with pressure sensitive paperbacked adhesive on surfaces to be bonded to forms. Gaskets shall be of sufficient thickness, widths and compressibility for specific use.

2.2. FORM HARDWARE

A. All form ties shall be a type which does not leave an open hole through the concrete and which permits neat and solid patching at every hole.

B. When forms are removed, all metal shall be not less than one inch from the surface.

C. Use commercially manufactured formwork accessories. Do not use wire ties and wood spreaders.

D. Where wall is exposed to view in final structure use form ties with cones.

E. Form Ties: Ties shall leave a hole of not more than 3/4" in diameter on the concrete surface, and no metal closer than 1" from the surface. Use stainless steel leave in material.

2.3. FORMWORK RELEASE AGENTS

A. Use commercially manufactured form release agents.

B. Formwork release agents and sealers shall not harmfully affect the appearance, discolor or change texture of finished concrete surface or inhibit proper application of any surface finishes, coatings or bonding agents.

C. Formwork release agents shall prevent the adhesion of forms to concrete.

2.4. EMBEDDED ITEMS

A. Expansion joint filler: Premolded expansion joint filler conforming to ASTM D 994, ASTM D 1751, or ASTM D 1752.

PART 3 - EXECUTION

3.1. EXAMINATION

A. Inspection:

1. Prior to Work of this Section, carefully inspect the installed Work of other trades and verify that such Work is completed to the point where this installation may properly commence.
2. Verify that forms are constructed in accordance with all applicable codes and regulations, the referenced standards, and the design documents.

B. Discrepancies:

1. In the event of discrepancy or conflict, immediately notify the Architect.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2. CONSTRUCTION OF FORMS

A. When a mock-up of the concrete is required do not construct forms for concrete, other than for mock-up, until mock-up has been accepted.

B. Earth Forms: Unless otherwise indicated or required by the Construction documents, concrete for foundations that will remain in permanent contact with the soil, may be placed directly against vertical excavated surfaces provided the material will stand without caving and suitable provisions are taken to prevent raveling of top edges or sloughing of loose material from walls of excavation. Sides of excavation shall be made with a neat cut and the width made as detailed on Drawings.

C. Layout:

1. Form all required cast-in-place concrete to the shapes, sizes, lines, and dimensions indicated on the Drawings. Camber forms where camber is indicated.
2. Construct all required forms to be substantial, sufficiently tight to prevent leakage of mortar, and able to limit deflection when filled with wet concrete.
3. Make proper provision for all openings, offsets, sleeves, recesses, anchorage, blocking, reglets, chases and other features of the Work as shown or required.
4. Provide openings as required for placing and consolidation of concrete. Provide temporary holes in formwork to facilitate cleaning and inspection.
5. See Drawings for boards, strips, or other methods of creating patterns, textures, and reveals on concrete surfaces.
6. For exposed or smooth surfaces minimize, to a practical minimum, the number of seams.
7. Form Ties for Exposed Surfaces: Locate as shown on drawings. Unless otherwise indicated arrange in a symmetrical regular pattern in level horizontal rows and plumbed vertically. Coordinate variations or changes in pattern from those shown on the drawings, with the Architect.
8. For all spans greater than 30 ft in length, forms shall have a minimum camber at the center of the span of 1/8 in x span length in ft/10 in inches. Camber of joists and girders shall be additive.
9. Conform to the provisions in sections 2.3.1.1 and 2.3.1.3 through 2.3.1.5 of ACI 301.

A. Construction Joints

1. Construction joints in exposed surfaces shall be made only at revealed form joint locations as indicated on the Architectural drawings.
2. Where joints in addition to those shown are desired, Contractor shall propose location of construction joints in submittal. Location of construction joints shall be based on provisions in section 2.2.2.5 of ACI 301
3. Revisions to reinforcing necessary to accommodate contractors proposal will be at Contractors expense.
4. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints sufficient to develop reinforcement.

B. Tolerances

1. Concrete surfaces shall not exceed the tolerances as specified in ACI 117. The class of surface for offset between adjacent pieces of formwork for formed surfaces shall be to Class Cas defined in ACI 117.
2. Maximum deflection of form facing material between studs as well as deflection of studs and walers shall be limited to 1/360 of the span nor more than 1/8-inch.
3. In addition conform to section 2.2.2.4 of ACI 301.

C. Construction:

1. Tape all joints at forms for concrete exposed in the finished structure, including joints between form panels and trim strips.
2. Provide 3/4-inch chamfers in the corners of formwork on permanently exposed surfaces. Do not bevel re-entrant corners or edges of formed joints.
3. Make all form panel joints, tight butt joints with all edges true and square.
4. Do not install inside forms until reinforcing installation has been inspected.
5. For slabs on grade verify top of subgrade is compatible with slab thickness shown.
6. Remove loose concrete, dust, and other material from the existing concrete surface prior to the erection of forms.
7. Reveal Formers and Reformers for Exposed Surfaces: Fabricate and fasten to avoid protruding splinters which may become embedded in the concrete.

D. Finishes:

1. Formed Finishes:
   a. For concrete surfaces exposed to view, unless otherwise noted, forms shall impart a smooth uniform appearance to the concrete without mottles and color variations caused by non-uniform absorption of moisture or chemical reaction.
   b. Concrete surfaces not exposed to view shall have a smooth uniform appearance.
2. Textures: Except as noted under Concrete Finishes, the forms will be smooth and impart no texture to surface of concrete.
3. Provide formwork for Architectural Grade concrete with the intent to provide a smooth, glossy finish, upon removal of the form, with no patching, stoning or other form of repair. Wash only.
4. Vertical form joints are to be plumb and horizontal joints level.

5. Fasten all contact material to supports with fasteners arranged in a symmetrical pattern. Fasteners shall be aligned horizontally and vertically.

E. Form Release Agents:

1. Apply form release agent on formwork in accordance with manufacturer's recommendations.
2. Apply form release agents prior to placing reinforcing steel and embedded items.
3. Keep form release agents away from reinforcing steel, embedded items, and concrete against which fresh concrete will be placed.

3.3. EMBEDDED ITEMS

A. Prior to concrete placement install and build into the work anchorage devices, inserts, and other items embedded in cast-in-place concrete. Use setting drawings, diagrams, instructions and directions for items to be attached thereto.

B. Install concrete accessories and embedded items in accordance with manufacturer's recommendations: straight, level, and plumb. Tolerances of embedded items shall be compatible with the systems they are a part of when more restrictive than specified for concrete work.

C. Provide pipe sleeves when pipes pass through concrete.

D. Fill voids in sleeves, inserts, and anchor slots with readily removable material to prevent entry of concrete into voids.

E. Notify the Architect whenever any embedded item interferes with the placing of the reinforcing steel or placement of concrete.

F. Comply with ACI 301, sections 2.3.1.10 and 2.3.1.11.

G. Use templates to securely hold anchor bolts other embedded items in place during construction, and take care that no displacement occurs during the pouring of concrete.

H. Conduits and Pipes in Concrete:

1. Do not run conduits, wires and pipes in concrete unless specifically indicated on the Drawings.

I. Waterstops: Comply with ACI 301, section 2.2.3.5. Wire tie waterstops at top to prevent displacement.

3.4. PREPARATION FOR PLACEMENT

A. Clean and prepare existing concrete surfaces prior to installing forms.

B. Clean and inspect forms, embedded materials, and existing concrete surfaces immediately before placing concrete.

C. The formwork for second placement of construction joints shall be gasketed and held tight to the in place concrete to prevent fluid loss.

1. Comply with ACI 318 section 6.3 for conduits and pipes embedded in concrete.
2. Maintain specified concrete cover for all conduits in concrete.
3. Reinforcing should not be displaced form required position due to conduits and pipes.

3.5. SHORES AND BRACES

A. Provide support for concrete until the structural system is substantially completed and has obtained its specified strength. If a lower compressive strength is proposed for removal of formwork and shoring, submit detailed plans for review and acceptance. As a minimum forms, shoring, and reshoring shall comply with the provisions of sections 6.1 and 6.2 of ACI 318.

B. Protect the concrete from cracking due to early application of loads or from loads in excess of those shown on the drawings.

C. Shores shall transfer loads from successive parts of the structure directly through falsework without creating bending, tensile, or shearing stresses in the concrete.

D. Reshoring shall comply with section 2.3.3 of ACI 301.

3.6. REMOVAL OF FORMS

A. Time of form removal shall depend on the strength of the concrete and the curing. When concrete mix contains fly ash, has been exposed to cold weather, curing has not been effective, or concrete strengths are lower than expected, defer form removal.

B. Forms and shoring used to support the weight of concrete shall remain in place until the concrete has reached its specified strength. Forms may be removed at an earlier time if acceptable justification is provided.

C. Forms shall be removed without damage to the concrete.

D. Formwork removal shall comply with section 2.3.2 of ACI 301

E. All forms below ground surface along with all shores and braces, shall be removed before backfilling.

F. Bolts, wires, clamps, rods, etc., not necessary to the Work, shall be removed to a minimum of one inch from the surface. Use care to eliminate any danger of rust stains from unprotected materials embedded in or adjacent to exposed concrete surface.

G. Whenever the formwork is removed during the curing period, the exposed concrete shall be cured by one of the methods specified in Section 03 30 00.

H. Removal of forms shall comply with weather protection requirements in Section 03 30 00.

3.7. RE-USE OF FORMS

A. Re-use of forms shall in no way delay or change the schedule for placement of concrete from the schedule obtained if all of the forms were new, nor shall quality, appearance, or performance of the final structure be reduced.

End of Section

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Section 03 20 01

CONCRETE REINFORCING

PART 1 - GENERAL

1.1. DESCRIPTION

A. Work Included - Furnish and place all reinforcing steel and accessories.

B. Related Work Specified Elsewhere:

1. 03 10 01 – Concrete Forming and Accessories.
2. 03 30 01 – Cast-in-Place Concrete.

1.2. REFERENCES

A. American Concrete Institute (ACI).

1. ACI 301 - "Specification for Structural Concrete for Buildings."
2. ACI 318 - "Building Code Requirements for Reinforced Concrete".

B. American Society for Testing and Materials (ASTM).

1. A 82 - "Standard Specification for Cold-Drawn Steel Wire for Concrete Reinforcement".
2. A 185 - "Standard Specification for Welded Steel Wire Fabric for Concrete Reinforcement".
3. A 615 - "Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement".
4. A 616 - "Standard Specification for Rail-Steel Deformed and Plain Bars for Concrete Reinforcement".
5. A 617 - "Standard Specification for Axle-Steel Deformed and Plain Bars for Concrete Reinforcement".
6. A 706 - "Standard Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement".

C. American Welding Society (AWS).

1. AWS D1.4 - "Structural Welding Code - Reinforcing Steel".

1.3. SUBMITTALS

A. General: Review of submittals is for general conformance with the design concept of the project and information shown on the contract documents only. The Contractor is responsible for conforming, correlating and coordinating dimensions in the field for tolerance, clearances, quantities, fabrication and installation processes means and methods of construction, coordination of this work with other trades and performing work in a safe and satisfactory manner.

B. Shop Drawings:

1. Submit fully detailed shop drawings for review. Shop drawings shall include:
   a. Placing drawings, bending schedules and bending diagrams showing size and location of reinforcing steel.

b. Elevations of beams and walls.

c. Details of areas of conjestion. Identify where reinforcing steel will interfere with the placement of embedded items such as anchor bolts, anchors, inserts, conduits, sleeves and any other items which are required to be cast in concrete.

2. Reinforcing steel shall not be fabricated or placed before the shop drawings have been reviewed by the Architect and returned.

3. Direct copies of the contract documents are not acceptable as a submission from the Contractor.

C. Mill Certificates: Submit steel producer's certificates of mill analysis, including steel source, description, heat number, yield point, ultimate tensile strength, elongation percent, bend test and the chemical composition of each heat as determined by ladle analysis, before delivery of steel to site. Where steel is required to be welded, mill reports shall be used to help verify the weldability of the steel.

D. Manufacturers Certification: Furnish electrode manufacturer’s certification that the electrode meets the requirements of its AWS classification.

E. Welding Procedures: Submit welding procedures for all reinforcement welding.

1.4. QUALITY ASSURANCE

A. Owner's Testing Laboratory

Shop and field testing and inspection of steelwork will be performed by an independent laboratory engaged by the Owner ("Inspector"). The inspector shall be currently certified as a AWS Certified Welding Inspector.

B. Qualifications of Welders:

1. All welding shall be performed by operators who are qualified for the types of welds used. Each operator shall have been qualified within the preceding one year as prescribed by AWS. Welder qualification shall include passing the Charpy tests when specified for the electrode.

2. Require welders to retake the qualification test if, as determined by the Architect, there is a reasonable doubt as to the proficiency of the welder. If the welder does not requalify, he shall not perform any welding on the project.

3. Pay all costs associated with welder qualification.

1.5. PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver reinforcement to jobsite bundled, tagged and marked. Use tags that indicate bar size, lengths and marks corresponding to markings shown on shop drawings.

B. Storage: Store reinforcement at the jobsite in a manner to prevent damage and accumulation of dirt and rust, moisture and grease or any other substance that may impair bond to concrete. Do not use damaged, reworked or deteriorated material.

PART 2 - PRODUCTS

2.1. MATERIALS

A. Reinforcing Bars ASTM A 615, Grade 60 or ASTM A706.

B. Reinforcing Bars to be Welded: ASTM A 706.

C. Plain Wire: ASTM A 82.

D. Deformed Wire: ASTM A 496.

E. Welded Wire Fabric: ASTM A 185 for plain wire fabric or ASTM A 497 for deformed wire fabric.

F. Tie Wire: American Wire 16 gauge or heavier black annealed wire.

G. Spiral Reinforcement: ASTM A82 if specified as wire or ASTM A615-Grade 60 if specified by bar size.

H. Accessories:

1. Metal or plastic spacers, supports, ties, precast concrete blocks, etc., as required for spacing, assembling, and supporting reinforcing in place.
2. Legs of accessories to be of type that will rest on forms without embedding into forms.
3. Galvanize metal items where exposed to moisture, or use other acceptable non-corrodible, non-staining supports.
4. Do not use wood, brick, or stone supports.
5. Where supports bear on earth, use concrete blocks or supports with sand plates.
6. On surfaces of walls to be sandblasted or where exposed to view in the final structure supporting chairs, spacers, or bolsters, shall be of stainless steel.

I. Electrodes for Welding Reinforcing Steel: As required by AWS D1.4.

J. Reinforcing Couplers: Lenton rebar couplers as manufactured by Erico or equal. Connection shall develop in tension or compression as required at least 125 percent of specified yield strength of the bar.

K. Mechanical Splices:

1. Cadweld full tensile strength splices as manufactured by Erico. Splices to be capable of developing 125 percent of reinforcement yield strength.
2. Lenton full tensile strength coupler as manufactured by Erico or approved alternate. Splices to be capable of developing 125 percent of reinforcement yield strength.
3. Notify mechanical splice supplier of rolling mill that rolled reinforcement to be spliced.

L. Deformed Bar Anchors: Nelson, flux filled deformed bar anchors, type D2L, as manufactured by Nelson Stud Welding Division of TRW or approved alternate.

2.2. FABRICATION

A. General: Fabricate reinforcing bars in accordance with the tolerances of ACI 117.

B. Bending:

1. Minimum bend diameters and hook extensions as shown on the drawings.
2. Reinforcing bars are to be bent cold unless heating is permitted.
3. Do not bend or kink reinforcing except as shown on the Drawings.
4. Do not bend or straighten reinforcing bars in a manner that will injure the material.
5. Do not rebend reinforcement that has previously been bent within 6 inches of new bend except as allowed in section 3.3.2.8 of ACI 301.

C. Spirals: Provide a minimum of 1-1/2 finishing turns top and bottom.

D. Install reinforcing couplers and mechanical splices in accordance with the manufacturer's recommendations.

E. Install deformed bar anchors in accordance with the manufacturer's recommendations.

2.3. MATERIAL TESTING

A. No testing will be required for domestically, manufactured reinforcing steel if the mill reports show the material conforms to these specifications. Testing by the Owners Testing Laboratory will be required for all reinforcing steel of foreign manufacture, and for all reinforcing steel of domestic manufacture that cannot be identified with mill reports.

B. Testing

1. Identify reinforcing steel and make one series of tests (tensile, bend and chemical) from each five tons, or fraction thereof, of each size and kind of foreign or unidentified reinforcing steel to demonstrate its compliance with the specified reinforcing. If reinforcing steel is from foreign sources, testing is required from each five tons, or fraction thereof, from each source.
2. Use full section of the reinforcing steel "as-rolled" for test specimens Sections machined or reduced in accordance with ASTM A 615, Section 9, "Test Specimens" will not be acceptable.
3. Include two samples of sufficient length to allow tests to be made on the ""as-rolled" reinforcing steel.
4. Perform other tests (such as dimensions and weight) as necessary to establish compliance with specifications.

PART 3 - EXECUTION

3.1. PREPARATION

A. Prior to Work specified in this Section, carefully inspect the installed Work of other trades and verify that such Work is complete to the point where this installation may properly commence.

B. The Contractor shall verify all dimensions prior to starting construction.

C. Discrepancies:

1. Notify the Architect of any discrepancies or inconsistencies.
2. Do not proceed with installation in areas of discrepancy until such discrepancies have been fully resolved.

3.2. INSTALLATION

A. General: Wherever embedded items interfere with placing of reinforcement notify the Architect and obtain approval before placing any concrete. Do not bend or field cut bars around openings or sleeves.

B. Placing:

1. Do not exceed the tolerances specified in ACI 117.
2. Do not place reinforcement in floor slabs or beams until concrete has been placed in columns and walls, except where bars extend down into columns or walls.
3. Dowels shall be tied securely in place before concrete is deposited. In the event there are no bars in position to which dowel may be tied, No 3 bars (minimum) shall be added to provide proper support and anchorage.
4. Use templates for placement of column dowels.
5. Install welded wire fabric in as long lengths as practicable.

C. Field bending or straightening in accordance with section 3.3.2.8 of ACI 301.

D. Welding:

1. Not permitted unless specifically shown on Structural Drawings.
2. Welding, where required, shall comply with AWS D 1.4 and shall be continually inspected during welding.
3. Welding material, wire cuttings, and tramp metal shall be thoroughly cleaned from forms for exposed concrete before any concrete is placed.
4. No tack welds not incorporated into other welds will be allowed without written acceptance.
5. Do not weld within 2 bar diameters of where bars have been bent cold.

E. Spacing of Reinforcing: Where Drawings do not show the spacing of the reinforcing, the minimum clear spacing shall conform to ACI-318 Section 7.6.

F. Concrete Cover: Place reinforcement to obtain as a minimum the coverages for concrete protection specified in section 3.3.2.3 of ACI 301.

G. Splicing: Make splices only at those locations shown on the Drawings or as accepted by the Architect. Stagger splices in adjacent bars wherever possible.

H. Reinforcing Supports:

1. Reinforcement shall be accurately located in the forms and held in place by means of supports adequate to prevent displacement and to maintain reinforcement at proper distance from form face. The use of wood supports and spacers inside the forms is not permitted.
2. Support reinforcement supported from the ground on precast concrete reinforcement supports.

3. Do not use reinforcing supports or reinforcing to support concrete conveying equipment and similar construction loads.

I. Tying:

1. Reinforcing shall be rigidly and securely tied with steel tie wire. Tie wires, after cutting, shall be bent in such a manner that concrete placement will not force the wire ends to surface of exposed concrete.
2. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
3. Reinforcing in concrete members that have one or more surfaces exposed, whether painted or unpainted finish, shall be tied with galvanized wire. Uncoated tie wire in exposed members will not be accepted.

J. Install deformed bar anchors in accordance with the manufacturer's recommendations.

K. Install mechanical splices and reinforcing couplers in accordance with manufacturers' recommendations.

L. Installation of manufactured products as per Part 2 of this specification and according to manufacturers' recommendation.

M. Cleaning:

1. Clean reinforcement to remove loose rust and mill scale, earth and other materials which might reduce or destroy bond with concrete.
2. Where there is a potential of rust staining adjacent finish surfaces, take necessary steps to prevent staining.

3.3. FIELD QUALITY CONTROL

A. Before any concrete is poured on any particular portion of the building, the reinforcing steel and form dimensions will be inspected by the Owners testing laboratory. Any errors or discrepancies shall be corrected before concrete is placed.

B. Notify both the testing laboratory and the Architect at least 48 hours before concrete is to be poured or reinforcing is covered up.

C. As a minimum, all testing and inspection as per the requirements of the International Building Code, 2015. Reinforcing steel to be assumed to have been designed for calculated stresses in excess of 70 percent of the basic allowable values.

D. Installation of deformed bar anchors to be tested in accordance with Section 7.1 of AWS D1.1.

E. Welding of Reinforcement:

1. There shall be continuous inspection during all welding of reinforcement.
2. All butt welds to be inspected using radiographic testing.

3. At the Owners option recognized non-destructive tests such as resistance, Magnetic Partical Examination, and Liquid Penetrant Inspection may be used to inspect the welds.

F. Testing and inspection of mechanical splices and reinforcing couplers to conform to manufacturer's recommendations and ICC approval.

End of Section

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Section 03 30 01

CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1. DESCRIPTION

A. Work Included: The work in this Section includes the cast-in-place concrete work as shown on the drawings and specified herein, including, but not limited to, the following

1. Substructure and footings.
2. Concrete slab on grade.
3. Retaining walls.
4. Superstructure of the building.

B. Related Work Described Elsewhere:

1. Section 03 10 01 – Concrete Forming and Accessories.
2. Section 03 20 01 – Concrete Reinforcing.

1.2. REFERENCES

A. American Concrete Institute (ACI).

1. ACI 301-05 - “Specification for Structural Concrete for Buildings.”
2. ACI 318-08 - “Building Code Requirements for Reinforced Concrete.”

B. American Society for Testing and Materials (ASTM).

1. C 31 - “Standard Method of Making and Curing Concrete Test Specimens in the Field.”
2. C 33 - “Standard Specification for Concrete Aggregates.”
3. C 39 - “Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.”
4. C 94 - “Standard Specification for Ready-Mixed Concrete.”
5. C 143 - “Standard Method of Test for Slump of Portland Cement Concrete.”
6. C 150 - “Standard Specification for Portland Cement.”
7. C 157 - “Standard Method of Test for Length Change of Hardened Cement Mortar and Concrete.”
8. C 192 - “Method of Making and Curing Concrete Compression and Flexure Test Specimens in the Laboratory.”
9. C 233 - “Testing Air-Entraining Admixtures for Concrete.”
10. C 260 - “Standard Specification for Air-Entraining Admixtures for Concrete.”
11. C 309 - “Standard Specification for Liquid Membrane - Forming Compounds for Curing Concrete.”
12. C 330 - “Standard Specification for Lightweight Concrete Aggregate for Structural Concrete.”
13. C 494 - “Standard Specifications for Chemical Admixtures of Concrete.”

14. C 618 - “Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.”
15. D 1751 - “Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-Extruding and Resilient Bituminous Types).”
16. E 329 - “Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction.”

C. American Association of State Highway and Transportation Officials (AASHTO).

1. AASHTO TP23 – “Standard Test Method For Water Content of Freshly Mixed Concrete Using Microwave Oven Drying.”
2. AASHTO T260 – “Standard Method of Test for Sampling and Testing for Chloride Ion in Concrete and Concrete Raw Materials.”

1.3. DEFINITIONS

A. Architectural Concrete: All concrete exposed to view in the completed structure including but not limited to walls, columns, curbs, beams, parapets, slabs, or stairs, and as indicated on the Drawings.

1.4. QUALITY ASSURANCE

A. Qualification of Workmen:

1. Provide one or more persons who shall be present at all times during the execution of this portion of the Work and who shall be thoroughly trained and experienced in placing the types of concrete specified and who shall direct all Work performed under this Section.
2. The individual directing this work shall have at least 5 years of foreman experience with ‘As-cast’ Architectural concrete.
3. For finishing of exposed surfaces of the concrete, use only thoroughly trained and experienced journeymen concrete finishers.

B. Owner’s Testing Laboratory:

1. Plant and field inspection and testing of concrete will be performed by an independent testing laboratory employed by the Owner.
2. The Owners use of a Testing Laboratory shall in no way relieve the Contractor of the responsibility to furnish materials and construction in full compliance with the Drawings.
3. If Contractor wants the Testing Laboratory to perform additional compression tests in order to establish compliance with specification requirements at an earlier date, he shall notify the Owners testing laboratory and reimburse the Owner for the expense.

C. Construction Conference:

1. Within 30 days prior to the start of concrete work, the Contractor shall schedule a meeting at a mutually agreeable time to include the Architect, appropriate Architects Consultants, the Construction Manager, and

appropriate subcontractors, the Concrete Supplier to discuss materials, methods of work, forming system and mixes for all classes of concrete.

2. The contractor shall send a pre-concrete conference agenda to all attendees 20 days prior to the scheduled date of the conference.

D. Records:

1. Keep a record and make available for inspection at the site, showing time and place of each pour of concrete, together with transit batch tickets per ASTM C94. Batch tickets shall include the time water was added to dry mix in addition to the other information required.
2. Make the records available to the Architect for his review upon request.

1.5. SUBMITTALS

A. General

1. Review of submittals is for general conformance with the design concept of the project and information shown on the contract documents only. The Contractor is responsible for conforming, correlating and coordinating dimensions in the field for tolerance, clearances, quantities, fabrication and installation processes means and methods of construction, coordination of this work with other trades and performing work in a safe and satisfactory manner.
2. Prior to final approval of Shop Drawings for exposed architectural concrete surfaces the Mock-up specified herein shall be completed and approved. Any modifications of the Mock-up formwork shall be incorporated into the Shop Drawings and other submittals.

B. Shop Drawings

1. Submit detailed drawings showing locations of all concrete joints (construction, contraction, and expansion), curbs, depressions, sleeves and openings.
2. Submit plans and other details showing sequence of concrete pours. This will be reviewed only for impact on the performance of the completed structure.
3. Submit details drawings indicating position of waterstops and details to be used for all water tight construction.
4. Submit shop drawings showing formwork features that impact the concrete finishes and textures including but not limited to form joints.
5. Submit shop drawings detailing Mock-up if a mock up has been specified.

C. Submit proposed methods for Cold and/or hot weather concreting when contemplated.

D. Concrete Mix Design:- Submit proposed mix designs for each class of concrete on the Mix Design Submittal form included at the end of this specification. Include the following:

1. Copies of mix designs. Mix designs shall be prepared by an independent testing laboratory.
2. The mix design submittal shall list:
   a. All materials and admixtures and their proportions.

b. Water and cement content, water cemetitious material ratio, slump, and combined aggregate gradation (percent retained on every sieve size).

c. Compressive strength documentation of how the strength was determined.

d. Information on concrete materials as per paragraph 4.1.2.3 of ACI 301.

e. Whether mix is appropriate for pumping.

f. Indicate where each mix will be used.

3. This submittal shall include the results of all testing performed to qualify the materials and to establish the mix designs. Include all calculations and tests required by ACI 318 Section 5.3.

4. Test results of total chloride in content.

5. Where shrinkage limit is specified submit shrinkage test results.

6. For lightweight aggregate used submit test results per ASTM C330.

7. For normal weight aggregate submit test results per ASTM C33.

E. Product Data: Submit product data for following products showing compliance with project specifications, manufacturer's recommendations, as well as known limitations. Provide certification that the following materials conform to the standards referenced in this section.

1. Curing materials.

2. Slab treatments.

3. Non-shrink grout.

4. (Shake on) hardeners.

F. Certifications: Submit certification by the manufacturers that each admixturer conforms to requirements specified in this section and that the admixtures are compatible with one another.

G. Submit cement mill tests.

H. Upon completion of the concrete Work, deliver the records of concrete placement and the concrete batch tickets to the Architect.

1.6. MOCK-UP AND SAMPLES OF WORKMANSHIP

A. Provide a mockup of the portion of the structure denoted on the Drawings.

B. Mock-up when accepted will serve as the minimum standard by which workmanship will be measured.

C. The mock-up shall be constructed using the same mixes, materials, products, procedures, and methods as will be used for the perminant construction.

D. Shop Drawing and submittal requirements for the mock-up shall be the same as for the permanent construction.

E. Testing and inspection for the mock-up will be the same as for the permanent construction.

1.7. STORAGE OF MATERIALS

A. Comply with ACI 301 Paragraph 4.1.4.

PART 2 – PRODUCTS

2.1. MATERIALS

A. General:
1. Materials used shall be the same as those submitted and from the same source.
2. When it is proposed to change materials from those submitted, conform to paragraph 4.2.1.5 of ACI 301.
3. It is the responsibility of the contractor to ensure that all products used are comptaible with each other.

B. Cement:
1. Portland Cement Type I or II, ASTM C 150.
2. The temperature of cement delivered to the plant shall not exceed 150 degrees F.
3. Architectural Concrete blended with white cement as required to match color of mock-up / samples.
4. One brand from the same source shall be used throughout the project.
5. There shall be no detrimental reaction between the cement and the aggregates used.

C. Normal Weight Aggregates:
1. ASTM C 33. Aggregates shall be evaluated for reactivity per Appendix XI.
2. Aggregates shall be from a source of supply which have shown by actual service to produce concrete of the required quality.

D. Lightweight Aggregates: ASTM C 330,

E. Water: clean, potable, and free of deleterious matter. In addition conform to ASTM C94 including the optional chemical tests.

F. Admixtures:
1. Except where specified herein do not use admixtures without the written acceptance of the Architect. Where more than one is used, admixtures shall be compatible.
2. Admixtures containing Calcium Chloride Thiocyanates or more than 0.05 percent chloride ions are not permitted.
3. Do not use admixtures that will negatively impact the visual finish of concrete exposed to view. For concrete exposed to view the finish shall not varry as a result of changes in the use of admixtures.
4. Water Reducing Admixtures: ASTM C 494, Type A.
5. Water Reducing, Retarding Admixtures: ASTM C494, Type D.

6. Non Chloride, Non-corrosive Accelerating Admixtures: ASTM C494, Type C or E. The admixture manufacturer must have long term non-corrosive test data (of at least a year's duration) from an independent testing laboratory using an acceptable accelerated corrosion test method such as that using electrical pltential measures.
7. Air Entraining Admixtures: ASTM C 260.
8. High Range Water Reducing Admixtures (Superplasticizers): ASTM C 494, Type F or G.
9. Fly ash or possolan admixtures:- ASTM C 618, Type C or Type F.

G. Non-Slip Aggregate Finish: Provide fused aluminum oxide grits, or crushed emery, as abrasive aggregate for non-slip finish with emery aggregate containing not less than 40 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory-graded, packed rust-proof, and non-glazing, and is unaffected by moisture and cleaning materials.

H. Liquid Densifier/Sealer: "Euco Diamond Hard" by The Euclid Chemical Co or approved equal.

I. Penetrating Anti-Spalling Sealer:
1. ASTM C957-15.
2. Sealer shall be siloxane-based compound which has a 92% chloride ion screen and a repellency factor of 92% when tested in accordance with NCHRP #244, Test Method.
3. Sealer treated concrete shall exhibit no scaling when exposed to 125 cycles of freezing-and-thawing.
4. Tests to establish compliance shall be by an independent testing laboratory.

J. Non-Oxidizing Metalic Floor Hardener: "Diamond-Plate" by the Euclid Chemical Co or approved equal.

K. Metallic Floor Hardener: "Euco-Plate HD" by the Euclid Chemical Co. or "MasterTop 200" by BASF Master Builders or approved equal.

L. Mineral Aggregate Hardener: "Surflex" by the Euclid Chemical Co. or "MasterTop 100" by BASF Master Builders or approved equal.

M. Synthetic Fibers:
1. "Fiberstrand" by The Euclid Chemical Co."
2. "Forta" by Forta Corp.
3. "Fibermesh" by Propex Fibermesh.

N. Curing Materials:
1. Fiber reinforced asphaltic vapor barrier building paper.
2. Polyethylene sheet 4-mil thickness.
3. Curing compound ASTM C 309, Type 1, clear or transparent and shall not discolor finished concrete surface or inhibit proper application or performance of any surface finishes or treatments. In addition curing compound shall limit maximum moisture loss to 0.03 g/cm^2 at the coverage used on this project.

O. Concrete Sealer: "Super Aqua-Cure VOX" or "Super Diamond Clear VOX" as manufactured by the Euclid Chemical Company.

P. Premolded Joint filler: ASTM D 1751.

~~**Q. Vapor Barrier: Polyethylene sheeting 10 mils thick of approved manufacturer.**~~

R. Water stops: Bentonite waterstops

2.2. CONCRETE MIXES

A. General

1. Contractor shall be responsible for the design of the concrete mixes.
2. Assume full responsibility for the strength, consistency, water cemetitious material ratio and handling of concrete.
3. Admixtures and products shall be used in accordance with the manufacturer's recommendations.
4. No change of brand or source of any of the concrete ingredients or of the mix proportions will be allowed until submittals have been resubmitted and approved.

B. Proportions:

1. Proportion concrete for strength and workability in accordance with Section 4.2.3 of ACI 301 and the contract documents.
2. Contractor to verify that aggregate size specified for each location is consistent with the forms and dimensions of the section being placed, along with the location and spacing of the reinforcing steel.
3. If the trial batch method is used, use an approved independent testing facility for preparing and reporting the proposed mix designs. Bear all costs in connection with these tests and for the design of the concrete mixes.
4. Adjust the required average compression strength based on subsequent test results for the mix design.
5. Combined aggregate gradation shall result in 8% - 18% being retained on every sieve size except for the top size and No. 100.
6. Limit chloride ion concentrates so as not to exceed the limit set in paragraph 4.3.1 of ACI 318 for "Reinforced concrete that will be dry in service".

C. Fly Ash shall be limited as per section 4.2.2.8.b of ACI 301. Concrete to be assumed to be exposed to deicing chemicals.

D. When lightweight aggregates are used the coarse aggregate shall not exceed 9 cubic feet per cubic yard of concrete.

E. Concrete used over metal deck shall be compatible with the recommendations of the ICC approval for the metal decking.

F. Admixture usage:

1. All concrete slabs, less than 8 inches in thickness, placed at air temperatures less than 50° F, shall contain non-corrosive, non-chloride accelerator.

G. Mixes:

1. Class “A”: For use in foundation, normal weight aggregate, f’c=4000 psi, 1-1/2 inch aggregate, 4 inch maximum slump with water reducing admixture or 8 inch maximum slump with High Range Water Reducing Admixture. Water/cement ratio 0.50 maximum.
2. Class “B”: Typical concrete, normal weight aggregate, f’c=4000 psi, 1 inch aggregate, 4 inch maximum slump with water reducing admixture or 8 inch maximum slump with High Range Water Reducing Admixture, water/cement ratio 0.50 maximum, drying shrinkage limit of 0.045 percent.
3. Class “C”: Exterior concrete exposed to freezing and thawing, normal weight aggregate, f’c=4000 psi, 1 inch aggregate, 4 inch maximum slump with water reducing admixture or 8 inch maximum slump with High Range Water Reducing Admixture, water/cement ratio 0.50 maximum, Air content of 4.5% to 7.5%.
4. Class “D”: For use over metal decking, lightweight coarse aggregate (110 pcf maximum air dry), f’c=3000 psi, 1 inch aggregate, 4 inch maximum slump with water reducing admixture or 8 inch maximum slump with High Range Water Reducing Admixture, water/cement ratio 0.50 percent. Lightweight concrete should have a minimum average 28-day splitting tensile strength of 300 psi as per Table 2 of ASTM C330.
5. Class “E”: For use as fill when footing was over-excavated, normal weight aggregate 1-1/2 inch aggregate, f’c=500 psi, 4 inch maximum slump with water reducing admixture or 8 inch maximum slump with High Range Water Reducing Admixture.
6. Class “F”: For filling metal stair pans, normal weight aggregate, f’c=2,500 psi, 1/2 inch aggregate, 4 inch maximum slump, water/cement ratio 0.50.
7. Class “G”: For exposed polished concrete topping slab, normal weight aggregate, f’c=5,000 psi , ¾ inch aggregate, 4” maximum slump with water reducing admixture, water/cement ratio .45 maximum, no added air entrainment, maximum admixture 2% of total mix weight, plasticizers, slag, fly ash or other products replacing Portland cement to be a maximum of 10% of Portland cement volume.

H. Clarification of Mix Properties:

1. f’c is the minimum compressive strength at 28 days, tested in accordance with ASTM C39.
2. Slump specified is maximum not to exceed tested in accordance with ASTM C143. If superplasticizers are used higher slumps will be allowed providing this will not lead to segregation of the aggregate and providing that the mix without the superplasticizer meets the slump requirements.
3. Aggregate size is the largest of the coarse aggregate.
4. Air content is by volume.
5. Water/cement ratio is specified by weight.
6. Concrete weight is maximum air dry weight. Unless noted otherwise weight shall be 150 pcf.
7. Drying shrinkage limit is percentage change in length when tested as per ASTM C157 with 4 inches x 4 inches x 11 inches specimen. The specimens

shall be stored using the air store option. Measurements shall be taken at the times required by the standard with the measurement taken after eight weeks of air storage to be used to determine compliance with the specified limits.

2.3. MORTARS AND GROUTS

A. Bonding Grout: Approximately 1 part Portland cement to 1 part fine sand passing a No 30 sieve, mixed to a creamy consistency.

B. Patching Mortar for exposed concrete shall be made of the same material and of approximately the same proportions as used for concrete, except that coarse aggregate shall be omitted and mortar shall consist of not more than 1 part Portland cement to 2-1/2 parts damp loose sand by volume.

1. Combine white and gray Portland cement as necessary to match color specified by Architect. Use no more mixing water than necessary for handling and placing.
2. Mix patching mortar in advance and allow to stand with frequent mixing with trowel without adding water until it has reached the stiffest consistency that will permit placing.

C. Drypack for Base Plates: Refer to section 05 12 00 Structural Steel Framing.

D. Non-Shrink Grout for Base Plates: Refer to section 05 12 00 Structural Steel Framing.

E. High Flow Grout:

1. Where high fluidity and/or increased placing time is required, use high flow grout.
2. ASTM C1107, “Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)”.
3. When placed at a fluid consistency there shall be at least 95% bearing under an 18”x36” base plate.

F. Epoxy grout for anchor reinforcing steel or threaded rods in concrete shall be MasterEmaco ADH 326 as manufactured by BASF Master Builders, or Sikadur 32 Hi-Mod as manufactured by Sika Corporation, or Epoxy 452 by Euclid Chemical Company.

G. Cementitious grout for anchor reinforcing steel or threaded rods in concrete shall be Masterflow 928 grout as manufactured by BASF Master Builders, Sika Grout 212 as manufactured by Sika Corporation, or Hi-Flow grout by Euclid Chemical Company.

2.4. BONDING AND REPAIR MATERIAL

A. Polymer Patching Mortar: These patching mortars may be used when color match of the adjacent concrete is not required. Prior approval by the Engineer is required.

1. “Thin-Top Supreme” or “Concrete-Top Supreme” by Euclid Chemical Company (horizontal repairs); “Verticoat or Verticoat Supreme” (vertical and overhead repairs) by Euclid Chemical Company.

2. "Sikatop 121 Plus or 122 Plus" (horizontal repairs), "Sikatop 123 Plus" (vertical and overhead repairs) by Sika Chemical Corp.

B. Low Shrinkage Structural Repair Mortar: All horizontal, vertical and overhead areas, so indicated on the plans, or otherwise designated by the Engineer to be repaired, shall use the specified low shrinkage structural repair mortar. This one component polymer, microsilica modified, high strength concrete repair mortar. Product shall be "EucoRepair V100" by the Euclid Chemical Co.

C. Epoxy Adhesive:

1. The compound shall be a two (2) component, 100% solids, 100% reactive compound suitable for use on dry or damp surfaces.
2. Designated repairs shall be made, with prior approval of the Engineer, as to method and procedure, using these epoxy adhesives and/or epoxy mortar. Where epoxy injection procedures must be used, an approved low viscosity epoxy made by these manufacturers shall be used.

"Euco #452 MV or Euco #620 Epoxy System" by the Euclid Chemical Co.

"Sikadur Hi-Mod" by the Sika Chemical Corp

D. Underlayment Compound: Free-flowing, self-leveling, pumpable cementitious base compound.

1. "Flo-Top" by the Euclid Chemical Co.

E. Repair Topping: Self-leveling, polymer modified high strength topping. Product shall be "Thin-Top Supreme" by the Euclid Chemical Co. The topping shall exhibit the following properties:

Chaplin Abrasion Test - 0.02 mm (0.0079") maximum @ 28 days

2.5. QUALITY ASSURANCE

A. Testing Laboratory will review concrete mix designs.

PART 3 – EXECUTION

3.1. SURFACE CONDITIONS

A. Examination: Prior to Work of this Section, carefully inspect the installed Work of other trades and verify that such Work is complete to the point where this installation may properly commence.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Architect.
2. Do not proceed with installation in areas of discrepancy until such discrepancies have been fully resolved.

3.2. GENERAL

A. Particular care shall be used when starting a concrete pour to maintain the continuity of appearance. Use all means necessary to avoid blemishes, imperfections, or changes in the finish. Cured colored concrete shall be consistent in color and appearance.

B. Note that the appearance of exposed concrete surfaces depends upon uniform color and texture within any one area and between adjacent areas and exercise strict batching, mixing, placing, curing, etc. controls to achieve this end.

C. Cutting and/or patching made necessary by failure or delay in complying with these requirements shall be at no additional expense to the Owner. No cutting or patching of exposed concrete shall be done without Architects approval.

D. All concrete work shall comply with the tolerances specified in ACI 117.

3.3. PREPARATION

A. Clear away debris and excess water from areas where concrete will be placed. Remove any material from in-place concrete or steel which will impair bond.

B. For concrete placed on soil, the subgrade shall be thoroughly wetted prior to placing.

C. Sandblast all construction joints and under baseplates to clean and roughen the entire surface of the joint, exposing coarse aggregate solidly embedded in mortar matrix. Roughen joint to a full amplitude of minimum ¼-inch. Roughen concrete surface while concrete is still green where possible. Do not leave laitance, loosened particles of aggregate or damaged concrete at surface. Forms and reinforcing shall be cleaned of drippings.

D. Dampen contact surfaces of construction joints, leaving them free of standing water, before placing fresh concrete.

E. Form clean-out openings and removable sections shall be placed and secured only after inspection of forms.

3.4. MIXING CONCRETE

A. Ready Mix and Site Produced Concrete

1. Comply with ASTM C 94.
2. The batching plant shall be equipped with an electric metering device capable of determining moisture content of sand.
3. The addition of water at the site is contingent upon full time inspection of the process by the owners testing laboratory and the acceptance of the Inspector, Comply with ACI 301, section 4.3.2.1.
4. Begin the mixing operation within thirty minutes after the cement has been intermingled with the aggregates.

B. Lightweight Concrete: Mix lightweight concrete in accordance with the directions of the approved lightweight aggregate manufacturer.

3.5. PLACING CONCRETE

A. Inspection: Do not place concrete until forms and reinforcement as well as other required inspections have occurred and the Inspector is present to perform observations and tests during placing.

B. Before placing concrete remove snow, ice, frost, water, and other foreign material from surfaces, including reinforcement and embedded items against which concrete will be placed.

C. Method:

1. Convey concrete from mixer to place of final deposit by methods that will prevent separation and loss of materials. Do not use aluminum pipes or chutes.
2. Deposit concrete as nearly as possible to its final position to avoid segregation due to re-handling and flowing.
3. Place concrete at a consistency that allows proper placement and consolidation. Do not exceed the maximum specified slump.
4. Comply with ACI 301, Section 5.3.2.4
5. The unconfined vertical drop of concrete from the end of hoses or other conveying equipment to the placement surface shall not be greater than 10 feet for concrete containing High Range Water Reducing Admixture and 6 feet for all other concrete.

D. Sequence: Place concrete in columns, beams and joist stems prior to pouring concrete slabs.

E. Rate of Placement:

1. Place concrete at such a rate that concrete is at all times plastic and flows readily between bars.
2. When placing is once started, carry it on as a continuous operation until placement of the panel or section is complete. Construction joints to be made only where indicated on the Drawings or on approved shop drawings. Prevent the formation of cold joints at other locations.
3. Do not pour a greater area at one time than can be properly consolidated and finished without cracking or causing other problems. During hot or dry weather adjust the area as necessary.
4. Insure that concrete is in its final position within 1-1/2 hours after the introduction of the cement to the aggregates. In hot weather reduce this time limit so that no stiffening of the concrete shall occur until after it has been placed.

F. Weather Considerations

1. Follow the provisions of sections 5.3.1.5 and 5.3.1.6 of ACI 301.
2. Implement the cold weather procedures submitted prior to placing concrete when the temperature is less than 40 degrees F or is expected to drop below 40 degrees F in the following three days.
3. Temperature of the concrete shall not exceed 90 degrees F. Implement hot weather procedures as necessary to limit concrete temperature.
4. Comply with the temperature requirements of ASTM C94, section 4.2.2.7 of ACI 301, and section 5.3.2.1.c of ACI 301.
5. Comply with section 5.3.2.1.a of ACI 301.

G. A sample load of each of the specified mixes of strength equal or greater than for footings, may be poured in the foundation to check workability of the concrete.

H. Consolidation

1. Use all means necessary to provide fully filled out, smooth, clean, and properly aligned surfaces free from honeycomb,all pockets, planes of weakness, and unsightly blemishes.
2. During the pour, use suitable tools along the faces of the forms to force large particles away from the forms and to bring mortar to the surface of the forms.
3. Vibration shall be by means of mechanical vibrators in direct contact with the concrete, and not by vibrating the forms or reinforcing. Vibration shall continue until water shows the first sign of rising.
4. A mechanical vibrator shall be employed at each point of deposit. A stand-by vibrator in good working condition, but not in use, shall be kept on the job until all concrete is placed.
5. During placement when placing more than one layer of concrete, extend vibrator into the previous layer.
6. Workers shall be experienced in the use of vibrators. All vibrating operations of architectural concrete shall be performed by the same skilled person responsible for vibrating acceptable concrete in the mock-ups.

3.6. CONCRETE FINISHES AND TREATMENTS

A. General:

1. Take care that the concrete meets the screeds accurately and does not rise above or below them.
2. When placing concrete on metal deck at interior slabs, adjust screeds during placement (adjusting for deflection in metal decking and steel beams) so as to assure top of slab is at desired elevation.
3. When placing concrete on metal deck at exterior slabs, set screeds so as to maintain specified slab thickness.
4. Carefully provide slab depression as required for the finishes indicated on the Drawings.
5. Tolerances of all non-formed concrete finishes shall be in accordance with ACI 117.

B. Finishing Horizontal Surfaces:

1. Unless otherwise noted make all slabs even and uniform in appearance and, finish.
2. Finished floor tolerances to be measured as specified in section 4.8.5 of ACI 117. All finished floors shall achieve level tolerances of F_f 25/F_l 20 (F_f 35 for high-density storage on rails and areas to receive thin-set ceramic tile or vinyl tile). Finished floor under operable partitions to maintain maximum 1/8” deviation in flatness per 12 feet along partition length.
3. Where floor drains or floor slopes are indicated, slope slabs uniformly to provide even fall for drainage.
4. Unless otherwise noted, trowel all interior slabs to a troweled finish as per section 5.3.4.2.c of ACI 301.

5. Where slab is to receive additional cementitious topping or self-leveling compound, provide fine broom finish.
6. Non-Oxidizing Metallic Floor Hardener:
    a. All slabs, in the loading dock area, or other areas noted on the drawings, shall receive an application of the non-oxidizing, metallic floor hardener applied at the rate of 1.5 lbs/ft^2. Immediately following the first floating operation, uniformly distribute approximately 2/3 of the required weight of the non-oxidizing metallic floor hardener over the concrete surface, by mechanical spreader, and embed by means of power floating. The hardener shall be floated in and the second application made. The surface shall be floated again to properly bond the hardener to the base concrete slab. The surface shall then be troweled, at least twice, to a smooth dense finish.
    b. After completion of broadcasting and floating, apply trowel finish as herein specified. Cure slab surface with curing compound recommended by hardener manufacturer. Apply curing compound immediately after final finishing.
7. Mineral Aggregate Hardener:
    a. All slabs, in areas noted on the drawings, shall receive an application of the mineral aggregate hardener applied at the rate of 1.2 lbs/ft^2. The hardener shall be applied in two applications by mechanical spreader. The first shake shall comprise 2/3 of the specified amount of hardener. This application shall be made after the initial floating operation unless climatic conditions dictate earlier application. The hardener shall be floated in and the second application made. The surface shall be floated again to properly bond the hardener to the base concrete slab. The surface shall then be troweled, at lease twice, to a smooth, dense finish.
    b. After completion of broadcasting and floating, apply trowel finish as herein specified. Cure slab surface with curing compound recommended by hardener manufacturer. Apply curing compound immediately after final finishing.

C. Finish of Formed Concrete Surfaces
1. Unless otherwise stated formed concrete surfaces shall have a smoothed formed finish.

D. Finish of Flatwork
1. Type of finish shall be in accordance with the architectural drawings.

E. Treatments and Repairs
1. Repairs of Tie Holes.
    a. Immediately after form removal, form ties shall be removed from exposed surfaces, and holes shall be pointed flush with mortar composed of one part Portland Cement and one part sand.
    b. Except where form tie holes are to be left exposed, fill tie holes solid with patching mortar to match finish of adjacent surface.
2. Repairs of Defects Other Than Tie holes.

a. It is the intent of these specifications that the work will be of such quality that no patching of concrete will be required. In the event remedial patching is required, patch only areas designated by Architect.

b. Prepare repair samples for Architect's approval at areas designated by Architect.

c. Comply with provisions of section 5.3.7.3 of ACI 301.

d. Slabs on Grade: After entire slab is finished any shrinkage cracks that are greater than 1/16 inch wide, shall be repaired.

1). As approved by the Architect, fill cracks larger than 1/32 inch wide with cement grout and strike off level with surfaces.

F. Concrete Surfaces to Receive Cement Plaster: Lightly sandblast to remove loose material and roughen surface in preparation for cement plaster.

3.7. CURING CONCRETE

A. Curing shall comply with ACI 301 Section 5.3.6.

3.8. CONCRETE FILL

A. Install concrete fill on a continuous wire mesh of not less than 14 gage welded wire fabric, 2 in square, supported approximately ½ in above the bottom of pans. Screed concrete fill level and finish with wood float.

B. Screeding the concrete finish level, permit it to stand until it will bear the weight of workmen standing on boards. At this time the abrasive aggregate, having previously been soaked in clean water for about ten minutes, shall be sprinkled uniformly on the surface and immediately wood floated into the cement finish.

3.9. LIQUID DENSIFIERS, SEALERS AND DUSTPROOFING

A. Sealer/Dustproofer

1. Apply the specified sealer/dustproofer to exposed slabs subject to pedestrian traffic and as noted on the plans. Compound should be applied in strict accordance with the directions of the manufacturer just prior to completion of construction.

2. Apply according to manufacturer's instructions in a consistent manner to all surfaces.

B. Liquid Densifier/Sealer:

Apply the compound on exposed interior floors subjected to vehicular abrasion and shake on hardener slabs as indicated on the drawings.] [Apply to hardened concrete surfaces exposed to the elements that are not otherwise protected.] Application shall be made in strict accordance with the directions of the manufacturer and just prior to completion of construction. Spray, squeegee or roll on liquid densifier to clean, dry concrete surface. The liquid should be scrubbed into the surface with a mechanical scrubber. Keep the surface wet with the densifier during the application process. When the product thickens, but not more than 60 minutes after initial application, the surface shall then be squeegeed or vacuumed to remove all excess liquid.]

3.10. PROTECTION

A. During curing period protect concrete from damaging mechanical disturbances, particularly load stresses, heavy shock and excessive vibration.

B. Protect surfaces from damage due to paints, oils, rust or other stains and from impact damage.

3.11. GROUTING

A. Mix grout in accordance with the manufacturer's instructions to a consistency which will permit placement. Place grout in accordance with manufacturers recommendations. Place grout so as to ensure complete bearing and elimination of air pockets.

3.12. BASE PLATE GROUTING

The setting of steel base plates is specified under section 05 12 00 Structural Steel.

3.13. INSTALLATION OF EPOXY GROUTED ANCHORS

A. Holes to receive epoxy grouted reinforcing steel or threaded rods shall be drilled ¼-inch larger than the embedded item.

B. Install the grout according to the manufacturer's recommendations with due care given to cleaning hole prior to injection of grout.

C. Use care to insure that reinforcing steel or threaded rods to be embedded in epoxy grout are clean of oil and other substances that impact the bond to the grout.

D. Remove excess grout on the surface of the existing concrete. Use sandblasting or other mechanical means.

E. Use care when drilling holes so as not to cut existing reinforcing steel.

3.14. INSTALLATION OF CEMENTITIOUS GROUTED ANCHORS

A. Holes to receive cementitious grouted reinforcing steel or threaded rods shall be drilled with an annular space of ½-inch, i.e. hole diameter shall be 1 inch larger than the maximum diameter (e.g. out-to-out of bar deformations) of the embedded item.

B. Install the grout according to the manufacturer's recommendations with due care given to cleaning hole of all grease, oil, dirt and loose particles prior to placement of grout.

C. Saturate surface 24 hours just prior to grouting. Remove all free water prior to grouting. The surface shall be saturated surface dry at the time of grouting.

D. Install grout and anchors with due care to ensure continuous bonding between surfaces and that there are no voids in the grout.

E. Use care to ensure that reinforcing steel or threaded rods to be embedded in grout are clean of oil and other substances that impact the bond to the grout.

F. Remove excess grout on the surface of the existing concrete. Use sandblasting or other mechanical means.

G. Use care when drilling holes so as not to cut existing reinforcing steel.

3.15. CLEANUP

A. Remove all form release agents, bond breakers, curing compounds or other materials inconsistent with the specified finishes or that would prevent proper application of sealants, liquid waterproofing, or other finishes or treatments specified.

B. Clean all concrete surfaces that are to be exposed to view. Remove all cement and concrete droppings or splatters. Remove stains, and other discolorations which mar the appearance of the concrete.

C. Take care not to damage surrounding surfaces or leave residue from cleaning agents.

3.16. FIELD QUALITY ASSURANCE

A. General:

1. Notify the Architect and Testing Laboratory at least 48 hours prior to start of placement of concrete.
2. All testing specified in this section, including preparation of samples, shall be done by Testing Laboratory retained by the Owner.
3. The Testing Laboratory shall have free access to all places where concrete materials are stored, proportioned, or mixed and all materials, equipment, and methods used shall be subject to this inspection and test. Provide assistance as needed by the testing laboratory.
4. As a minimum, all testing and inspection as per the requirements of the International Building Code, 2015.

B. Sampling and Field Tests:

1. Take a sample from each 50 cubic yards of each grade of concrete or fraction thereof, or from each 2000 square feet of surface area for slabs or walks placed each day. No less than one sample to be taken for any one days operation. Each sample shall consist of:
    a. Five identical test cylinders made and stored in accordance with ASTM C-31.
    b. Slump test in accordance with ASTM C143 at point concrete is discharged into forms.
    c. Air entrainment test ASTM C173 or ASTM C231.
    d. Temperature of concrete and air.
    e. Water content in accordance with AASHTO TP23.
2. In addition to the normal samples make a slump test at 2-hour interval during concrete placement.
3. When shrinkage limit is specified take a shrinkage sample at the first pour for the mix design.

C. Testing:

1. Specimens to be cured in the laboratory in accordance with ASTM C 192 and tested in accordance with ASTM C 39.
2. Test two cylinders of each sample at 7 days for information and two cylinders at 28 days for acceptance. Keep the additional cylinder for later testing.
3. The strength level of the concrete will be acceptable if the averages of all sets of three consecutive 28 day strength tests results equal or exceed the specified strength, and no individual strength test result fall below the specified strength by more than 500 psi.
4. Test shrinkage in accordance with ASTM C-157.

D. Periodically inspect batch plant operations during production of concrete.

E. Notify Architect and Testing Laboratory when reinforcing steel or threaded rods are to be installed in grouted holes so the Testing Laboratory can observe work and proof test bars. A minimum of 25 percent of the bars or rods to be proof tested to 100 percent of specified yield.

End of Section

Section 03 45 00

PRECAST ARCHITECTURAL CONCRETE
(TRADE CONTRACT REQUIRED AS PART OF SECTION 04 00 01)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Sub-Bid Requirements: As provided under Section 04 00 01 - MASONRY TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.

1. Work of this Filed Sub-Bid includes all individual specification sections listed in Section 04 00 01.

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish finished and cured, reinforced plant-cast architectural concrete planters for installation under Section 04 20 00 - UNIT MASONRY.

B. Make provisions in forms for proper location and installation of pipe sleeves, duct openings, keys, chases, electrical boxes, bolts, anchors, inserts, and similar items, as required by other trades. Notify appropriate trades when items noted are ready for installation.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Structural concrete and concrete housekeeping pads.

B. Section 04 20 00 - UNIT MASONRY:

1. Concrete block and brick masonry work.
2. Installation of precast concrete units furnished under this Section 03 45 00.

C. Section 05 12 00 - STRUCTURAL STEEL FRAMING: Structural steel framing.

D. Section 05 31 00 - STEEL DECKING: Metal roof decking.

E. Section 05 50 00 - METAL FABRICATIONS: Loose lintels, light iron and other miscellaneous metal work furnished to Section 04 20 00 for building into masonry.

F. Section 07 92 00 - JOINT SEALANTS: Sealant and back-up materials.

1.3 REFERENCES

A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. ACI 318 - Building Code Requirements for Reinforced Concrete.

2. ANSI/ASTM A 36 - Structural Steel.
3. ANSI/ASTM A 185 - Welded Steel Wire Fabric for Concrete Reinforcement.
4. ANSI/ASTM A 307 - Carbon Steel Externally Threaded Standard Fasteners.
5. ASTM A 325 - High Strength Bolts for Structural Steel Joints.
6. ANSI/ASTM A 386 - Zinc Coating on Assembled Steel Products.
7. ASTM A 615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
8. ANSI/ASTM C 31 - Making and Curing Concrete Test Specimens in the Field.
9. ASTM C 33 - Concrete Aggregates.
10. ASTM C 143 - Test for Slump of Portland Cement Concrete.
11. ASTM C 150 - Portland Cement.
12. ASTM C 260 - Air Entraining Admixtures for Concrete.
13. AWS - D1.1 - Structural Welding Code.
14. PCI - Manual For Structural Design of Architectural Precast Concrete.
15. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.
16. PCI MNL-120 - Design Handbook - Precast and Prestressed Concrete.
17. All applicable federal, state and municipal codes, laws and regulations for structural concrete

1.4 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's complete product data specifications for portland cement, each admixture proposed to be used, integral colorants, curing compounds, compressible fillers, and other manufactured items.
2. Shop drawings:
    a. Reinforcement Drawings show: elevations dimensions of concrete, reinforcement clearances; brackets, openings, sleeves or other items furnished by other Sections; and shapes, dimensions, and details of reinforcement and accessories.
    b. Except as otherwise noted, approval of shop drawings will be for size and arrangement of components. Errors in dimensions shown on shop drawings shall be responsibility of contractor. Check and coordinate cast-in-place concrete work with work of other trades before submitting shop drawings.
    c. Do not proceed with fabrication of material or performance of work until corresponding item on shop drawing has been approved by the Engineer.
3. Samples:
    a. Manufacturer's standard samples of integral colorant material, for initial selections by the Architect.
    b. After receipt of initial approval of the submittals required hereunder, and selections of integral colorants, submit one 12 by 12 by 2 inch piece of

each type and finish of architectural concrete for preliminary approval of the Architect.

4. Test Reports: Submit preliminary rest results for the Architect's approval at least three weeks prior to the beginning of the work. In addition to the test reports specified under “Quality Control”, submit the following from the testing laboratory through the contractor to the Architect:
   a. Preliminary Design Mix Reports (ACI 301).
   b. Aggregate Soundness Test Reports (ASTM C 88).
   c. Aggregate Staining Test Reports (ASTM C 641).
   d. Air Entrainment Test Reports (ASTM C 260).

B. Submit maintenance data under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS; indicate surface cleaning instructions.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with PCI MNL-116, PCI MNL-120, PCI Manual For Structural Design of Architectural Precast Concrete,

B. Welding: ANSI/AWS D1.1.

C. Design reinforcement under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the Commonwealth of Massachusetts.

1.6 QUALIFICATIONS

A. Fabricator Qualifications: A firm that complies with the following requirements and is experienced in producing architectural precast concrete units similar to those indicated for this Project and with a record of successful in-service performance.
   1. Participates in PCI’s Plant Certification program (at the time of bidding) and is designated “at a minimum” a PCI Certified plant for the following Groups:
      a. Group AT (Architectural Trim Units).
   2. Participates with annual standard reviews per PCI MNL-117,

B. Erector Qualifications: A precast concrete erector with erecting crews experienced and qualified to erect Architectural Precast Concrete with a minimum of 5 years of Architectural Concrete Erecting experience.

C. Welders: Employ only experienced welders who are certified for the specific weld processes and positions required and who have been qualified within the preceding 12 months under AWS standard qualification procedure for the type of work required.

1.7 DELIVERY, STORAGE AND HANDLING

A. Handle precast units to position, consistent with their shape and design. Lift and support only from support points.

B. Lifting or handling equipment: Capable of maintaining units during manufacture, storage, transportation, erection, and in position for fastening.

C. Blocking and lateral support during transport and storage: Clean, non-staining, without causing harm to exposed surfaces. Provide temporary lateral support to prevent bowing and warping.

D. Protect units to prevent staining, shipping, or spalling of concrete.

E. Mark units with date of production in location not visible to view when in final position in structure.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate the work of this Section with the respective trades responsible for installing interfacing work, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

1. Coordinate the placement of anchorage devices and embedded inserts.

PART 2 - PRODUCTS

2.1 DESIGN REQUIREMENTS

A. Design units and all connections and embedded items to design loads as calculated in accordance with Massachusetts State Building Code, and erection forces.

1. Precast concrete fabricator shall prepare design calculations in accordance with PCI Manual 121, "Manual for Structural Design of Architectural Precast Concrete". The calculations shall be certified, stamped and signed by a Structural Engineer registered in the State where project is located.
2. Design Loads: Design panels and connections to support total loads including dead loads, live loads, earthquake loads, thermal loads, wind loads and other loads as prescribed by applicable building codes for this project location and by reference standards.
3. Connection Points: Connect precast to building structure only at locations approved by building structural engineer and as indicated on the approved shop drawings.

B. Design units to accommodate construction tolerances, deflection of building structural members and clearances of intended openings.

C. Design component connections to accommodate building movement and thermal movement. Provide adjustment to accommodate misalignment of structure without unit distortion or damage.

2.2 CONCRETE MIX

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout the Project:

1. Cement: ASTM C 150, Portland Type III - High Early Strength; white or gray mix color as required to match specified finish and Architect's approved sample. Use only one brand throughout project.
2. Fine Aggregate: Washed, inert, sand of with color characteristics which when combined with other constituents will produce concrete of specified color. Fine aggregate shall conform to ASTM C33.

3. Coarse Aggregate: Provide aggregate conforming to ASTM C 33. Hard, durable, carefully selected and graded; free of material causing staining or reacting with cement. 3/8" and 3/4" stone of color, type and size gradation to Architect approved sample.
4. Air Entraining Admixture: ASTM C260 as approved by Architect.
5. Water-Reducing Admixture: ASTM C494, Type A, unless otherwise approved by Architect.
6. Water: Clean and not detrimental to concrete.

B. Color Additives:

1. Manufacturer: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include, the following, or approved equal:
   a. Davis Colors, Beltsville, MD, product: “Davis Colors”.
   b. L.M. Scofield Company, Douglasville, GA, product: “Chromix”.
   c. Bayer Corporation, Pittsburgh, PA, product: “Bayferrox”.
2. Materials: Color additives shall contain pure, concentrated mineral pigments specially processed for mixing into concrete, resistant to alkalis and complying with ASTM C979.
   a. Color additives containing carbon black are not acceptable.
   b. Provide color as selected by the Architect matching approved samples.
3. Admixtures: Do not use calcium chloride admixtures.

C. Air-Entraining Admixture: ASTM C 260.

D. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.

2.3 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

1. Chemical Surface Retarder: Water-soluble, liquid set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to depth of reveal or etch required of specified finish.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.4 STEEL REINFORCEMENT

A. Plain-Steel Wire: ASTM A 82, for reinforcing.

B. Bar Supports: Manufactured according to CRSI's "Manual of Standard Practice" of plastic or CRSI Class 1 plastic-protected steel wire or Class 2 stainless-steel wire.

C. Tie wire, minimum 16 gage annealed type, epoxy coated.

2.5 SUPPORT DEVICES AND CONNECTION MATERIALS

A. General: Connecting hardware shall be engineered and designed by the fabricator to accommodate all loads to which it will be subject both in the permanent condition and due to handling. Connection details indicated on the drawings shall be considered minimum required and shall be strengthened as necessary in accordance with design calculations.

B. Connecting and Support Devices:

1. Surface preparation prior to galvanizing: Pickle steel prior to galvanizing in conformance with SSPC-SP8. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter.
2. Hot-dip galvanizing: Comply with ASTM A 123. Provide thickness of galvanizing specified in referenced standards.
    a. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating as specified herein above. Apply liquid zinc by brush or spray on all damaged areas in two coats to a total dry film thickness of not less than 3 mils. Apply first coat within two hours after damage to hot-dip film to prevent undue oxidation of exposed surface. On all welds remove weld spatter by power wire brushing or equivalent before applying liquid zinc coating. Repair material should extend at least 3 inches beyond all edges of the damaged galvanized area as possible to assure continuity of galvanic protection.
    b. Touch-up of galvanized surfaces with aerosol spray, silver paint, bright paint, or aluminum paints is not acceptable.
3. Bolts, Nuts, and Washers: A ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); carbon-steel, hex-head bolts and studs; carbon-steel nuts; and flat, unhardened steel washers.
    a. Hot dip galvanize studs, bolts, and nuts to be embedded into concrete.
4. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.
5. Unheaded Carbon-Steel Rods and Nuts: ASTM A 36/A 36M, threaded rods with ASTM A 563, nuts.

C. Welding Electrodes: Comply with AWS standards.

D. Hot-Dip Galvanized Finish: Apply zinc coating to steel connections by hot-dip process, complying with ASTM A 123/A 123M or ASTM A 153/A 153M as applicable.

1. Zinc Repair Paint: SSPC-Paint 20.

2.6 FORMS AND ACCESSORIES

A. Forms: Metal, dressed lumber, or other approved materials that are nonreactive with concrete and that will provide continuous, true, and smooth concrete surfaces.

B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm).

C. Form Liners: Units of face design, texture, arrangement, and configuration indicated. Furnish with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent surface treatments of concrete.

D. Reveal Strips: Metal, PVC, rubber, straight dressed wood, or plywood; with sides kerfed.

E. Sealer: Penetrating, clear, polyurethane wood form sealer formulated to reduce absorption of bleedwater and prevent migration of set-retarding chemicals from wood or plywood.

2.7 ACCESSORIES

A. Non-shrink grout: Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents; complying with ASTM C 1107, of consistency suitable for application.

1. Minimum compressive strength of 2400 psi in 48 hours and 7000 psi in 28 days.

B. Recessed Reglets: Stainless steel, lead or zinc, shaped and flanged to remain in place once cast, taped closed to eliminate wet concrete intrusion.

2.8 CONCRETE MIXTURES

A. Concrete mix proportions for each mix required shall be determined in accordance with the requirements of ACI Standard 318.

1. Concrete mix designs shall be established by test on trial batches to achieve the required specified strengths. Tests will be necessary on all mixes including facing, backup, and standard which may be used in production of units. Testing procedures shall comply with the recommendations outlined in PCI “manual for Quality Control for Plants and Production of Architectural Precast Concrete Products”. Plant records shall be kept available to the Architect – Engineer upon request.

B. Proportion concrete mixture as follows:

1. Minimum Compressive Strength: 5000 psi (27.6MPa) at 28 days
2. Maximum Water-Cementitious Materials Ratio: 0.45.

3. Slump Limit: 4 inches (100 mm) or 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range, water-reducing admixture, plus or minus 1 inch (25 mm).
4. Air Content: 6 percent plus or minus 1.5 percent for 3/4-inch (19-mm) nominal maximum aggregate size at point of delivery.
5. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete according to ACI 301 requirements.

C. Limit water-soluble chloride-ion content in hardened concrete to 0.05 percent by weight of cement.

D. Exposed Aggregate Retarder: (if required for desired finish) Provide non-staining product which produces results matching approved samples and mock-ups.

E. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing or high-range, water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

F. Pigments and coloring agents The amount and type of coloring agent used shall not reduce the quality of the concrete as specified.

G. Provide and stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for project.

2.9 FABRICATION

A. Fabrication procedure to conform to PCI MNL-117.

B. Maintain plant records and quality control program _during production of precast units. Make records available upon request.

C. Use rigid molds, constructed to maintain precast unit uniform in shape, size and finish.

D. Maintain consistent quality during manufacture.

E. Fabricate connecting devices, plates, angles, [items fit to steel framing members,] inserts, bolts, and accessories. Fabricate to permit initial placement and final attachment.

F. Embed reinforcing steel, anchors, inserts plates, angles, and other cast-in items as indicated on [shop] Drawings.

G. Place recessed flashing reglets furnished by Section 07 62 00 continuous and straight.

H. Locate hoisting devices to permit removal after erection.

I. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.

J. Minor patching in plant is acceptable, providing structural, adequacy and appearance of units is not impaired.

2.10 FINISH - PRECAST UNITS

A. Abrasive-Blast Finish: Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces.

1. Light aggregate exposure.
2. Color: Match abutting brick.

B. Ensure exposed-to-view finish surfaces of precast units are uniform in color and appearance.

2.11 FABRICATION TOLERANCES

A. Conform to PCI MNL-117.

B. Location of Reglets: 1/4 inch from true position.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation of Precast concrete unit trim elements, is included under Section 04 20 00 - UNIT MASONRY.

3.2 REPAIRS

A. Repair damaged architectural precast concrete units if permitted by Architect. The Architect reserves the right to reject repaired units that do not comply with requirements.

B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet (6 m).

C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.

D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.

E. Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.

3.3 CLEANING

A. Clean surfaces of precast concrete units exposed to view.

B. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.

C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

End of Section

Section 04 00 01

MASONRY TRADE CONTRACT REQUIREMENTS
(TRADE CONTRACT REQUIRED)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.

1.2 PUBLICLY BID TRADE CONTRACTOR

A. The work of this section pertains to a Publicly Bid Trade Contract and includes the following requirements:

1. Specification requirements for Trade Contract “MASONRY” include all of the following listed Specification Sections: in their entirety:

a. Section 04 00 01 –MASONRY TRADE CONTRACT REQUIREMENTS.

b. Section 03 45 00 – PRECAST ARCHITECTURAL CONCRETE

c. Section 04 20 00 – UNIT MASONRY.

B. Submit bid as directed by and in compliance with the Request for Bids, the Instructions to Bidders, and this Article 1.2.

C. Submit bid on the bid form provided in the Project Manual.

D. Submit bid in a sealed envelope in the manner described in the Instructions to Bidders before the date and time indicated for submission of bids.

E. The work to be completed by the Trade Contractor for the work of this Section is shown on the following listed Drawings, not just those pertaining particularly to this Trade Contract, unless specifically called out otherwise, regardless of where among the Drawings it appears:

1. The Work of this Trade Contract is shown on the following Drawings:

A001, A101, A101A, A101B, A101C, A101D, A102, A102A, A102B, A102C, A102D, A103, A103A, A103B, A103C, A104, A200, A211, A201, A212, A202, A213, A203, A214, A204, A215, A205, A230, A300, A301, A311, A312, A313, A314, A315, A316, A317, A318, A319, A320, A321, A322, A440, A441, A442, A450, A451, A452, A453, A460, A461, A462, A463, A503, A510, A511, A512, A513, A514, A515, A520, A521, A522, A523, A524, A530, A531, A532, A533, A544, A570, A603, A605, A710, A711, A713, A714, S000, S001, S002, S003, S101A, S101B, S101C, S101D, S101L, S102A, S102B, S102C, S102D, S103A, S103B, S103C, S103D, S104B, S104C, S104D, S105B, S105C, S200, S201, S202, S203, S204, S205, S300, S301, S302, S303, S304, S305, S400, S401, S500, S501, S502, S503, S504, S600, S601, S602, S603, S604, S700, S701, A002, A100, A111A, A111B, A111C, A111D, A112A, A401, A501, A502, A606, A700

2. The complete List of Drawings for the Project is provided on the Drawing Cover Sheet.

F. The Trade Contractor shall perform the complete trade work, including the following listed sub-trade classes of work, with employees on its own payroll unless the Trade Contractor identifies on the bid form, the name of a sub-trade subcontractor that will perform each of the following classes of sub-trade work and the corresponding sub-trade subcontract sum.

1. None Required.

G. If the Trade Contractor intends to use sub-trade subcontractors to perform any portion of the trade work other than the customary sub-trade classes of work listed in Paragraph 1.2(G), above, the Trade Contractor shall list on the bid form the names of each such sub-trade subcontractor and each respective sub-trade subcontract sum unless: (a) the value of the sub-trade subcontract is less than Twenty-Five Thousand Dollars ($25,000), or (b) the sub-trade subcontract is not subject to the provisions of MGL c. 149, §§ 44A-J.

H. The BIDDING REQUIREMENTS, CONTRACT FORMS, and Contract Conditions as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.

1.3 RELATED RQUIREMENTS

A. Construction Manager's Document entitled: "BID PACKAGE #3: MASONRY CM's SUPPLEMENTAL INSTRUCTIONS, (Issued by separate Addendum).

1.4 EXAMINATION OF SITE AND DOCUMENTS

A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from Construction Manager or Trade Contractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.

1.5 MEETINGS AND CONFERENCES

A. Pre-Bid Conference: Trade Contractors are strongly encouraged to attend the Pre-Bid Conference; refer to INVITATION TO BID for date and time.

B. Installer of the Work of this trade is required to attend pre-installation conferences specified under the following specification sections:

1. Section 07 27 26 – FLUID-APPLIED MEMBRANE AIR BARRIERS.

1.6 SEQUENCING

A. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.

B. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.

C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

PART 2 - PRODUCTS

2.1 SCAFFOLDS AND STAGING

A. General: Trade Contractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in the Construction Manager's GENERAL PROJECT REQUIREMENTS – APPLICABLE TO ALL TRADE AND NON-TRADE SUBCONTRACTORS and herein.

1. Scaffolding and staging required for use by this Trade Contractor pursuant to requirements of the Construction Manager's GENERAL PROJECT REQUIREMENTS – APPLICABLE TO ALL TRADE AND NON-TRADE SUBCONTRACTORS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contractor requiring such scaffolding.
2. Each Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the Construction Manager.
3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility this Trade Contractor.

B. Weather protection and temporary enclosures: Comply with requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and the following:

1. Each individual Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the Construction Manager pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).
    a. Construction Manager is responsible to provide, maintain and remove temporary enclosures of the work from November 1, to March 31 pursuant to Mass. General Laws.
    b. Trade Contractor is responsible to provide, maintain and remove temporary enclosures of the work for protection from inclement weather from April 1, to October 31, at no additional cost to the Owner.

2.2 HOISTING MACHINERY AND EQUIPMENT

A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed,

operated and maintained in safe conditions by this Trade Contractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 3 - EXECUTION (Not Used)

End of Section

Section 04 20 00

UNIT MASONRY
(TRADE CONTRACT REQUIRED AS PART OF SECTION 04 00 01)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Sub-Bid Requirements: As provided under Section 04 00 01 - MASONRY TRADE CONTRACT REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.

1. Work of this Filed Sub-Bid includes all individual specification sections listed in Section 04 00 01.

1.2 SUMMARY

A. Furnish and install:

1. Brick masonry veneer construction for exterior and interior walls.
2. Ground face concrete masonry veneer construction.
3. Concrete masonry unit construction for interior partitions.
4. Concrete masonry unit structural bearing walls and reinforcing piers.
5. Mortar.
6. Thermal blocks at base of exterior walls on concrete decks.
7. Grout fill for bond beams, and vertical reinforcement, cavities of base courses at grade, baseplates, wherever ties or anchorage items occur in masonry, and as further indicated in the Drawings.
8. Reinforcing, ties, anchors, and other metal accessories, for anchoring unit masonry together and to other materials.
9. Compressible joint fillers for control joints in unit masonry work and joints with structural steel.
10. Rigid insulation and semi-rigid mineral fiber insulation at exterior masonry walls.

B. Place, install and build-in, as work progresses, the following products and materials furnished under the indicated Sections:

1. Anchor bolts, wood blocking, and anchorage items furnished or set by other trades as specified in individual Sections.
2. Precast architectural concrete, furnished by 03 45 00.
3. Steel embeds furnished by Section 05 12 00 – STRUCTURAL STEEL FRAMING.
4. Steel embeds furnished by Section 05 21 00 –STEEL JOIST FRAMING.
5. Steel lintels furnished by Section 05 50 00 - METAL FABRICATIONS.
6. Flashing and reglets furnished by Section 07 62 00 - SHEET METAL FLASHING AND TRIM.
7. Access door frames furnished by Section 08 31 00 - ACCESS DOORS AND PANELS or by section requiring the same.

C. Build-into place as work progresses, the following products and materials furnished under the indicated Sections:

1. Electrical outlets, fire alarm boxes and similar products as indicated on Drawings.

D. Coordinate masonry with products recessed into masonry construction, including recessed drinking fountains, cardiac cabinets and similar products as indicated on Drawings.

E. Clean and point exposed to view surface masonry.

1.3 RELATED REQUIREMENTS

A. Section 01 43 39 - MOCKUPS: Requirements for exterior wall mock-up assembly requiring work of this Section.

B. Section 01 45 29 - TESTING LABORATORY SERVICES: Perform testing of masonry, mortar and grout specified herein.

C. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.

D. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Special administrative and procedural requirements related to LEED VERSION 4 FOR BUILDING DESIGN AND CONSTRUCTION" (LEED V4 BD+C) certification goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

E. Section 03 20 01 – CONCRETE REINFORCING.

F. Section 03 30 01 - CAST-IN-PLACE CONCRETE:

1. Concrete foundation work, walls and slabs.
2. Reinforcing steel stub-ups for reinforced masonry partitions and walls.

G. Section 03 45 00 - PRECAST ARCHITECTURAL CONCRETE.

H. Section 04 00 01 - MASONRY TRADE CONTRACT REQUIREMENTS.

I. Section 05 12 00 - STRUCTURAL STEEL FRAMING.

J. Section 05 21 00 - STEEL JOIST FRAMING.

K. Section 05 30 00 – METAL DECKING.

L. Section 05 40 00 - COLD-FORMED METAL FRAMING.

M. Section 05 50 00 - METAL FABRICATIONS.

N. Section 06 10 00 – ROUGH CARPENTRY.

O. Section 06 16 00 - SHEATHING: Wall sheathing at masonry veneer walls.

P. Section 07 27 26 – FLUID-APPLIED MEMBRANE AIR BARRIERS.

Q. Section 07 54 19 - POLYVINYL-CHLORIDE (PVC) ROOFING

R. Section 07 62 00 - SHEET METAL FLASHING AND TRIM

S. Section 07 84 00 - FIRESTOPPING.

T. Section 07 92 00 - JOINT SEALANTS: Sealant, caulking materials, and compressible joint bead back-up, in conjunction with masonry work.

U. Section 11 66 23 - GYMNASIUM EQUIPMENT

V. Section 11 66 24 - BASKETBALL EQUIPMENT

W. Section 11 66 43 - INTERIOR SCOREBOARDS

X. Section 12 66 13 – TELESCOPING BLEACHERS.

Y. Division 21 – FIRE SUPPRESSION.

Z. Division 22 – PLUMBING.

AA. Division 23 – HEATING VENTILATING AND AIR CONDITIONING.

BB. Division 26 – ELECTRICAL.

CC. Division 27 – COMMUNICATIONS.

DD. Division 28 – ELECTRONIC SAFETY AND SECURITY.

1.4 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. Masonry Standards Joint Committee (MSJC) [The Masonry Society (TMS)/American Concrete Institute (ACI)/American Society of Civil Engineers (ASCE)]: TMS 602/ACI 530.1/ASCE 6 - “Specifications for Masonry Structures”
2. ASTM A 36 - Structural Steel.
3. ASTM A 82 - Steel Web, Plain, for Concrete Reinforcement.
4. ASTM A 123 - Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products.
5. ASTM A 153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
6. ASTM A 497 - Welded Wire Fabric; Deformed, for Concrete Reinforcement.
7. ASTM A 615 - Deformed and Plain Billet-Steel Bar for Concrete Reinforcement.
8. ASTM A 641 - Zinc-Coated (Galvanized) Carbon Steel Wire.
9. ASTM A 767 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

10. ASTM A 775, "Standard Specification for Epoxy-Coated Steel Reinforcing Bars."
11. ASTM A 884, "Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement for Reinforcement."
12. ASTM A 934/A 934M, "Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
13. ASTM B 117 - Salt Spray (Fog) Testing.
14. ASTM B 633 - Electrodeposited Coatings of Zinc on Iron and Steel.
15. ASTM C 5 - Quicklime for Structural Purposes.
16. ASTM C 55 - Concrete Building Brick.
17. ASTM C 62 - Building Brick.
18. ASTM C 67 - Sampling and Testing Brick and Structural Clay Tile.
19. ASTM C 90 - Load-Bearing Concrete Masonry Units.
20. ASTM C 91 - Masonry Cement.
21. ASTM C129 - Non-Load Bearing Concrete Masonry Units.
22. ASTM C 140 - Method of Sampling and Testing Concrete Masonry Units.
23. ASTM C 144 - Aggregate for Masonry Mortar.
24. ASTM C 150 - Portland Cement.
25. ASTM C 207 - Hydrated Lime for Masonry Purposes.
26. ASTM C 216 - Facing Brick.
27. ASTM C 270 - Mortar for Unit Masonry.
28. ASTM C 387 - Packaged, Dry, Combined Materials, for Mortar and Concrete.
29. ASTM C 404 - Aggregates for Masonry Grout.
30. ASTM C 476 - Grout for Masonry
31. ASTM C 514 - Water Penetration and Leakage Test to Assess Performance of Integral Water Repellent Admixtures.
32. ASTM C 578 - Preformed, Cellular Polystyrene Thermal Insulation.
33. ASTM C 595 - Blended Hydraulic Cement.
34. ASTM C 652 - Hollow Brick (Hollow Masonry Units Made from Clay or Shale).
35. ASTM C 778 – Specification for Standard Sand.
36. ASTM C 780 - Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
37. ASTM C 1019 - Method of Sampling and Testing Grout.
38. ASTM C 1072 - Method for Measurement of Masonry Flexural Bond Strength.
39. ASTM C 1093 - Standard Practice for Accreditation of Testing Agencies for Masonry.
40. ASTM C 1329 – Standard Specification for Mortar Cement.
41. ASTM C 1357 – Test Methods for Evaluating Masonry Bond Strength.
42. ASTM C 1709 Standard Guide for Evaluation of Alternative Supplementary Cementitious Materials (ASCM) for Use in Concrete.
43. ASTM D 1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.

44. ASTM D 2000 - Classification System for Rubber Products.
45. ASTM D 2287 - Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds.
46. ASTM D 3963/D, Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars.
47. ASTM E 119 - Fire Tests of Building Construction and Materials.
48. ASTM E 447 - Compressive Strength of Masonry Prisms.
49. ASTM E 488 - Strength of Anchors in Concrete and Masonry Elements.
50. ASTM E 518 - Test Method for Flexural Bond Strength of Masonry.
51. American National Standards Institute Building Code requirements.
52. MCAA – Hot and Cold Weather Masonry Construction.

B. The following reference materials are hereby made a part of this Section by reference thereto:
   1. UL Fire Resistance Directory.
   2. BIA applicable Technical Notes, Research Reports and Standards, including, but not limited to the following
      a. BIA Research Report Number 15 – Causes and Control of Efflorescence in Brickwork.
      b. BIA Technical Notes, Number 18A – Accommodating Expansion of Brickwork.
      c. BIA Technical Notes, Number 20 - Cleaning Brick Masonry.
   3. IMI: Masonry Construction Guide Manual.
   4. PCA, “Concrete Masonry Handbook”.
   5. NCMA applicable TEK Bulletins.
   6. NCMA TEK Bulletin Nº. 45 - Removal of Stains from Concrete Masonry Walls.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.
   2. Coordinate work with that of other trades which require placement and building-in of, as work progresses, anchor bolts, wood blocking, hollow metal frames, aluminum windows, storefront and curtain wall framing, and anchorage items.
   3. Be responsible for establishing locations and levels for all work of this Section, except such parts as may be delivered to others and set by them. In such cases assist them in properly locating said parts.
   4. Examine all Drawings as to requirements for the accommodation of work of other trades. Provide all required recesses, chases, slots, and cutouts. Place anchors, bolts, sleeves and other items occurring in the masonry work. Take every precaution to minimize future cutting and patching. Closely coordinate the location and placement of such items.

B. Sequencing:

1. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.
2. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

1.6 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties for each item furnished hereunder.
2. Material certificates: Provide for the following, signed by manufacturer and Contractor certifying that each material complies with requirements.
    a. Masonry materials: Each different cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
    b. Each material and grade indicated for reinforcing bars.
    c. Each type and size of joint reinforcement.
    d. Each type and size of anchors, ties, and metal accessories.
3. Material test reports from a qualified independent laboratory employed and paid by Contractor indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:
    a. Mortar complying with the property requirements of, and tested in accordance with ASTM C 270.
    b. Mortar complying with the proportion requirements of ASTM C 270 and tested in accordance with ASTM C 780.
    c. Grout mixes: Include description of type and proportions of grout ingredients.
    d. Masonry units; report for tests performed within the previous six months.
4. Verification samples:
    a. Samples of each masonry accessory or anchorage item required.
    b. Brick masonry full size units, demonstrating full range of colors anticipated.
    c. Mortar samples; Initial from manufacturer's full range of available colors and for final verification.

1.7 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1. Engineered Masonry: Design and certify under direct supervision of Professional Engineer, where indicated that the work of this section meets or exceeds the performance requirements specified in this section and as required by *International Building Code*, 2015 edition as amended by the Massachusetts State Building Code, Ninth edition.
2. Structural requirements as indicated on Structural Drawings.

B. Sole Source:

1. Facing units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.
2. Concrete masonry units: Obtain standard concrete masonry units for the project from a single manufacturer.
3. Mortar materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.
4. Prepackaged mortar materials: Obtain masonry cement or masonry mortar from a single manufacturer. Colored mortar is required; provide batch tickets confirming all materials are from a single production run to ensure uniformity of the mix.

C. Qualifications:

1. Installer: Company specializing in performing the masonry work of this Section with minimum of 10 years documented experience. Work shall be done by skilled workmen, fully instructed as to the requirements of this Specifications and adequately supervised during the work.
2. Welders Certificates: Utilize only qualified welders employed on the Work. Submit verification that Welder's are AWS D1.1 and D1.4 qualified within the previous 12 months.
3. Testing Agencies: To qualify for performing tests and inspection specified in this Section, an independent testing laboratory must demonstrate to Architect's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM C 1093, that it has the experience and capability to conduct satisfactorily the testing indicated without delaying the progress of the Work.

D. Epoxy coated reinforcement, ASTM A775 and A884:

1. Coating applicator shall have quality control program to assure that coated reinforcement comply with requirements of Specifications.
2. Submit proof of current certification for rebar coating plant from Concrete Reinforcing Steel Institute.

E. Inspection, Testing, and Quality Control: A program of Inspection and Testing of structural masonry work will be established by the Structural Engineer of Record (SER) who will direct the implementation of tests as carried out by an independent testing agency. All costs for inspection and testing will be borne by the Owner.

F. Preconstruction Testing Service: Owner shall engage a qualified independent testing agency to perform preconstruction testing indicated below. Payment for

these services will be made by Owner. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.

1. Concrete Masonry Unit Test: For each concrete masonry unit indicated, per ASTM C 140.
2. Prism Test: For each type of wall construction indicated, per ASTM C 1314.
3. Mortar Test: For mortar properties per ASTM C 270.
4. Grout Test: For compressive strength per ASTM C 1019.

1.8 MOCK-UPS

A. Provide 4 by 4 foot sized color sample mock-ups for Brick, CMU Ground Face, CMU plain face in accordance with Section 01 43 39 – MOCKUPS at exterior on-site location where directed by Architect. A total of nine color sample mock-ups are required, each with 3 separate mortar colors. Mock-up will demonstrate quality of work, construction methods, relationship to other work.

B. Provide mock-up elements for three separate field panels showing different percentage blends of Brick type 1 in accordance with Section 01 43 39 – MOCKUPS at exterior on-site location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work.

C. Provide mock-up elements interior/exterior wall for Auditorium Wall mock-up in accordance with Section 01 43 39 – MOCKUPS at on-site location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work.

D. Provide mock-up elements for Exterior Wall mock-up in accordance with Section 01 43 39 – MOCKUPS at exterior on-site location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work.

1.9 PRE-INSTALLATION CONFERENCE

A. At least two weeks prior to preparing shop drawings for the work of this Section, conduct a pre-installation conference at the Project site. Coordinate time of meeting to occur prior to installation of work under the related sections named below.

1. Required attendees: Architect, Contractor, Mason’s Project Superintendent, and representatives of other related trades as directed by the Architect or Contractor, and representatives for installers of related work.
2. Agenda:
    a. Scheduling of masonry operations.
    b. Review of staging and material storage locations.
    c. Coordination of work by other trades.
    d. Protection of completed Work.
    e. Establish weather and working temperature conditions to which Architect and Contractor must agree.

1.10 DELIVERY, STORAGE, AND HANDLING

A. General: Do not deliver cement, lime, and similar perishable materials to the site until suitable storage is available. Store such materials in weatherproof structures, and ensure that materials are in perfectly fresh condition when brought for use. Protect masonry units and manufactured products of all types from wetting by rain or snow, and keep covered when not in use.

B. Masonry Face Units: Handle all masonry units carefully in transit and on the site, so as to keep units whole, with edges sharp, and faces clean and undamaged. Deliver all masonry units on pallets; or handle units individually, and properly stack same.

C. Aggregates: Deliver, store and handle aggregate materials so as to prevent contamination with earth or other foreign materials.

1. Store cement, lime and similar products under cover and from direct contact with earth or floor slabs.

D. Manufactured items: Deliver manufactured products in original containers plainly marked with product identification and manufacturer's name.

1. Store metal accessories and the like under cover and from direct contact with ground, and in manner to prevent rust.

E. Avoid damaging coatings on epoxy coated reinforcement:

1. Contact areas of handling and hoisting systems shall be padded or be made of nylon or other acceptable material.
2. Use spreader bars to lift bundles of coated bars to prevent bar-to-bar abrasion.
3. Pad bundling bands or fabricate of nylon or other acceptable material.
4. Store coated bars on padded or wooden cribbing.
5. Do not drag coated bars.
6. After placement, restrict traffic on coated bars to prevent damage.
7. Repair damaged epoxy coatings according to ASTM D 3963.

F. Damaged material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages, packages containing water marks, or which show other evidence of damage, unless Architect specifically authorizes correction thereof and usage on project.

1.11 ENVIRONMENTAL CONDITIONS

A. Hot and cold weather requirements shall be in accordance with the recommendations of the Masonry Industry Council as contained in the document "*HOT AND COLD WEATHER MASONRY CONSTRUCTION*" published by the MCAA (Masonry Contractor's Association of America). Enforcement for these requirements shall take place under the following conditions which modify those in the referenced document.

1. The recommended hot weather requirements for 100 degrees Fahrenheit (37.8 degrees Celsius) shall be enforced for this project when ambient

temperatures are above 90 degrees Fahrenheit (32.2 degrees Celsius) under all wind conditions including zero velocity.

2. Cold weather requirements shall be enforced when ambient temperatures fall below 40 degrees Fahrenheit (4.4 degrees Celsius).

PART 2 - PRODUCTS

2.1 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

1. Provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E 119 by a testing and inspecting organization, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

D. Performance Requirements:

1. Provide structural unit masonry that develops the following net-area compressive strengths (f'm) at 28 days. Determine compressive strength of masonry from net-area compressive strengths of masonry units and mortar types according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
2. Provide unit masonry that develops the following net-area compressive strengths (f'm) at 28 days. Determine compressive strength of masonry by testing masonry prisms according to ASTM C 1314.
   a. For Concrete Unit Masonry: f'm = 2,000 psi.
   b. For Brick Unit Masonry: f'm = 3,000 psi.

2.2 SUSTAINABILITY CHARACTERISTICS

A. Comply with sustainability characteristics for each “Sustainability Focus Material” in accordance with Section 018113 Appendix A and Appendix B.

2.3 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3,350 psi (23.10 MPa).
3. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C 67.

4. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."

B. “B1” Brick types: ASTM C 216, Type FBS Grade SW, matching Architect’s samples.
   1. “B1” Brick types, Nominal 4 inches deep by 4 inches high, by 12 inches wide.
      a. Brick Scored Type B1A, with scores (false joints) per Drawings.
      b. Brick Scored Type B1B, with scores (false joints) per Drawings.
      c. Brick Scored Type B1C, with scores (false joints) per Drawings.
   2. Colors:
      a. Brick color Type 1: Match Bowerston 49R I.S.
   3. Finish: Iron Spot.
   4. Acceptable Manufacturers.
      a. Bowerston, Bowerston, OH..
      b. Endicott Clay Products Company, Endicott, NE.
      c. Belden Brick Company, Canton, OH.

C. “B2” Brick types: ASTM C 216, Type FBS Grade SW, matching Architect’s samples.
   1. “B2” Brick types, Nominal 4 inches deep by 8 inches high, by 8 inches wide.
      a. Brick Scored Type B2A, with no scores.
      b. Brick Scored Type B2B, with scores (false joints) per Drawings.
      c. Brick Scored Type B2C, with scores (false joints) per Drawings.
      d. Brick Scored Type B2D, with scores (false joints) per Drawings.
   2. Colors:
      a. Brick color Type 2: Match Bowerston 49R I.S.
   3. Finish: Iron Spot.
   4. Acceptable Manufacturers.
      a. Bowerston, Bowerston, OH.
      b. Endicott Clay Products Company, Endicott, NE.
      c. Belden Brick Company, Canton, OH.

D. Building brick: ASTM C 62, Grade SW, solid units in size to match facing brick.

2.4 CONCRETE MASONRY UNITS

A. Acceptable Concrete Masonry Fabricators: Subject to compliance with the requirements specified herein, Fabricators offering concrete masonry products which may be incorporated in the work include the following, or approved equal:
   1. Westbrook Concrete Block Company, Inc., Westbrook CT
   2. Foster-Southeastern, Inc., Holbrook, MA.
   3. Adolf Jandris and Sons, Inc.; Gardner, MA.
   4. Medway Block Company, Inc., Medway MA.
   5. Park Avenue Cement Block Co.. Cranston RI.

6. Nitterhouse Masonry Products, LLC, Chambersburg, PA., as distributed by Consolidated Brick & Building Supplies, Avon, MA.

B. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

C. Load bearing hollow and solid, normal weight concrete masonry units: Conform to ASTM C90, Type 1, Class 1, normal weight.

1. Basis of Design: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Westbrook Concrete Block Company, Inc., Westbrook CT.
2. Plain-faced units of nominal thickness indicated on the Drawings, nominal 8 by 16 inch face dimension with uniform medium-fine texture, sound, true to plane and line, and free from chips, cracks, and other defects.
    a. Plain Face Types:
        1) “C1”: Nominal 4 inches deep by 4 inches high by 12 inches wide, having scores (false joints) as indicated.
        2) “C2”: Nominal 4 inches deep by 8 inches high by 16 inches wide, having scores (false joints) as indicated.
        3) “M1”: Nominal 12 inches deep by 8 inches high by 16 inches wide, having no scores (false joints).
        4) “M2”: Nominal 8 inches deep by 8 inches high by 16 inches wide, having no scores (false joints).
    b. Types required (C1A, C1B, C1C, C2A, C2B, C2C) having wythe (depth) and fire resistant construction rating as indicated on Drawings,
    c. Recycled content: Use maximum available percentage of recycled materials. Concrete masonry units incorporated into the work shall contain not less than 3 percent of recycled content.
3. Aggregate: sand and gravel: conform to ASTM C 33.
4. Minimum allowable compressive strength for an individual unit of not less than 1700 psi (net area); and not less than 2,000 psi. (net area) for average of 3 units; when tested in accordance with ASTM C 140.
5. Oven dry density: 125 pounds per cubic foot.
6. Moisture content for average of 3 units, when delivered, not exceeding 35 percent of the total absorption, when tested in accordance with ASTM C 140.
7. Integral insulation: Molded polystyrene insulation as manufactured by Korfil Inc., West Brookfield MA., conforming to FS HH-I-524, type 1 and having an U-Value of 0.24 when tested with block in accordance with ASTM C236. Factory install insulation in block cores by concrete unit masonry manufacturer.
8. Block Colors:
    a. “C1”: Gray Portland Cement with color as selected by Architect from manufacturer’s options.
    b. “C2”: Gray Portland Cement with color as selected by Architect from manufacturer’s options.
    c. “M1”: Gray Portland Cement with no color additive.
    d. “M2”: Gray Portland Cement with no color additive.

D. Concrete Building Brick (concealed conditions only): ASTM C55 and characteristics indicated below for grade, type, size and weight classification.

1. Grade: N.
2. Type: moisture controlled units, Type 1.
3. Size: modular, 2-1/4" x 3-5/8" x 7-5/8".
4. Weight classification: Same as for concrete block.

E. Concrete masonry grout blocks (bond beams): Open end high strength concrete masonry units and slot type strength concrete masonry units for use at reinforced concrete masonry construction where indicated on the Drawings. Conform to all requirements specified above for standard concrete masonry units, and the following additional requirements:

1. Plain-faced bond beam units of nominal thicknesses indicated on the Drawings, with color, texture, and scores (false joints) matching surrounding plain-faced units with scores. Bond Beam units shall be true to plane and line, and free from chips, cracks, and other defects.
    a. Block Colors:
        1) “C1”: Gray Portland Cement with color as selected by Architect from manufacturer’s options.
        2) “C2”: Gray Portland Cement with color as selected by Architect from manufacturer’s options.
        3) “C3”: Gray Portland Cement with no color additive.
        4) “C4”: Gray Portland Cement with no color additive.

F. Integral water-repellent: Factory fabricate all exterior-exposed concrete masonry units with Integral water repellent admixture in concrete mix.

1. Description: Integral liquid polymeric admixture mixed with concrete during production of concrete masonry units, which will cross link and become permanently locked into masonry unit to provide resistance to water penetration (water permeance) to achieve a Class E rating when tested to ASTM E 514-74.
    a. Flexural Bond Strength of Masonry: No statistically lower masonry flexural bond strength shall occur as a result of adding integral water-repellent CMU and mortar admixtures when compared to a control (containing no admixtures) CMU and mortar tested according to ASTM C 1357.
    b. Compressive Strength of Masonry Prisms: No statistically lower compressive strength of prisms shall occur as a result of adding integral water-repellent CMU and mortar admixtures when compared to a control (containing no admixtures) CMU and mortar when tested according to ASTM C 1314.
    c. Drying Shrinkage of CMU: No statistically higher drying shrinkage of the CMU shall occur as a result of adding integral water-repellent CMU admixture when compared to a control (containing no admixtures) CMU when tested according to ASTM C 426.
2. Acceptable products include the following, or approved equal:
    a. ACM Chemistries, Inc., Norcross GA., product “Rainbloc”.

b. BASF Corporation, Master Builders Brand, Cleveland OH., product: “MasterPel 240”.

c. W.R. Grace & Company, Cambridge MA., product: “Dry-Block”.

3. Fabricate blocks using water-repellent admixture at rate recommended by admixture manufacturer.

2.5 MORTAR

A. Prepackaged mortar (ready mix) complying with ASTM C 1142, or site-mixed portland cement mortar complying with ASTM C 270 may be used.

1. Admixtures are not permitted except where expressly specified herein or as otherwise approved by Architect for specific field conditions.

2. Color for all exposed-to-view masonry as selected by Architect.

B. Mortar materials for site mixed mortar:

1. Portland cement for masonry conforming to ASTM C 150, Type I, non-staining, without air entrainment. Use Type III as necessary for laying masonry in cold weather.

a. Color for all exposed-to-view masonry as selected by Architect.

2. Aggregates for grout: Conforming to ASTM C 144 for fine aggregate and ASTM C 404, Size 8 or 89.

3. Aggregate for concrete masonry mortar: Clean, washed uniformly well graded sand conforming to ASTM C 144, with the following gradation, and having a fineness modulus between 2.15 and 2.35:

Seive Size	Percentage Passing
#4	100%
#8	95 to 100%
#16	70 to 100%
#30	40 to 75%
#50	10 to 35%
#100	2 to 15%
#200	0 to 5%

4. Lime: Approved brand of plastic hydrated lime, conforming to ASTM C 207, Type “S”.

5. Water: Clean and fresh without contaminants.

C. Prepackaged mortar (ready mix)

1. General: complying with ASTM C 1142, factory blended consisting of:

a. Portland cement: Comply with ASTM C 150, Type I.

b. Hydrated lime: Type S, complying with ASTM C 207.

c. Aggregate: Provide clean, sharp, well graded aggregate free from injurious amounts of dust, lumps, shale, alkali, surface coatings, and organic matter, and complying with ASTM C144.

d. Admixtures: Prepackaged mortar mixes contain manufacturer’s own proprietary admixtures, additional field admixtures are strictly prohibited.

e. Water: Provide water free from deleterious amounts of acids, alkalis, and organic materials. Water shall be potable.

f. Pigments: Chemically inert synthetic iron oxide pigments, lightfast, weather resistant, complying with ASTM C-979.

1) Mortar Color: As selected by Architect from manufacturer's full range of standard colors.

D. Integral water-repellent admixture for mortar: Integral liquid polymeric admixture mixed with mortar unit to provide resistance to water penetration.

1. Source Control: Integral water-repellent admixture must be of same manufacturer and type as used for production of concrete masonry units.
2. Acceptable products include the following, or approved equal:
   a. ACM Chemistries, Inc., Norcross GA., product "Rainbloc".
   b. BASF Corporation, Master Builders Brand, Cleveland OH., product: "Rheopel Plus-D".
   c. W.R. Grace & Company, Cambridge MA., product: "Dry-Block Mortar Admixture".

E. Mortar types:

1. Mortar for masonry below grade or in contact with earth: ASTM C 270 Type M using the property specification.
2. Mortar for load bearing masonry: ASTM C 270 Type M using the property specification.
3. Mortar for reinforced masonry: ASTM C 270 Type S using the property specification.
4. Mortar for non-load bearing masonry above grade: ASTM C 270 Type N using the property specification.
5. Color for all exposed-to-view masonry as selected by Architect.
6. Mortar for pointing, dirt and stain resistant type: ASTM C 270 Type N using the property specification with added aluminum tristearate, calcium stearate, or ammonium stearate to a quantity of 3 percent of Portland cement weight.

2.6 GROUT MIXES

A. Prepackaged grout (ready mix) complying with ASTM C 1107, or site-mixed Portland cement grout complying with ASTM C 476 may be used.

B. Grout for setting equipment, anchor bolts, elevator guide rails, structural steel elements and miscellaneous metals: Non-metallic high-strength controlled expansion grout of flowable consistency, having a compressive strength of 6,500 pounds per square inch (44.8 MPa) at 28 days; slump 8 to 10 inches.

1. Five Star Products, Inc., Fairfield CT, product "Five Star Grout".
2. L&M Construction Chemicals, Omaha NE, Product: "Crystex".
3. Master Builders, Cleveland, OH., product "Masterflow 713".
4. Sika Corporation, Lyndhurst, NJ., product "SikaGrout 212".
5. Sonneborn Building Products, Minneapolis, MN., product "Sonogrout 10K".
6. Symons Corporation, DesPlaines, IL., product "Symons Multi Purpose Grout".

C. Grout for engineered masonry (core fill): Course grout having a compressive strength of 3,000 pounds per square inch (13.8 to 15.5 MPa) at 28 days; slump 8 to 10 inches.

D. Grout for bond beams and lintels: Fine grout having a compressive strength of 3,000 pounds per square inch (17.2 to 20.6 MPa) at 28 days; slump 8 to 10 inches.

2.7 REINFORCEMENT AND ANCHORAGE MATERIALS

A. Reinforcing steel (typical), additional to rods which are embedded in concrete: Solid steel reinforcing bars, conforming to ASTM A 615, Grade 60, in accordance with ASTM 767 of sizes indicated on the Structural Drawings.

1. Recycled content of Steel: Use maximum available percentage of recycled steel. Reinforcing steel incorporated into the work shall contain not less than 60 percent of recycled scrap steel.

B. Reinforcing steel (at reinforced double-wythe entrance screen walls), Epoxy-Coated Fabricated Reinforcing Bars complying with ASTM A775, and conforming to ASTM A 615, Grade 60, of sizes indicated on the Structural Drawings

1. Recycled content of Steel: Use maximum available percentage of recycled steel. Reinforcing steel incorporated into the work shall contain not less than 60 percent of recycled scrap steel.
2. For epoxy-coated reinforcement, use all-plastic bar supports.

C. Single wythe longitudinal reinforcement for concrete masonry unit walls and partitions: in overall width 1-5/8 inches less than the overall wall thickness, as manufactured by Dur-O-Wal, Hohmann, AA Wire, or equal.

1. Interior partitions: Ladder design, 9 gage ASTM A 641 class 1 galvanized wire.
2. Exterior partitions: Ladder design, 9 gage ASTM A 580 type 304 stainless steel wire.
3. Provide preformed reinforcing sections at intersections of masonry walls and partitions, and whenever walls and partitions change direction.

D. Multi-wythe longitudinal reinforcement for concrete masonry unit walls and partitions: in overall width 1-5/8 inches less than the overall wall thickness, with moisture drip as manufactured by Dur-O-Wal, Hohmann, AA Wire, or equal.

1. Interior partitions: Ladder design, 9 gage ASTM A 641 class 1 galvanized wire without a moisture drip
2. Exterior partitions: Ladder design, 9 gage ASTM A 580 type 304 stainless steel wire with moisture drip.

E. Masonry anchors to steel columns:

1. Weld-on anchor tie with 1/4 inch plain steel rod and adjustable hot dipped galvanized web-tie (end partition condition):
    a. Heckmann model number 315 rod with 318 tie.
    b. Hohmann & Barnard model number 359 rod with “318” tie.
    c. Wire Bond Inc., model number 1000 rod with 1200 tie.

2. Weld-on anchor tie with 1/4 inch plain steel rod and adjustable hot dipped galvanized triangular-tie:
    a. Heckmann model number 315 rod with 316 tie.
    b. Hohmann & Barnard model number 359 rod with “Vee” tie.
    c. Wire Bond Inc., model number 1000 rod with 1100 tie.

F. Veneer anchorage shall be anchor plate design with “U” shaped adjustable pintle. Back plate shall be fabricated from 12 gage stainless steel sheet metal conforming to ASTM A 1008, in length required to suit insulation thickness with double leg pintle formed from 3/16 inch diameter cold drawn stainless steel wire tie conforming to ASTM A 82. All components shall be Type 304 stainless steel. Size ties to penetrate a minimum of two-thirds of the depth of veneer when measured from the back face. Provide anchors with insulation retaining clips. Anchor spacing shall be as specified in herein below.

1. Subject to compliance with the requirements specified herein, manufacturers offering concrete masonry products which may be incorporated in the work include the following, or approved equal:
    a. Basis of Design: Hohmann & Barnard model number HB-5213 with pintle wire tie.
    b. Heckmann: approved equal.
    c. Wire Bond Inc.: approved equal.
2. Screws for Application to Metal Stud Backup Wall: Self-tapping, Type 410 stainless steel screw with anti-corrosion coating and hex washer head bonded to EPDM washer,
    a. Size: No. 12.
    b. Product: Textron Fastening Systems, “Drill Screws with Bonded Sealing Washers, Part No. EHL431, or equal.
3. Screws for Application to Cast-In-Place Concrete and concrete masonry units: Heavy-duty, Type 410 stainless steel screw with anti-corrosion coating and hex washer head,
    a. Size: No. 14.
    b. Product: Textron Fastening Systems, “Crete-Flex SS4 Masonry Fastening System, Part No. EMF330” or equal.

2.8 FLASHING MATERIALS

A. Flashing materials, furnished by Section 07 62 00 – SHEET METAL FLASHING AND TRIM, and installed under this Section 04 20 00, including tie-in materials.

B. Termination and lap sealant (concealed conditions only) cap sealant at self-adhering flashing strip, and including thru-wall overlap at drip edge, Type PE sealant: Polyether, single-component non-sagging gun-grade, low-odor, neutral curing polyether, sealant, conforming to FS TT-S-000227E, Type II, Class A, and ASTM C 920, Type S, Class 25, Grade NS, use NT, T, M, G, A and O with a minimum movement capability of ±25 percent, equal to the following:

1. BASF (Sonneborn), product, “Sonolastic 150”.
2. STS Coatings, product “GreatSeal PE-150” Sealant.
3. Chem Link, product “MetaLink”.

4. York Manufacturing, product: “PE-150 Liquid Tape”.

2.9 EXTERIOR WALL CAVITY INSULATION

A. Thermal Isolation Blocks: Load bearing insulation block

1. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on CSI of Virginia, Inc., Richmond VA, product: Last-a-Foam R-9300, having minimum 1000 psi compressive strength
   a. Acceptable manufacturer’s of equivalent products having minimum 1,000 psi.
      1) CSI of Virginia, Inc., Richmond VA, product: Last-a-Foam R-9300ß∑.
      2) Fabreeka International, USA, Stoughton, MA., product Fabreeka-TIM RF Series 1020.
      3) Marmox Egypt, Product: “Thermoblock, R2 nano/100”
      4) Or approved equal.

B. Cavity wall insulation (Typical): Semi-rigid mineral wool insulation for exterior wall cavities: mineral wool fiber insulation board, conforming to ASTM C612, Type IVB having a nominal density of 4.4 pounds per cubic foot.

1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
   a. Johns Manville, Inc., Denver CO.
   b. Roxul, Inc., Milton, Ontario. (Roxul).
   c. Thermafiber Inc., Wabash IN. (Thermafiber)
2. Non-Combustible as tested per ASTM E-136.
3. Flame Spread Classification: Class A (less than 25, per testing by NFPA 255, ASTM E-84 or UL 723), with flame spread rating of 0 and smoke developed rating of 0.
4. Thermal Resistance: ASTM C518 (C177), R-value of 4.2 per inch.
5. Thickness: 3 inches, and as otherwise indicated on Drawings.
6. Size: 16 inches x 48 inches (406 mm x 1219 mm).
7. Acceptable products include the following or approved equal:
   a. Roxul, Inc., Milton, Ontario, product “CavityRock MD”.
   b. Owens Corning, Wabash IN, product “Thermafiber, RainBarrier 45.”
   c. Johns Manville, Inc., Denver CO. product: “MinWool Curtainwall CW4”.

C. Cavity wall insulation (at locations where concrete unit masonry is solid grouted): Closed cell foam board, square edge, conforming to ASTM C 578, Type IV, with a compressive strength of 25 pounds per square inch when tested in accordance with ASTM D 1621.

1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
   a. The Dow Chemical Company, Midland, MI

b. Owens Corning Commercial Insulation, Toledo OH.
c. Kingspan Insulation LLC; Atlanta, GA.
d. DiversiFoam Products, Rockford, MN

2. Minimum Thermal Resistance: 5 per inch thickness.
3. Thickness: 3 inches, and as otherwise indicated on Drawings.
4. Compressive Strength: 25 psi.
5. Acceptable products include the following or approved equal:
   a. Dow Chemical Corp., product, Styrofoam Brand “Cavitymate Plus” (Basis of Design).
   b. Owens Corning, product “Foamular CW25”.
   c. DiversiFoam Products, product “CertiFoam 25 SE”.

D. Contact Adhesive: Liquid or spray applied for adhering rigid foam to various substrates.

E. Provide adhesive compatible with both surfaces to be joined. Provide letters of compatibility from each manufacturer.

D. Insulation plate and fastener: 3-inch diameter metal insulation plate, 0.017 thick galvalume coated steel, 0.265 ID. hole with corrosion resistant fasteners used for fastening rigid insulation to concrete or steel at locations referenced on the detail drawings only.

2.10 ACCESSORIES

A. Epoxy Coating Materials for Reinforcement: ASTM A 775 and A 884:
   1. Supplier shall be certified currently under CRSI Fusion Bonded Epoxy Coating Applicator Plant Certification Program.
   2. Provide one of following epoxy coatings for reinforcement and steel accessories as noted on Drawings:
      a. "Scotchkote 413," 3M Company.
      b. "Nap-Gard 7-2709," DuPont Powder Coatings, USA, Inc.
      c. "Epoxiplate R346 or R349," Armstrong Products Company.
   3. Use patching material recommended by epoxy powder manufacturer, compatible with epoxy coating and inert in concrete.

B. Compressible filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self-expanding, continuous in length, and in width to fill the joint to a point 3/4 inch back from each face of wall or partition.

C. Compressible filler for joints at tops of non-load bearing masonry partitions, and for expansion joints in masonry walls: Closed cell Neoprene or PVC foam board, soft grade, 25 percent thicker than joint width, continuous in length, and in width to fill the joint to a point 3/4 inch back from each face of wall or partition.

D. Pre-molded control joints for concrete masonry construction: Solid rubber of profile as indicated (to maintain lateral stability of wall), 60-80 shore A hardness.

E. Building paper (to maintain joints open for subsequent application of sealant and backer rod): Nº. 15 asphalt saturated felt.

F. Weeps for veneer: plastic weep, equal to:

1. Hohmann & Barnard, Inc., Model 342",
2. Heckman Building Products; No equal
3. Wire Bond Inc., Model 3603.

G. Mortar netting: High Density Polyethylene (HDPE) course geotextile fabric having a 90 percent open weave mesh, with stepped topped edging, shaped in a manner to catch and hold mortar droppings and preventing blockage of weep hole vents, nominal 5 feet long by 10 inches high. Provide combination of thicknesses as required to fully fill cavity space.

1. Hohmann & Barnard, Inc. product "Mortar Net".
2. Mortar Net USA, Ltd., Highland IN., product "Mortar Net".
3. Wire Bond, Inc., Charlotte, NC, product "Mortar Net Green".

H. Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

2.11 MIXING MORTARS AND GROUT

A. General: Mix mortar and grout in accordance with the requirements of ASTM C270, and ASTM C 476 as applicable.

1. Control batching procedure to ensure proper proportions by measuring materials by volume. Amount of mixing water and mortar consistency shall be controlled by mason.
2. Control batch sizes to allow for use within manufacturer's recommended pot life.
3. Re-tempering will be permitted only within the first two hours of initial mix or shorter times as directed by manufacturers.
4. Discard all mortar and grout which exceeds the time limits allowed by the manufacturer .Discard mortar that has partially set.

B. Maintain sand uniformly damp immediately before mixing process.

C. Add mortar color and admixtures in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.

D. Do not use anti-freeze compounds to lower the freezing point of mortar or grout.

E. Pouring grout shall be fluid consistency (as fluid as possible for pouring without separation of constituent parts).

2.12 SOURCE QUALITY CONTROL

A. Preconstruction testing: Except for testing by the Contractor, required as part of this Section, or Section 01 45 29 – TESTING LABORATORY SERVICES, the Owner will

employ and pay a qualified independent testing laboratory to perform the following preconstruction testing indicated as well as other inspecting and testing services required by referenced unit masonry standard or indicated herein for source quality control:

1. Clay unit masonry tests: For each different clay masonry unit indicated, units will be tested per ASTM C 67. Test each type and grade of brick for compression, water absorption and efflorescence per ASTM C 67. If coefficient of variation of compression samples tested exceeds 12 percent, obtain compressive strengths by multiplying average compressive strengths by (1 - 1.5) x (0.01 x coefficient of variation) – 0.12
2. Concrete Masonry Unit Tests: For each different concrete masonry unit indicated, units will be tested for strength, absorption, and moisture content per ASTM C 140.
3. Mortar efflorescence: Test each mortar type which will be exposed to weather for efflorescence in accordance with the “Wick test” procedure in BIA Research Report Number 15, The Causes and Control of Efflorescence in Brickwork”, Section 4.4. Mortar mixes which show efflorescence shall not be used in the Work.
4. Mortar composition and properties will be field evaluated per ASTM C 780 for compressive strength, consistency, mortar aggregate ratio, water content, air content, and splitting tensil strength.
5. Grout compressive strength will be tested per ASTM C 1019 for compressive strength and slump.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive the work of this Section.

B. Verify built-in and other items provided by separate Sections of the work are properly sized and located.

C. Verify foundation walls supporting masonry is constructed within tolerances required by code

D. Beginning of installation means acceptance of site conditions.

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied to other Sections.

B. Foundations:

1. Do not commence installation until foundations are clean, rough, and level.
2. Sandblast the foundation tops, if necessary, and remove all laitance and foreign material.
3. Verify that the foundation elevation is such that the bed joint thickness shall not vary from specified thickness, and that the foundation edge is true to line with masonry not projecting over more than 1/4”.

C. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

D. Protect surfaces of windows, louvers and vents as well as similar finish products with painted and integral finishes from mortar droppings and stains.

3.3 INSTALLATION - GENERAL

A. Thickness of walls and partitions: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single wythe walls to actual thickness of the masonry units, using units of nominal thickness indicated.

B. Build chases and recesses as shown or required to accommodate items specified in this and other Sections of the Specifications. Provide not less than 8 inches of masonry between chase recess and jamb of openings and between adjacent chases and recesses.

C. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.

D. Establish lines, levels and coursing indicated. Protect from displacement.

E. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

F. Isolate masonry partitions from vertical structural framing and where indicated on the Drawings. Maintain joints free from mortar, ready to receive sealant and joint bead back-up.

G. Provide compressible filler at tops of interior masonry partitions abutting structural above.

3.4 COURSING, BONDS AND JOINTS

A. Coursing, joints and bond pattern:.

1. Lay up masonry in running bond with random pattern of false joints, as indicated on the Drawings. Acceptance of subcontractor’s plan to implement random pattern will be reviewed and evaluated as part of the mock-up process.

B. Joints:

1. Exposed to view masonry: except as specified below, fill all joints with mortar, strike off flush, and when mortar is thumb print hard tool joints with a non-staining tool. Joints shall be free of drying crack.
    a. Exterior joints:
        1) Horizontal joints
            a) Exterior joints at brick and exposed to view concrete masonry units tool joints ”weathered” struck joint, weathered to drain with top of joint recessed approximately 1/16 inch behind face of masonry surface.
            b) Concealed joints at concrete units (inside of cavity wall): Tool joints flush to receive air and vapor barrier.

2) Vertical joints (all):
   a) Brick: Tool joints raked.
   b) Concrete unit masonry: Tool joints raked.

b. Interior joints (all):
   1) Horizontal joints Tool joints ”weathered” struck joint.
   2) Vertical joints: Tool joints raked.

2. Concealed from view masonry, including masonry which will be concealed by flashings and similar materials: Fill joints with mortar and strike joints flush. Concave tool exterior joints below grade.
3. Remove all excess mortar when raking joints and when striking joints flush.
4. Clear vertical scores and vertical rake joints.from excess mortar.

3.5 OPEN CONTROL JOINTS

A. Locate open control joints where shown on Drawings, at corners adjacent to openings in masonry, changes in wall height and intersections with structural walls as approved by Architect.
   1. Do not continue horizontal joint reinforcement through control joints.

3.6 LAYING MASONRY - GENERAL

A. Build the masonry walls and partitions in the various combinations and thickness as indicated on the Drawings.

B. Erect all masonry work in compliance with the line and level tolerances specified herein. Hold uniform joint sizes. Correct, or replace, as directed by the Architect, non-conforming masonry work at no additional cost to the Contract.

C. Lay out coursing before setting to minimize cutting closures or jumping bond, Avoid the use of less-than-half-size units.

D. Laying masonry units:
   1. Lay solid masonry units in full bed of mortar, with full head joints; uniformly joint with other work.
   2. Lay hollow masonry units with face shell bedding on head and bed joints. Fill cores at the top of masonry directly under reliving angles, smooth surface.
   3. Use finished CMU end blocks at jambs of wall openings for curtain wall, storefront, windows, louvers and similar conditions.
   4. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
   5. Interlock intersections and external corners.
   6. Cut all exposed masonry with a motor-driven carborundum blade saw to ensure straight and clean, unchipped edges.
      a. Lay no unit having chipped edges or face defects where such unit would be exposed to view. Remove any such unit, if installed, and replace with an undamaged unit, and bear all costs therefore.
      b. At sloped roof edge, cut concrete masonry neat to align with roof slope for uniform sloped appearance.

7. Do not spread any more mortar than can be covered before surface of mortar has begun to dry.
8. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove entirely, clean off mortar, and reset with fresh mortar.
9. Except for cleaning down and repointing, finish all masonry as the walls and partitions are carried up.

E. Build-in reinforcement and anchorage items as the work progresses, grouting for secure anchorage.

1. Where steel reinforcing rods have been cast into concrete slabs, and left with upturned ends, carefully place masonry units down over the upturned ends of the rods, and fill cells of masonry units with specified grout.
2. Embed prefabricated horizontal joint reinforcing as the work progresses, with a minimum cover of 5/8” (16 mm) on exterior face of walls and 1/2” (13 mm) at other locations. Lap units not less than 6” (152 mm) at ends. Use prefabricated L and T units to provide continuity at corners and intersections. Cut and bend units as recommended by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

F. Except as indicated otherwise, isolate masonry from overhead structure:

1. Isolate masonry partitions from vertical structural framing members with a control joint.
2. Isolate top joint of masonry partitions from horizontal structural framing members and slabs, decks or blocking with compressible joint filler.

G. Provide control joints at 30 feet on center maximum spacing and as indicated on Drawings, and keep clean of mortar droppings.

H. Provide complete protection against breakage and weather damage to all masonry work, over the tops of walls and wherever necessary to protect work at all stages of completion. Protect masonry when not roofed over, at all times when masons are not working on the walls. Apply tarpaulins or waterproof paper, properly weighted, or nailed, to assure their remaining in place to protect masonry from all possible hazards.

I. Point and fill all holes and cracks in new mortar joints with additional fresh mortar; do not merely spread adjacent mortar over defect or use dead mortar droppings. Do all pointing while mortar is still soft and plastic. If hardened, chisel defect out and refill solidly with fresh additional mortar, and tool or rake joints as specified herein.

J. Protect all masonry from rain prior to, and during the installation thereof. If the temperature is in excess of 80 degrees Fahrenheit at time of installation, lightly moisten contact surfaces of masonry units by brushing with water.

K. Cold/Hot Weather Procedures: No masonry work shall be laid in temperatures below 40 degrees Fahrenheit without the submittal to and review by the Architect of cold weather procedures.

1. In ambient temperatures below 40 degrees Fahrenheit make provisions to adequately protect the masonry materials and the finished work from frost by

heating of masonry materials, enclosing the work or heating the enclosed spaces.

2. No frozen work shall be built upon nor shall anti-freeze admixtures be permitted in the mortar mix.

3. Any completed work found to be affected by frost shall be taken down and rebuilt at no additional expense to the Owner.

3.7 PRECAST CONCRETE UNITS

A. Set architectural precast concrete units accurately in strict accordance with approved shop drawings, and as indicated on the Contract Drawings.

B. Set all units in full mortar bed, and when initial set has occurred, rake out joint 3/4" for application of sealant.

C. Secure precast units to masonry with anchors, set firmly with grout. Install lead buttons in horizontal joints under heavy units.

3.8 FLASHING INSTALLATION

A. Stainless steel: Build-in through-wall 28 gage (0.016 inch) thick stainless steel flashings at lintels, and relieving angles.

1. Ensure through-wall flashing is in proper position in wythe without forming pockets.

2. Extend flashing to back up wall, turn up a minimum of 8 inches above cavity mortar net and terminate as follows, coordinated with air and vapor barrier system:

a. Terminate flashing at backup wall with S-12 screws. Seal top of stainless steel flashing with self adhering strip flashing and PE Sealant.

3. Carry head flashing 6 inches beyond both ends of lintels. At steel lintels, apply a heavy bed coat of compatible adhesive mastic isolating flashing and steel.

4. Seal all punctures with an elastic cement mastic recommended by flashing manufacturer.

B. Build-in counter flashing as indicated in the Drawings and as specified herein.

1. Clean surface of masonry smooth and free from projections that might puncture or otherwise damage flashing membrane.

2. Carefully fit flashing around projections, neatly fold and bed in mastic or mortar so as to direct moisture to the outside. Form flashing to required profiles without wrinkles or buckles and install in such a manner as to direct moisture to the outside.

3.9 CAVITY WALL CONSTRUCTION

A. Build inner wythe of cavity walls ahead of outer wythe to receive insulation and air/vapor barrier adhesive.

B. Install continuous row of "mortar netting" at base of wall and over all wall openings directly onto flashing. Install combinations of thicknesses of "mortar netting" as required to match full cavity widths.

1. Install mortar netting to full thickness of cavity.

2. Install mortar netting against back of outside wythe with dovetail section facing up. Cut netting as required to prevent contact with wall ties, conduit, plumbing and or other materials that bridge or intrude into cavity.

C. Remove excess mortar as work progresses. Do not permit mortar to drop or accumulate into cavity air space or to plug weeps.

D. Anchorage for brick veneer: Install specified wall ties as shown on Drawings, if not shown, install one wall-tie/anchor for every 16 inches on center both horizontally and vertically of veneer wall area. Extend wire anchors into the veneer a minimum of 1-1/2 inches with at least 5/8 inch mortar cover to the outside face of brick.

1. Place additional wall ties around perimeter of openings and within 12 inches of ends of walls.
2. Place additional wall ties on each side of expansion joints, install within 4 inches of joint.
3. Place wall ties starting with the third course of brick masonry or 8 inches of concrete foundation walls.
4. Attach metal ties to metal anchors previously screw attached through sheathing to each metal stud.

E. Coordinate sequence of work with installation of air and vapor barrier. Ensure air and vapor barrier is fully sealed at all masonry ties.

3.10 WEEP HOLES

A. Provide weep holes in head joints in first course of veneer immediately above all through-wall flashing, shelf angles, lintels and bottoms of walls.

B. Install specified pre-fabricated weeps in head joint.

1. Space weep holes:
   a. In brick: 24 inches on center maximum.
   b. In concrete masonry: 32 inches on center maximum.

C. Keep weep holes and area above flashing free of mortar droppings.

3.11 PRECAST CONCRETE UNITS

A. Set precast concrete unit accurately in strict accordance with approved shop drawings and as indicated on the Drawings.

B. Erect units without damage to shape or finish. Replace or repair damaged planters.

C. Erect units level and plumb within allowable tolerances.

D. Align and maintain uniform horizontal and vertical joints as erection progresses.

E. When units require adjustment beyond design or tolerance criteria, discontinue affected work; advise Architect.

F. Erection Tolerances:

1. Maximum Variation from Plane of Location: 1/4 inch in 10 feet and 3/8 inch in 100 feet, non-cumulative.

2. Maximum Offset from True Alignment Between Two Connecting Units: 1/4 inch.
3. Joint Tolerance: Plus or minus 1/4 inch.

3.12 ENGINEERED MASONRY

A. Lay masonry units with core cells vertically aligned and clear of mortar and unobstructed.

B. Place mortar in masonry unit bed joints back 1/4 inch from edge of unit grout spaces, bevel back and upward. Permit mortar to cure 7 calendar days before placing grout.

C. Refer to the Drawings for locations where vertical steel reinforcing rods will be required in masonry walls. Reinforce masonry unit cores with reinforcement bars and grout.

D. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters. Splice reinforcement in accordance with Division 03 32 01 – CONCRETE REINFORCING.

E. Repair all epoxy-coated reinforcing bars where coating has been damaged in accordance with the coating manufacturer's directions.

F. Wet masonry unit surfaces in contact with grout just prior to grout placement.

G. Grout spaces less than 2 inches in width with fine grout using low lift grouting techniques. Grout spaces 2 inches or greater in width with course grout using high or low grouting techniques.

H. When grouting is stopped for more than one hour, terminate grout 1-1/2 inch below top of upper masonry unit to form a positive key for subsequent grout placement.

I. Low lift grouting: Place first lift of grout to a height of three concrete masonry unit courses, and rod for grout consolidation. Place subsequent lifts in 8 inch increments and rod for grout consolidation.

J. High lift grouting: not permitted.

3.13 BUILDING-IN WORK

A. As work progresses install flashing, anchor bolts, plates and other similar indicated items to be built-in the work.

B. Install built-in items plumb and level; take care not to distort alignment of such items.

C. Do not build-in organic materials subject to deterioration.

3.14 BUILDING-IN LINTELS

A. Install loose lintels over all openings, whether or not scheduled.

B. Where not detailed otherwise, maintain the following minimum bearings for lintels on each side of opening:

1. 6 inches bearing on concrete.
2. 3 inches bearing on steel.
3. 8 inches bearing on masonry.

C. Install loose lintels over all openings, whether or not scheduled. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
   1. Openings up to 42 inches wide: Place two Nº4 reinforcing bars 1 inch from bottom web.
   2. Openings from 43 inches wide up to 78 inches wide: Place two Nº5 reinforcing bars 1 inch from bottom web.
   3. Openings over 79 inches wide: Reinforce as detailed in Drawings, consult Architect/Engineer if not detailed.
   4. Do not splice reinforcing bars.
   5. Support and secure reinforcing bars from displacement. Maintain position with 1/2 inch of dimensioned position.
   6. Place and consolidate grout fill without displacing reinforcing.
   7. Allow masonry lintels to attain specified strength before removing temporary supports.

3.15 REINFORCEMENT AND ANCHORAGE

A. Reinforce horizontal joints with continuous masonry joint reinforcement, spaced 16 inches vertically commencing one course above supporting concrete slab.

B. Place masonry joint reinforcement in first and second horizontal joint above and below openings. Extend 16 inches each side of opening.

C. Place joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches .

E. Install preformed units (or optional field-formed units) at corners, reveals, and offsets in exterior masonry, at intersections of all masonry walls and partitions, and wherever walls and partitions change directions.

F. Do not bridge control and expansion joints in the wall system.

G. Anchor ends of walls to structure with anchors spaced 24 inches, except as otherwise shown.

H. Embed anchors in concrete. Attach to structural steel members. Embed anchorages in every second block. Embed anchorages in sixth brick joint.

I. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

3.16 FIELD QUALITY CONTROL

A. Field inspection will be performed under the provisions of Division 1 – GENERAL REQUIREMENTS (Section 01 45 00 - QUALITY CONTROL, or Section 01 45 29 – TESTING LABORATORY SERVICES, as applicable).

B. Testing frequency: Tests and evaluations listed in this article shall be performed during construction for each 5000 square feet of wall area or portion thereof.

C. Prism Test Method: For each type of wall construction indicated on Drawings, masonry prisms will be tested per ASTM E 447, Method B: and as follows:

1. Prepare one set of prisms for testing at 7 days and one set for testing at 28 days.

D. Evaluation of Quality Control tests: In absence of other indications of noncompliance with requirements, masonry will be considered satisfactory if results from source quality control tests comply with minimum requirements indicated.

3.17 PROTECTION OF WORK

A. Loading: Do not apply loading for at least 7 days after building masonry columns, walls or partitions, until 75 percent strength is attained in both mortar and grout.

B. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
2. Where one wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to un-constructed wythe and hold cover in place.

C. Stain prevention: Provide protection and prevent grout, mortar, and soil from staining the face of exposed masonry and building finishes. Protect base of walls from rain-splashed mud and mortar splatter.

1. Remove immediately all grout, mortar, and soil that come in contact with such masonry.

3.18 TOLERANCES

A. Maximum variation from true surface level for exposed to view walls and partitions:

1. Unit-to-unit tolerance: 1/16 inch.
2. Surface, overall tolerance: 1/4 inch in 10 feet in any direction and 1/2 inch in 20 feet or more.
    a. Where both faces of single wythe wall or partition will be exposed to view, request and obtain decision from the Architect as to which face will be required to conform to the specified surface level tolerance.

B. Maximum variation from plumb: For lines and surfaces of walls do not exceed 1/4 inch in 10 feet, 3/8 inch in any story up to 20 feet maximum. At expansion joints and other conspicuous lines, do not exceed 1/4 inch in 20 feet.

C. Maximum variation from level: For lines of sills, tops of walls and other conspicuous lines, do not exceed 1/8 inch in 3 feet, or 1/4 inch in 10 feet and 1/2 inch in 30 feet.

D. Maximum variation of linear building line: For position shown in plan relating to columns, walls and partitions, do not exceed 1/2 inch in 20 feet or 3/4 inch in 40 feet.

E. Maximum variation in specified height: 1/2 inch per story.

F. Maximum variation of joint thickness: 1/8 inch in 3 feet.

3.19 CLEANING

A. Comply with requirements of Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL for handling and disposition of all construction and demolition waste.

B. Progress Cleaning:

1. General: Maintain site free of waste materials, debris, and rubbish resulting from the work of this Section.
    a. Remove from work areas surplus and waste materials resulting from the work of this Section. Remove on a continual on-going basis through-out the term of construction.
2. During the progress of the work, keep the exposed surfaces of masonry and stone clean at all times, and protected against damage. As each segment of the masonry is erected, dry-brush the surfaces free from mortar spots and droppings.

C. Prior to performing the final cleaning work, examine all face joints in exposed masonry to locate cracks, holes or other defects in the mortar; and point up all such defects and fill with mortar as specified herein. Where necessary, in the opinion of the Architect, cut out defective joints in masonry and replace with new materials, exercising extreme care to match original work.

D. At a time approved by the Architect, perform final cleaning operations on all masonry as specified herein and as recommended by applicable BIA Technical Notes.

1. Perform the final cleaning work only when the ambient temperature is above 40 degrees Fahrenheit, and rising.
2. Do not use wire brushes or other abrasive tools in the cleaning operations.
3. Perform final cleaning operations from the top down. If masonry cleaning work is performed after windows, doors, frames, and other work has been installed, provide complete protection for said items; be fully responsible for any damage due to the cleaning operations.
4. Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.
5. Perform final cleaning of masonry units and stone by scrubbing with stiff bristle fiber brushes and clear water, changing the water frequently.

E. Provide suitable protective coverings for all other surfaces and materials during the final cleaning procedures, and bear full responsibility for correcting any damage caused by these operations, to the satisfaction of the Architect.

End of Section

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Section 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 – GENERAL

1.1. SUMMARY

A. Section Includes

The structural steel as shown on the drawings and specified herein, including, but not limited to, the following:

1. Girders and beams.
2. Columns and diagonal bracing.
3. Miscellaneous steel shown on the structural drawings.
4. Grouting of base plates, leveling and bearing plates
5. Bolts and other steel accessories.
6. Stair stringers and pans

B. Related Sections

1. 03 10 00 – Concrete Forming and Accessories.
2. 03 20 00 – Concrete Reinforcing.
3. 03 30 00 – Cast-in-Place Concrete.

1.2. REFERENCES

A. American Institute of Steel Construction (AISC).

1. AISC 360 - “Specification for Structural Steel for Buildings”.
2. AISC “Code of Standard Practice for Steel Buildings and Bridges”.

B. Research Council on Structural Connections (RCSC).

1. RCSC “Specification for Structural Joints Using ASTM A 325 or A 490 Bolts".

C. American Society for Testing and Materials (ASTM)

1. ASTM A 6 "Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use".
2. ASTM A 27 "Specification for Steel Castings, Carbon, for General Application".
3. ASTM A 36 "Specification for Carbon Structural Steel".
4. ASTM A 53 "Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless".
5. ASTM A 148 "Specification for Steel Castings, High Strength, for Structural Purposes".
6. ASTM A 153 "Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware".
7. ASTM A 307 "Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength".
8. ASTM A 325 "Specification for Structural Bolts, Steel, heat Treated, 120/105 ksi Minimum Tensile Strength ".

9. ASTM A 449 "Specification for Quenched and Tempered Steel Bolts and Studs".
10. ASTM A 490 "Specification for Heat-Treated, Steel Structural Bolts, 150 ksi Minimum Tensile Strength".
11. ASTM A 500 "Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes".
12. ASTM A 501 "Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing".
13. ASTM A 514 "Specification for High-Yield Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding".
14. ASTM A 563 "Specification for Carbon and Alloy Steel Nuts".
15. ASTM A 992 "Standard Specification for Steel for Structural Shapes for Use in Building Frame".
16. ASTM A 588 "Specification for High-Strength Low-Alloy Structural Steel with 50 ksi Minimum Yield Point to 4 in Thick".
17. ASTM A 618 "Specification for Hot-Formed and Seamless High-Strength Low-Alloy Structural Tubing".
18. ASTM A 687 "Specification for High-Strength Nonheaded Steel Bolts and Studs".
19. ASTM A 913 “Standard Specification for high-Strength Low-Alloy Steel Shapes of Structural Quality, Produced by Quenching and Self-Tempering Process (QST).
20. ASTM B 695 “Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
21. ASTM F 436 "Specification for Hardened Steel Washers".
22. ASTM F 959 "Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners".

D. American Welding Society (AWS).
   1. AWS D1.1 “Structural Welding Code - Steel".

E. American Association of State Highway and Transportation Officials (AASHTO).
   1. AASHTO "Standard Specifications for Highway Bridges".

F. Structural Steel Painting Council (SSPC).
   1. SSPC "Steel Structures Painting Manual, Volume 2, Systems and Specifications".

1.3. SUBMITTALS

A. Shop Drawings:
   1. Prepare complete shop drawings showing anchor rod setting plans, details of layout, fabrication, and erection.
      a. Indicate the materials used and beam marks.
      b. Reference shop drawings to specific location and detail number on the Drawings.
      c. Show extent of painting .

d. Indicate location and type of special finish requirements, including grinding of welds. Indicate architecturally exposed steel.

e. Copies of the Contract Documents will not be considered as meeting these requirements.

2. Provisions of AISC Code of Standard Practice for Steel Buildings and Bridges related to shop and erection drawings are applicable.

3. Submit shop drawings to Architect for review and obtain acceptance prior to start of fabrication.

4. Prior to submitting erection drawings submit plans of all levels showing dimensioned location of edge of slab, deck, and openings.

5. Submit fabricators identification mark system prior to fabrication.

B. Mill Reports

1. Submit copies of certified mill test reports for each heat of steel and for all fasteners, including nuts and washers prior to start of fabrication.

2. Mill test reports shall include ladle analysis and tensile elongation and bend tests. Perform mechanical and chemical tests for all material regardless of thickness or use.

3. Along with mill reports submit tests results of Charpy V-notch tests when Charpy V-notch criteria is specified.

4. Mill reports shall be traceable to individual pieces of steel used.

5. In addition to other requirements mill reports shall address the following elements: copper, columbium, chromium, nickel, molybdenum, silicone, and vanadium.

6. Provide mill reports for all welding consumables used on this project.

C. Submit certificates of compliance for:

1. Welding electrodes

2. Shear studs including manufacturers test reports.

3. Welder have passed qualification tests.

D. Welding Procedure Submittals:

1. Submit written Welding Procedures Specifications (WPSs) in accordance with AWS D1.1 requirements for each different welded joint proposed for use whether prequalified or qualified by testing. The manufacturer and specific electrode shall be stated in the WPS. Manufacturer and specific electrode shall be considered essential variables for the WPS.

2. In addition to the Welding Procedure Specifications submit fabrication and erection procedures where needed to control shrinkage, fabrication tolerances, or to insure proper inspection.

3. Procedure Qualification Record (PQR) in accordance with AWS D1.1 for all procedures qualified by testing.

4. Electrode manufacturers data.

5. When larger effective throat thicknesses of flare groove welds than allowed by Table J2.2 of AISC “Specification for Structural Steel for Buildings Allowable Stress Design and Plastic Design”, submit data establishing by qualification the consistent production of of such larger effective throat thicknesses.

Qualification of effective throat thicknesses shall be as prequired by the AISC specification.

6. The WPS and PQR will be reviewed by the Testing Laboratory for conformance with the requirements of AWS D1.1.

E. Connection Design

1. The Contractor is responsible for the design of connections when they are not fully defined on the contract documents.
2. At the commencement of the project submit a letter signed and sealed by the Engineer that will supervise the steel connection design attesting to this responsibility.
3. At the end of the steel shop drawing submission phase submit a letter, signed and sealed by the Engineer supervising the steel connection design, attesting to the completion of the work.
4. Submit calculations of all connections. Calculations and details shall be clearly keyed to the appropriate members on the construction documents. Calculations shall bear the seal of the Engineer supervising design the of steel connections.
5. Contractor shall not proceed with steel erection until these requirements are fulfilled.

F. Stair Design

1. The Contractor is responsible for the design of the steel stringers and pans for stairs not fully detailed on the contract documents.
2. Submit calculations of all members and connections Provide all reactions imposed on primary structure. Calculations shall bear the seal of the Engineer supervising design of the stringers, pans, and connections. Consider self-weight, superimposed dead load loading as depicted on architectural stair drawings, live load per the loading schedule, and any reactions from rails.
3. Sizes shown on architectural drawings shall be used, even if a more economical size is proven to work structurally.

1.4. QUALITY ASSURANCE

A. Qualifications: Design of structural steel connections to be under the direct supervision of a Professional Engineer experienced in the design of such components and registered in the State of Massachusetts, and shall conform to the applicable national, state and city standards.

B. Owner's Testing Laboratory: Shop and field testing and inspection of steelwork specified in this document or requested by the Owner will be performed by an independent laboratory engaged by the Owner ("Inspector").

C. All work shall be performed by qualified operators experienced in their field of work and as otherwise required by these specifications.

D. Qualifications of Welders:

1. Qualify welders in accordance with AWS D1.1 for each process, position, and joint configuration. Each operator shall have been qualified as prescribed by AWS. Welder qualification shall include passing the bend test and Charpy tests when Charpy values are specified for the electrode.

2. Require welders to retake the qualification test if, as determined by the Architect, there is a reasonable doubt as to the proficiency of the welder. If the welder does not requalify, he shall not perform any welding on the project.
3. Pay all costs associated with welder qualification.

E. MOCK-UP

1. Provide a full size mock-up of architecturally exposed steel if specified. Mock-up shall be representative of the finished work in all respects. Replace unsatisfactory work as direct. Mock-up shall be provided at the fabricator's plant. Mock-up assembly will be used as a standard for judging acceptability of work on project.
2. Apply finished paint system specified herein and in Section 09 90 00 "Painting" to exposed surfaces of mock-up.
3. After acceptance transport mock-up to job site and erect where directed. Provide foundation and bracing as required to maintain mock-up in a stable condition until completion of the work. Paint bracing and touch-up mock-up.

1.5. DELIVERY, STORAGE AND HANDLING

A. Store materials to permit easy access for inspection and identification. Support steel members off ground. Protect steel members and packaged materials from corrosion and deterioration. Materials showing evidence of damage will be rejected and shall be immediately removed from the site.

B. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

C. Do not handle structural steelwork until paint has thoroughly dried. Care shall be exercised to avoid abrasions and other damage.

D. All fasteners and washers shall be delivered to the site, where they will be installed, in unopened containers.

PART 2 - PRODUCTS

2.1. MATERIALS

A. Steel Shapes, Bars, and Plates:

1. ASTM A 992 Gr. 50 for all “W” shapes unless noted otherwise on drawings.
2. ASTM A 36 for: “M”, “S”, “C”, “MC”, “L” and bars and plates and where noted on drawings.
3. ASTM A 913 Gr. 50 where noted on drawings with a maximum yield stress of 65ksi. In addition the Additional Tension Test, Ultrasonic Examination, Maximum Carbon Equivalent, and Fine Austenite Grain Size as included in the added supplemental requirements shall apply.
4. ASTM A 913 Gr. 65 where noted on drawings. In addition the Additional Tension Test, Ultrasonic Examination, Maximum Carbon Equivalent, and Fine Austenite Grain Size as included in the added supplemental requirements shall apply.
5. Members that are noted as a part of moment frames, braced frames, eccentrically braced frames, or spliced in tension:

a. ASTM A6 Group 3, 4 and 5 rolled shapes or plates more than 2 inches thick shall conform to Section A3.1.c of "Specification for Structural Steel Buildings", March 9, 2005 except that a Charpy V-Notch value of 20 ft.-lb at [21] degrees C is specified.

6. Rotary straightening shall not be used to straighten columns unless ASTM A913 steel is specified.

7. Weathering Steel: ASTM A 588 Grade A or B unless otherwise shown. Use one (1) grade throughout.

B. Square, Rectangular and Round Tubing: ASTM A 500 Grade B

C. Pipe: ASTM A 53, Type E or S, Gr. B

D. Steel Castings: ASTM A 27, Grade 65-35, Class 1 or ASTM A 148 Gr. 80-50, carbon steel as noted on Drawings.

E. Shear Studs or Headed Studs: Comply with AWS D1.1 Section 7 for type B studs (Table 7.1). Length noted is the installed length.

F. Welding Electrodes:

1. Conform to AWS D1.1. Base selection of electrodes on the actual properties of the metal connected.

2. Electrodes shall have a specified minimum tensile strength of at least 70 ksi.

3. Use low hydrogen electrodes.

4. For all welds in special moment frame connections (where noted on drawings), electrodes shall have minimum Charpy values of 20 ft. lb. and a minimum average value of 20 ft. lb. at 0°C.

5. Electrodes for Weathering Steel: Conform to base metal manufacturer's recommendations for strength, atmospheric corrosion resistance and weathered appearance which shall match the base metal.

G. Metallic Filler: Plastic Steel Putty manufactured by Devcon Corporation.

2.2. FASTENERS

A. Unfinished Bolts and Nuts (Machine Bolts) and Threaded Rods:

1. Bolts and Nuts: ASTM A 307, Grade A

2. Washers: ASTM F 844

B. High Strength Bolts Nuts and Washers: ASTM A 325 Type 1 except use Type 3 bolts where ASTM A588 material is specified, Use ASTM A490 Type 1 bolts where noted.

C. Anchor Rods: ASTM F1554 unless otherwise noted.

D. Where fasteners are indicated as galvanized, provide units that are zinc coated in accordance with ASTM B 695, Class 50

E. Direct Tension Indicators: ASTM F 959, Type as required, at Contractor's option.

F. Expansion Bolts: Kwik-Bolt III as manufactured by Hilti Inc. or approved alternate.

G. Clevises and Turnbuckles: Dimensions and minimum capacities to conform to the values listed in Tables 8-27 and 8-29 of the “AISC Steel Construction Manual.”

H. Sleeve Nuts: Strength of sleeve nut shall be such that when loaded axially the sleeve nut shall be stronger than the ultimate capacity of the connected parts.

I. Recessed-Pin Nuts: Dimensions and minimum capacities to conform to the values listed in the “AISC Steel Construction Manual.”

J. Cotter Pins: Dimensions and minimum capacities to conform to the values listed in the “AISC Steel Construction Manual.”

2.3. PRODUCTS

A. Bearings

1. Sliding Bearing Pads as indicated, one of the following: Seismic Energy Products "Fluorogold"; Lubrite Division, Merriman Inc "Lubrite"; The Duriron Co Inc. "Riload".
2. Elastomeric Bearing Pads: Comply with AASHTO "Standard Specifications for Highway Bridges", Section 18, Durometer as shown.

B. Paint

1. Shop Paint: SSPC, Paint 20, Type I, Inorganic, or Type II, Organic. Paint shall comply with the requirements of SSPC-PS 12.01.
2. Primer paints shall be compatible with finishes specified by the architect.

C. Grout

1. Nonmetallic Shrinkage-resistant Grout: Premixed, nonmetallic, non-corrosive, nonstaining product containing selected silica sands, Portland Cement, shrinkage compensating agents, plasticizing and water-reducing agents. Subject to compliance with requirements, provide: BASF MasterBuilders "MasterFlow 713" or Five Star Products "Five Star Grout".
2. Non-Shrink Grout: Premixed non-shrink, non corrosive compound consisting of non-metallic aggregate, cement; water reducing and plasticizing agents capable of developing minimum compressive strength of 2,400 psi in 48 hours and 6,000 psi in 28 days; "Five Star Grout" manufactured by Five Star Products.
3. Drypack: Euclid Chemical Company “Euco Dry Pack Grout”, BASF MasterBuilders “MasterFlow 700”, or equal. Mix to a plastic consistency.

2.4. CONNECTION DESIGN

A. Contractor shall design all steel connections not fully defined.

B. Type of Connections

1. All connections shall be one of the following:
   a. High-strength bolts.
   b. Unfinished bolts.

c. Welds.

2. When the type of connection is shown on the drawings use that type of connection.
3. Use a connection other than unfinished bolts where required by code and in the following locations:
   a. All connections indicated as such.
   b. Connections that are a part of the lateral force resisting system.
   c. Connections for supports of running machinery or of other live loads which produce impact.
   d. Connections carrying cooling tower loads.
   e. Beams supporting columns or posts.
   f. Connections for cantilevers.
   g. All column splices.

C. Design Criteria.

1. Design connections for the loads and according to the requirements in the Contract Documents and the applicable building regulations.
2. Connections shall be adequate to provide for the reaction due to the maximum uniformly distributed load that the beam is capable of carrying for its span, based on the allowable unit stresses, except where other reactions are shown on the Drawings.
3. Minimum connections shall comply with appropriate tables headed “Framed Beam Connections” shown in the AISC “Manual of Steel Construction.” Seated connections may be used only when they do not interfere with architectural features.
4. Bolts shall be at least 3/4 inches in diameter.

2.5. FABRICATION

A. General:

1. Fabrication to be performed in accordance with Chapter M of AISC "Specification for Structural Steel Buildings", the AISC “Code of Standard Practice for Buildings and Bridges” sections 3.2, 5, 6, 8 and the Drawings and Specifications.
   a. Assume all thermally cut edges are subject to substantial stresses.
   b. Paragraph M4.6 shall be considered deleted from Chapter M.
   c. The last sentence of paragraph M5.1 shall be deleted from Chapter M.
2. Provide holes and accessories required for securing other work to the work specified here.
3. Where thickness of material exceeds 7/8 inch or the diameter of hole, drill or ream holes after punching even when punching is allowed by referenced standards. Flame cut holes for fasteners are not acceptable.
4. Fabricate beams and girders with natural camber upward, unless otherwise shown or indicated on the Drawings.

5. Splice members only where indicated on Structural Drawings or where accepted by the Architect.
6. Remove burrs that would prevent solid seating of the connected parts.
7. When bending steel plate:
    a. Bend plates perpendicular to the rolling direction.
    b. Grind flame cut plate edges transverse to the bend line.
    c. Grind out nicks in plate edges transverse to the bend line.
    d. Round sharp corners on plate edges transverse to the bend line.
8. Weld sizes where shown shall be assumed to be the effective weld sizes.

B. Architecturally Exposed Steel (AESS)

1. All members exposed to view in the completed structure shall be classified as "Architecturally Exposed Structural Steel".
2. Comply with the provisions of the AISC Code of Standard Practice for Steel Buildings and Bridges regarding architecturally exposed structural steel.
    a. Abutting cross sectional configurations shall match.
    b. Remove backing bars.
    c. Remove weld runoff tabs and grind smooth.
    d. All surfaces and welds exposed to view shall be treated as finished surfaces.
3. Exposed Welds:
    a. All exposed fillet welds shall be made smooth of uniform convex contour, radius and dimension for their full length; grind smooth, if welds were not made to this criteria.
    b. All other exposed welds shall be milled or ground smooth and flush with the surfaces of the adjoining materials welded.
4. Weld show-through shall not be permitted.
5. Remove weld splatter on architecturally exposed steel.
6. All exposed corners shall be square and sharp, eased to a radius of 1/4 in.

C. Bolting, General:

1. Bolts shall be of a length that will extend not more than 1/4 in beyond the nuts unless noted otherwise.
2. Washers shall be used on Bolts. Use beveled washers where bolts bear on sloping surface.
3. Bolts shall be installed such that no threads occur in the shear plane when joining pieces 3/8” thick and thicker.
4. Manufacturers symbol and grade markings shall appear on all bolts and nuts.
5. Product containers must be marked so that correspondence with mill reports can be established.
6. Holes in column baseplates shall be oversized per Section 14 of AISC Manual of Steel Construction, latest edition.

7. Circular and slotted holes shall be as per Specification for Structural Joints Using ASTM A325 or A490 Bolts. For purposes of hole fabrication assume dynamically loaded connections.
8. When bolt holes are subject to welding shrinkage stresses the holes shall be drilled.

D. Unfinished Bolts (Machine Bolts) and Anchor Rods:

1. Install and tighten unfinished bolts in accordance with requirements for snug tightened bolts as defined in “Specification for Structural Joints Using ASTM A325 or A490 Bolts”.
2. Mutilate bolt threads for unfinished bolts to prevent the nuts from backing off.

E. High-Strength Bolts

1. Install high-strength threaded fasteners in accordance with RCSC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts". Contact surfaces of bolted parts shall as a minimum comply with the class A requirements.
2. For slip critical (friction) type connections, tighten nuts using Direct Tension Indicator. Calibrated wrench and "Turn of Nut" methods are not acceptable.
3. When connection has bolts and welds, tighten bolts prior to welding with the exception that in moment connections the flange welds are completed prior to final tightening of high strength bolts.
4. When already tensioned bolts have had their tension relaxed, either re-torque the bolts using a calibrated wrench or replace the bolt and tension indicator and re-tighten.

F. Welding

1. Welding shall be in accordance with AWS D1.1 "Structural Welding Code".
    a. Contractor is responsible for selection of specific materials and procedures except as specifically noted in contract documents.
    b. Connections have varying levels of restraint and thus necessary steps shall be taken by Contractor to control or accommodate the restraint.
    c. Welding and fabrication procedures shall incorporate measures necessary to eliminate cracking. These measures shall include but are not limited to additional preheat, postheat, or retarded cooling.
    d. When selecting materials and procedures, consideration shall be given to the need for materials and procedures in excess of code requirements.
    e. The need for pre-heat and other procedures are to be based on the actual chemistry and mechanical properties of the steel and not solely on the specified properties of the steel.
    f. Limit maximum interpass temperatures so as not to decrease toughness and strength of the weld metal.
    g. Weld variables shall be consistent with the recommendations of the electrode manufacturer.
    h. Welding Procedure Specifications shall be readily available to all welders, inspectors, and supervisors during the production process.

i. Weld only in accordance with the WPSs.

j. Do not mix different electrodes in the same weld joint unless the interactions have been shown not to cause problems.

k. Welding procedures shall incorporate low hydrogen practices.

l. Use stringer beads only (no weaving).

2. No tack welds not incorporated into a weld will be allowed on the finished structure with the exception of backing plates that are not removed.

3. All groove or butt welds shall be full penetration unless noted otherwise on the Drawings.

4. Do not weld into the column flange to column web intersection.

5. Sequence the work as necessary to accommodate testing.

6. Remove run-off tabs and backup plates and grind surfaces smooth as required for inspection or testing.

7. At connections of members that are a part of "special moment frames" or "eccentrically braced frame":

   a. Remove backing bars and apply reinforcing fillet weld per note J of figure 2.4 of AWS D1.1.

   b. Remove weld runoff tabs and grind smooth.

   c. Delete "...root and ..." from subsection 4.14.1.5 of AWS D1.1

   d. Limit oscillation of FCAW electrodes to 3d, for d >= 3/32 inches, and to 5d, for d < 3/32 inch (d = wire diameter)

   e. Pay increased attention to uniform and adequate preheat.

   f. Maximum interpass temperature not to exceed 550 degrees F when notch toughness properties are specified.

   g. Complete individual weld layers prior to applying portions of subsequent layers. Ends of interrupted passes to be staggered. Minimize starts and stops within body of the weld.

8. Splices of members in tension, members of moment frames, members of braced frames, and members of eccentrically braced frames that are made from ASTM A6 Group 4 of 5 rolled shapes, and or plates more than 2 inches thick shall be made in conformance with Section J1.5 of "Specification for Structural Steel Buildings".

9. Shear Studs: Install shear studs in accordance with the manufacturer's recommendations and AWS D1.1.

10. Where tubes, pipes or other closed sections are exposed to the weather, provide seal welds where other specified welds do not provide a complete seal of the enclosed space.

G. Finishes of Architecturally Exposed Steel

1. All surfaces of architecturally exposed structural steel members shall be uniform in appearance, including smoothness and texture, when viewed in direct sunlight at a distance of 10 feet, at angles of incidence 0 degree to 90 degree at completion of the following stages of work:

   a. "Surface Preparation" and "Shop Prime Painting,".

2. Surface Appearance: The initial condition of steel to be exposed in use shall conform to SSPC-Vis 1 Rust Grade A. The exposed surfaces, edges and ends of all plates and other components shall be free of any surface defects including weld splatter, burrs, dents, gouges, occlusions, streak, ridges and recesses. Such defects may be repaired and surface restored with weld or other approved filler material and machining (milling, grinding or sanding) to match appearance, including smoothness and texture, of parent surface.

H. Shop Painting

1. All structural steel exposed to the weather, classified as Architecturally Exposed Steel, or not completely concealed by interior finishes shall receive a shop coat of primer except as follows:
   a. Steel in contact with concrete or cementitious fireproofing.
   b. Contact surfaces of welded connections and areas within 4 in on each side of field welds.
   c. Machined surfaces.
   d. Contact surfaces of high-strength bolted connections.
   e. Reinforcing steel.
   f. Exterior exposed surfaces of weathering steel.
2. Steel members not otherwise painted shall be painted when subjected to condensation from piping, are in shower or steam rooms, are exposed to chemical fumes or are exposed to other conditions of potentially aggressive corrosion.
3. The following surfaces shall be temporarily protected by a thin coating of varnish or lacquer:
   a. Unpainted area around field welds.
   b. Steel around high strength bolts.
   c. Machined surfaces.
4. Surface preparation and application shall be in accordance with SSPC-PS 12.01 “One-Coat Zinc-Rich Painting System”.

C. **For hot-dipped galvanized steel items scheduled for shop applied coating: Canopy structure, bandshell structure, administrative egress walk structure.**

1. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating as specified above under the Article entitled “Hot Dip Galvanizing”, herein above.

2. Primer over Galvanized Steel: Provide factory-applied polyamide thermosetting epoxy prime coat over hot-dipped galvanized steel.
   a. Basis-of-Design: Duncan product “Primergalv Thermoset”.
   b. Primer shall be a polyamide epoxy powder primer with 0 VOC.
   c. Apply primer within 12 hours after galvanizing or blasting at the same galvanizer's plant in a controlled environment meeting applicable environmental conditions and as recommended by the

primer coating manufacturer. Cure schedule shall be as recommended by the manufacturer.

d. Polyamide epoxy powder primer shall be applied at 1.8-3 mils DFT and certified OTC/VOC compliant and conform to EPA and local requirements.

e. Polyamide epoxy powder primer shall meet or exceed the following performance criteria as stipulated by the coatings manufacturer:

1) Cure Schedule: 10 min. at 400¬∞F
2) Specific Gravity: 1.58 +/- .05 3) Coverage at 1.0 Mil 121.7 sq. ft./ lb.
4) 60¬∞ Gloss: 55-65 (ASTM D-523)
5) Adhesion: 5B (ASTM D-3359)
6) Flexibility: Pass 1/8 " Mandrel Bend (ASTM D-522)
7) Pencil Hardness: 2H-3H (ASTM D-3363)
8) Impact Resistance: 80 in-lbs direct (ASTM D-2794) 80 in-lb reverse
9) Typical Environmental Properties:On Bonderite 1000 Panels
10) Salt Fog 1000 hours (ASTM B-117)
11) Salt Fog (top-coated)* 5000+ hours (ASTM B-117)
12) Humidity 1000 hours PASSED

3. High-Performance Fluoropolymer Powder Color-coat: Provide coating matching approved samples. Factory-applied metal coatings shall be applied in a facility acceptable to the coating manufacturer. Full cure of the coatings shall be verified by the coating manufacturer's recommended test methods.

a. Coatings must meet or exceed the criteria for the following categories as stipulated by the coating manufacturer. All testing must be on lab prepared panels.

1) Adhesion: ASTM D 3359, no loss.
2) Hardness: ASTM D 3363 (pencil), H min.
3) Falling Sand ASTM D 968 40L/mil.
4) Salt Fog Resistance: ASTM B 117, passes 4000 hrs.
5) Humidity: ASTM D 2247, 4000 hours, few #8 blisters.
6) Impact Resistance (3mm): ASTM D 2794, no loss.
7) Color Retention: ASTM D 2244, 10 year less than or equal to 5 delta E.
8) Chalk Resistance: ASTM D 4214, #8 rating.
9) Gloss Retention: ASTM D 523, greater than or equal to 50 percent retention.
10) Erosion Resistance: ASTM B 244, less than 10 percent film loss. 11) Compliance: AAMA 2605.

4. Clear Coat: Provide Super Durable Polyester Powder Urethane Clear-Coat in the gloss range specified.

a. Super Durable Polyester Powder Urethane Clear-Coat shall be applied over the color coat per the manufacturer's recoat schedule at the same galvanizer's plant in a controlled environment meeting

applicable environmental conditions as recommended by the coating manufacturer.
Cure schedule shall be as recommended by the manufacturer.

b. Super Durable Urethane Polyester Powder Urethane Clear-Coat shall be applied at 2-3 mils DFT and certified OTC/VOC compliant and conform to EPA and local requirements.

c. Super Durable Urethane Clear-Coat shall meet or exceed the following performance criteria as stipulated by the coatings manufacturer:

1) Cure Schedule 10 min @400¬∫F
2) Specific Gravity (g/ml): 1.17
3) Coverage at 1.0 Mil (ft2/lb) 165.2
4) 20¬∫ Gloss (ASTM D-523) 99
5) 60¬∫ Gloss (ASTM D-523) 110
6) Adhesion (ASTM D-3359) 5B
7) Flexibility : Pass 1/8 " Mandrel Bend (ASTM D-522)
8) Pencil Hardness: (ASTM D-3363) H-2H
9) Impact resistance ASTM D-2794) Direct 100 in-lbs Reverse 100 inlbs
10) Humidity (ASTM D-4585) Slight gloss and color change
11) Salt Spray (ASTM B-117) Max 1/8" Creepage

5. Engage the services of a galvanizing facility which will assume single-source responsibility for galvanizing and finish coating.

a. Touch-up finish in conformance with manufacturer's recommendations. Provide touch-up such that repair is not visible from a distance of 6 feet.

2.6. SOURCE QUALITY CONTROL

A. Testing and inspection of structural steelwork will be performed by the Testing Laboratory. Provide the Inspector with the following:

1. A complete set of accepted "Submittals"
2. Cutting lists, order sheets, material bills, and shipping bills
3. Representative sample pieces as requested by the testing agency
4. Full and ample means and assistance for testing all material.
5. Access and facilities, including scaffolding, temporary work platforms, etc., for testing and inspection at all places where materials or components are stored or fabricated, and also in their erected position.

B. Scheduling of Tests and Inspections

1. The Contractor shall notify the Inspector in sufficient time prior to fabrication or erection work to allow testing and inspection without delaying the work.
2. Shop welds will be inspected in the shop before the work is painted or shipped.

C. Each person installing connections shall be assigned an identifying symbol or mark and all shop and field connections shall be so identified so that the Inspector can refer back to the person making the connection.

D. Non-destructive Testing and Inspections

1. As a minimum the inspector will make all tests and inspections as required by the International Building Code, 2015. The Inspector will make all the tests and inspections indicated in the Construction Documents.
2. The Inspector will make all verification tests and inspections as required by AWS D1.1 "Structural Welding Code".
3. Do not reduce testing frequency unless permission is obtained from Architect.
4. Inspector shall be present during all welding operations.
5. Verify that welders are certified.
6. Check materials, equipment and procedures. Verify meters on welding equipment are functioning and are accurate.
7. Visual Inspection:
    a. Visually inspect all welds.
    b. Visual inspection of multi-pass welds to be continuous.
    c. Visually inspect welds to Group 4 and 5 sections of at least 72 hours after completion of welding for the presence of cracks.
    d. Verify the effective throat thickness of flare groove welds is consistently obtained when flush to bar or section. This verification shall be based on test sections where necessary.
8. Test Methods:
    a. Butt welds will be tested using magnetic partical test methods and either ultrasonic or radiographic test methods.
    b. Butt welds to pipes and tubes to be tested using magnetic particle tests.
    c. Use magnetic partical test methods for filet welds and to supplement the testing requirements for butt welds.
    d. For radiographic a double film technique will be used. One copy of each film will be sent to the Architect, the other will be retained by the Inspector.
    e. In addition to the non-destructive testing specified other non-destructive test methods recognized by AWS D1.1 may be used at the Architects discretion and the results can be used to reject work under this contract.
9. Frequency of non-destructive examination is to be as follows:
    a. Full Penetration Butt Welds: 100 percent ultrasonic.
    b. Partial Penetration Butt Welds: 50 percent min. ultrasonic or radiographic inspection.
    c. Fillet and other welds not otherwise inspected: a minimum of 20 percent.
    d. Selection of welds to be examined: Where there is a requirement for less than 100% examination the method of selection of welds to be examined is to be agreed with the Architect before commencement of the work. If the Architect does not provide more specific criteria

inspectors will select the welds to be tested. The inspectors will chose specific weld so as to obtain results that are representative of the conditions in the structure. In addition inspectors will emphasize those locations that experience has shown are more likely to have problems.

e. On five percent of the full penetration butt welds (as chosen by inspector) at connections denoted as being a "special moment connection" as noted on the drawings, after removing, run-off tabs, grind the end of the weld sufficiently to allow determination of number and sizes of weld passes.

10. Testing of Base Metal: These provisions are in addition to other applicable requirements.
    a. For full penetration welds where they are part of moment frame or eccentrically braced frames the edges of material to be welded will be ultrasonically examined for evidence of laminations, inclusions or other discontinuities.
    b. Ultrasonically test column flanges and webs at the location of all moment connections and brace connections. Test for a distance 3 inches around the location to be welded. The test procedure and acceptance criteria is defined by ASTM A898-07, “Standard Specification for Straight Beam Ultrasonic Examination of Rolled Steel Structural Shapes” Level I.
    c. Base metal thicker than 1-1/2 inches, when subjected to through-thickness weld shrinkage strains, shall be ultrasonically inspected for discontinuities behind and within a distance of 3 inches of such welds after joint completion. Any material discontinuities shall be accepted or rejected on the basis of the defect rating in accordance with flaw severity, Class B criteria in Table 8.2 in AWS D1.1.
11. Where inspection reveals unacceptable defects:
    a. The extent of inspection will be increased to provide confidence that the defects in a joint has been found and to assure that the problem is not systematic.
    b. As a minimum, examine two additional joints in the group represented by the joint. If the non-destructive examination of the two additional joints reveals unacceptable defects, examine each joint in the group.

E. Take samples of all welding consumables and store in sealed containers.

F. Tests of High Strength Bolts, Nuts and Washers:
1. The Inspector will make all tests and inspections of high strength bolt connections as required by RCSC "Specifications for Structural Joints Using High Strength Bolts".
2. Observe all Direct Tension Indicators to see if proper tightness was achieved.
3. Confirm that the faying surfaces have been properly prepared before connections are assembled.

G. Testing of End-Welded Studs:
1. End-welded studs shall be random sampled and tested from stock furnished to each project. Tests shall meet the requirements in Table 7.1 of AWS D1.1.
2. Production control testing shall be in accordance with AWS D1.1 Chapter 7.

3. As a minimum, visually inspect 100% of the installed studs and test 15% of installed studs in accordance with AWS D1.1 paragraph 7.8.

H. Inspection Records

1. Make systematic record of all welds, including:
   a. Location and type of weld.
   b. Identification marks of welders.
   c. List of defective welds.
   d. Manner of correction of defects.
2. The Inspector will maintain a daily record of the work that has been inspected and its disposition. One copy of each of the report will be submitted to the Owner on a weekly basis. Test reports will be made on the form suggested in the AWS D1.1 "Structural Welding Code."

I. Mill Reports: Testing laboratory will review mill reports for conformance to referenced standard.

PART 3 - EXECUTION

3.1. CONDITION OF SURFACES

A. Prior to commencing with the erection of structural steel inspect the job site and verify that the structural steel may be erected in accordance with the Drawings and Specifications.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Architect in writing.
2. Do not proceed with construction in the region of the discrepancy until all such discrepancies have been resolved.

3.2. PREPARATION

A. Secure field measurements required for proper and adequate fabrication and installation of the work covered in this Section. Assume responsibility for exact measurements.

B. Furnish templates for exact locations of items to be embedded in concrete, and any setting instructions required for installation.

C. Contractor to employ an engineer or surveyor to check elevations of concrete bearing surfaces, anchor rods locations, and similar devices before erection proceeds. Report discrepancies to the Architect. Do not proceed with erection until corrections have been made or until compensating adjustments to structural steel work have been agreed upon with the Architect.

3.3. ERECTION

A. General:

1. Structural steel shall be erected in accordance with Chapter M of AISC Specifications and the Drawings and Specifications and with the AISC Code of Standard Practice.
2. Erection of architecturally exposed structural steel shall be in accordance with Section 10.5.1 and 10.5.2 of AISC Code of Standard Practice for Steel Buildings and Bridges.
3. Dimensions shown on drawings are based on an assumed design temperature of 70 degree F. Fabrication and erection procedures shall take into account the ambient temperature range at the time of the respective operations.
4. Care shall be taken to protect work already installed from damages resulting from structural steel erection.
5. Steel erection may be allowed prior to supporting concrete reaching specified strengths if the contractor provides technical justification and the Architect concurs.

B. Temporary Shoring and Bracing:

1. Provide temporary bracing and shoring adequate to protect the structure against damage due to construction loads and other loads such as wind and seismic forces.
2. Provide temporary works as necessary to erect the structure.
3. Items installed before concrete is placed shall be properly braced to prevent distortion by pressure of concrete. Watch and maintain bracing during concrete operations.
4. Contractor is responsible for identifying need for temporary construction.

C. Field Assembly:

1. Set structural members to the lines and elevations indicated. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
2. Before assembly clean bearing surfaces and other surfaces which will be in permanent contact after assembly.
3. Do not enlarge unfair holes in members by burning or by the use of drift pins. Ream holes that need to be enlarged to admit bolts. Where a hole is required to be enlarged by more than 3/32-inch ream to and use next larger bolt size.
4. Do not use gas cutting torches in the field for correcting fabricating errors in the structural framing unless accepted by the Architect. Finish gas cut sections equal to a sheared appearance when permitted.
5. The quality of field welds or bolting shall be the same as that performed in the shop.
6. Erection bolts for welded connection shall be tightened securely and left in place.
7. Erection Bolts: On architecturally exposed steel construction, remove erection bolts, fill holes with plug welds, and grind exposed surfaces smooth.

D. Installation of Bearing Pads:

1. As per manufacturer’s instructions.

E. Setting Base Plates:

1. Prepare surface of existing concrete as if for a concrete construction joint. Clean the bottom surface of base plates.
2. Grout shall be non-shrink grout mixed and applied in strict accordance with the manufacturer's directions.
3. Leave no voids between the base plate and the concrete.
4. Tighten anchor rods after the supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the base plate prior to installing grout.

F. Expansion Bolts:

1. Install in accordance with the manufacturer's recommendations.
2. Use washers on all bolts.
3. Use care to avoid cutting or damaging reinforcing bars.
4. When exposed to view in the final structure, bolts shall be of a length that will extend entirely through but not more than 1/4-inch beyond the nuts unless otherwise shown on the Drawings.

G. Shear Studs shall be attached in accordance with requirements of AWS D1.1 "Structural Welding Code".

3.4. BASE PLATE GROUTING

A. Base plate grout shall be mixed and applied in strict accord with manufacturer's directions.

B. Leave no voids between the base plates and the concrete.

3.5. TOUCH-UP PAINTING

A. Immediately after erection, clean field welds, bolted connections, and abraded areas of the shop paint, and paint all surfaces exposed to the elements with the exception of those surfaces in direct contact with concrete or fireproofing.

B. Use same materials and standards as for shop painting.

3.6. FIELD QUALITY CONTROL

A. All field welding shall be inspected by a full time inspector.

B. Field quality control shall, as a minimum, conform to the requirements specified under Source Quality Control.

C. Expansion bolts to be proof tested after installation by loading 25 percent of them to 150 percent of the manufacturers recommended tensile design loads.

End of Section

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SECTION 05 21 00

STEEL JOIST FRAMING

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Open web steel joists with bridging, attached seats, anchors, and necessary accessories.

1.02. RELATED SECTIONS

A. Section 05 12 00 – Structural Steel Framing.

B. Section 05 30 00 – Metal Decking

C. Section 05 50 00 – Metal Fabrications:

1.03. QUALITY ASSURANCE

A. Qualification of Welders:
   1. All welding shall be performed by operators who are qualified for the types of welds used. Each operator shall have been qualified as prescribed in AWS D1.1 and AWS D 1.3.
   2. Require welders to retake qualification test if, as determined by the Architect, there is a reasonable doubt as to the proficiency of the welder. If the welder does not requalify they shall not be employed on this Project.
   3. Pay all costs associated with welder qualification.

B. Design Criteria: All design of open web joists as well as accessories provided shall conform to:
   1. IBC 2015 as amended by the Massachusetts State Building Code, 9th Edition.
   2. Applicable SJI specifications.
   3. Load and other supplemental design criteria shown on the drawings. Make provisions for equipment and other concentrated loads that will be supported by the trusses.
   4. Minimum shear capacity at any point along the web shall be greater or equal to 50 percent of the required end reaction capacity.
   5. Deflection under total load shall not exceed span over 240.
   6. Deflection under 300 pound concentrated load at midspan shall not exceed span over 200.
   7. Actual conditions of support and attachment.
   8. Verify need for additional bridging due to reversal of stress in bottom chord.
   9. Loads provided on the Contract Documents are unfactored.

1.04. REFERENCES

A. ASTM A307 - Carbon Steel Threaded Standard Fasteners.

B. ASTM A325 - High Strength Bolts for Structural Steel Joints.

C. AWS D1.1 - Structural Welding Code.

D. SJI - Standard Specifications for Long span Steel Joists LH Series and Deep Long span Steel Joists DLH Series.

1.05. SUBMITTALS

A. General:

1. Review of submittal is of a general nature only, and responsibility for conformance with intent of Contract Documents shall remain with the Contractor. Review does not imply or state that fabricator has correctly interpreted the Contract Documents.

2. Submit Shop Drawings and other submittals to Architect for review and obtain Architect's acceptance prior to start of fabrication.

B. Shop Drawings:

1. Indicate standard designations, configuration, sizes, spacing, locations of joists, bridging, connections, attachments and cambers

C. Structural calculations for truss joists, bridging and accessories.

D. Welders' Certificates: Submit to testing laboratory manufacturer's certificates that welders employed on the Work have met AWS qualification requirements.

E. Mill reports for all steel. Mill reports shall be traceable to individual pieces of steel used.

F. Certified test reports indicating steel yield strength is consistent with design assumptions.

G. Provide criteria for use by other trades for hanging loads from the joists.

1.06. QUALIFICATIONS

A. Fabricator and erector shall specialize in performing the work of this Section with a minimum 5 years documented experience.

B. Joists to be designed by a Professional Structural Engineer experienced in the design of this work and licensed in the State of Massachusetts

1.07. DELIVERY, STORAGE, AND HANDLING

A. Use all means necessary to protect the structural steel and paint before, during, and after installation and to protect the installed Work and materials of other trades.

B. In the event of damage, immediately make repairs and replacements necessary, to the acceptance of the Architect and at no additional cost to the Owner.

C. Follow manufacturers' instructions for transportation, storage and handling.

D. Storage:

1. Material shall be stored in a manner to preclude damage and to permit ready access for inspection and identification of each shipment and piece. Material showing evidence of damage will be rejected and shall be immediately removed from the Site.

2. Steel materials either plain or fabricated shall be stored above ground. Material shall be kept free from dirt, grease, and other foreign matter, and shall be protected from corrosion.

E. All fasteners and washers shall be delivered to site in unopened containers.

PART 2 PRODUCTS

2.01. MATERIALS

A. Anchor Bolts, Nuts, and Washers: ASTM A325 .

B. Machine Bolts: ASTM A307, Grade A.

C. High Strength Bolts, Nuts, and Washers: ASTM A325.

D. Structural Steel For Supplementary Framing and Joist Leg Extensions: ASTM A36

E. Welding Materials: AWS D1.1, type required for materials being welded. Minimum E70 electrodes.

F. Paint:

1. As per SJI "Specifications".
2. Compatible with surface finishes.

2.02. PRODUCTS

A. Open web joists [and girders] designed and fabricated in accordance with Steel Joist Institute Standard Specifications consistent with the criteria on the contract documents..

B. Open Web Joists Members: SJI Type DLH deep long span

C. Provide top and bottom chord bridging and erection bridging.

D. Provide end anchorages as indicated.

E. Joist designations on plans indicate minimum sizes and do not imply a standard joist is adequate.

F. Where no camber is indicated, provide camber as recommended by SJI specification

G. Bearing ends shall be sloped when joist slope exceeds 1/4 inch in 12 inches

2.03. FABRICATION

A. General: Fabricate steel joists in accordance with SJI "Specifications".

B. Where feasible, layout web member so as to minimize conflict with ducts, piping or other equipment adjacent to or passing through joists. Arrange web members in adjacent trusses so ducts and other services can pass through. If unavoidable conflict is identified, notify Architect.

C. As a minimum all welding shall conform to AWS D1.1.

D. Frame special sized openings in joist chord framing as detailed

E. Space shear stud connectors as noted on Drawings

2.04. COORDINATION

A. Coordinate location and details of attachment of loads from building services, ceiling systems, and other products that are to be attached to the joists.

2.05. PAINTING

A. Shop prime joists.

B. Shop Painting:
   1. Remove loose scale, heavy rust and other foreign materials from fabricated joists and accessories before application of shop paint.
   2. Apply one coat of steel prime paint to joist and accessories.

2.06. SOURCE QUALITY CONTROL

A. As a minimum, all testing and inspection as per IBC 2015 as amended by the Massachusetts State Building Code, 9th Edition.

A. Inspections: Inspection of shop and field welding operations during welding performance, as follows:
   1. Verify that welders are certified
   2. Visually inspect every weld for quality and conformance.
   3. Make systematic record of all welds, including:
      a. Location and type of weld.
      b. Identification marks of welders.
      c. List of defective welds.
      d. Manner of correction of defects.
   4. Check materials, equipment and procedures.

B. Non-Destructive Testing:
   1. Test 100 percent of full penetration butt welds by means of ultrasonic testing in conformance with AWS.

PART 3 EXECUTION

3.01. CONDITION OF SURFACES

A. Prior to commencing with the erection of steel joists inspect the job site and verify that the steel joists may be erected in accordance with the Drawings and Specifications.

B. Discrepancies:
   1. In the event of discrepancy, immediately notify the Architect in writing.
   2. Do not proceed with construction in the region of the discrepancy until all such discrepancies have been resolved.

3.02. PREPARATION

A. Secure field measurements required for proper and adequate fabrication and installation of the work covered in this Section. Assume responsibility for exact measurements.

B. Furnish templates for exact locations of items to be embedded in concrete and masonry, and any setting instructions required for installation.

C. Coordinate placement of anchors in masonry construction for securing bearing plates.

3.03. ERECTION

A. Erect joists and bridging in accordance with manufacturer's recommendations, Steel Joist Institute specifications and standards, and regulatory requirements.

B. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment until completion of erection and installation of permanent bridging and bracing.

C. After joist alignment and installation of framing, attach joists to bearing plates.

D. Weld or bolt joists to supporting framework in accordance with Steel Joist Institute specifications and the Drawings.

E. Provide high-strength threaded fasteners for bolted connections of steel joists to steel columns, and at other locations where shown, installed in accordance with AISC "Specifications for Structural Joints Using ASTM A 325 or A490 Bolts".

F. Position and attach chord extensions and wall attachments as detailed.

G. Install supplemental web members necessary to support concentrated loads where indicated.

H. Bridging:
   1. Install bridging needed for the joists to support the design and errection loads.
   2. Install cross bridging as necessary to anchor horizontal bridging.

I. Do not permit erection of decking until joists are braced, bridged, and secured.

J. Do not field cut or alter structural members without approval of joist fabricator and Architect.

K. Where cold-formed members are used in joists field welding of these members shall not be permitted without approval of joist fabricator.

L. Rigid connection of the bottom chord to columns or other support shall be made only where indicated and then shall be made only after application of decking and concrete fill.

M. After erection, prime welds, abrasions, and surfaces not shop primed. Materials and workmanship same as shop painting.

N. Do not load steel joists beyond the levels for which they were designed. Do not attach or support equipment or other items from chord or web members except as indicated.

O. Do not field cut or alter joists without written approval of the engineer who designed the joists.

3.04. FIELD PAINTING

A. Touch-Up Painting: After joist installation, paint field bolt heads and nuts, and welded areas, abraded or rusty surfaces on joists and steel supporting members. Wire brush surfaces and clean with solvent before painting. Use same materials and workmanship as used for shop painting.

3.05. ERECTION TOLERANCES

Refer to SJI tolerances for guidance. Specify tolerances only if SJI tolerances are inadequate.

B. As a minimum conform to the tolerances established by SJI.

C. Maximum Variation from Plumb: 1/4-inch.

D. Maximum Offset from True Alignment: 1/4-inch.

E. Errected horizontal sweep shall not exceed L/360.

3.06. FIELD QUALITY ASSURANCE

A. All field welding shall be inspected by a full time inspector employed by an independent testing laboratory.

B. Field quality assurance shall, as a minimum, conform to the requirements specified under Source Quality Control.

END OF SECTION 05 21 00

Section 05 30 00
METAL DECKING

PART 1 - GENERAL

1.1. SUMMARY

A. Section Includes - Fabrication and installation of metal decking and metal decking accessories.

B. Related Sections
1. 03 30 00 – Cast-In-Place Concrete.
2. 05 12 00 – Structural Steel Framing.
3. 05 50 00 – Metal Fabrications.
4. 07 81 00 – Applied Fireproofing.

1.2. REFERENCES

A. American Iron and Steel Institute (AISI).
1. AISI “Specification for the Design of Cold Formed Steel Structural Members.”

B. American Society for Testing and Materials (ASTM).
1. ASTM A 1008A.
2. ASTM A 653.
3. ASTM A 36 "Specification for Carbon Structural Steel".

C. American Welding Society (AWS).
1. AWS D1.3 “Specifications for Welding Sheet Steel in Structures".

D. Underwriters Laboratories Fire Resistance Directory.

1.3. SUBMITTALS

A. General:
1. Submit shop drawings for review and obtain acceptance prior to start of fabrication.
2. Review of submittals is for general conformance with the design concept of the project and information shown on the contract documents only. The Contractor is responsible for conforming, correlating and coordinating dimensions in the field for tolerance, clearances, quantities, fabrication and installation processes means and methods of construction, coordination of this work with other trades and performing work in a safe and satisfactory manner.

B. Product Data:
1. Submit manufacturer’s literature for each style and combination of deck assembly provided including steel decking design calculations, section properties, load carrying capacity, deflection data, and load test data substantiating calculated capacities.
2. Submit U.L. Fire Rating Report.

3. Submit certified copies of mill test reports for each heat of steel and for all fasteners, including nuts and washers prior to start of fabrication.
4. Mill test reports shall include ladle analysis and tensile elongation and bend tests. Perform mechanical and chemical tests for all material regardless of thickness or use.
5. Mill reports shall be traceable to individual pieces of steel used.

C. Shop Drawings:

1. Prepare decking plans showing deck profile, sheet layout, method of attachment, edge details, supplemental framing, openings and reinforcement, projections and accessories.
2. Show type and location of welds and other fasteners.
3. Show where shoring of deck is needed.

D. Submit certificates of compliance for:

1. Welding electrodes including electrode specification sheets.
2. Shear studs including manufacturers test reports.
3. Welder has passed qualification tests.

E. Welding Procedures:

1. Submit welding procedures for all welding.

1.4. QUALITY ASSURANCE

A. Owner's Testing Laboratory: Testing and inspection of metal decking will be performed by an independent laboratory engaged by the Owner ("Inspector").

B. All work shall be performed by qualified operators experienced in their field of work and as otherwise required by these specifications.

C. Qualifications of Welders:

1. All welding shall be performed by operators who are qualified for the types of welds used. Each operator shall have been qualified as prescribed by AWS. Welder qualification shall include passing the bend test.
2. Require welders to retake the qualification test in, as determined by the Architect, there is a reasonable doubt as to the proficiency of the welder. If the welder does not requalify, he shall not perform any welding on the project.
3. Pay all costs associated with welder qualification.

1.5. DELIVERY, STORAGE AND HANDLING

A. Store materials to permit easy access for inspection and identification. Support material off the ground and protect from corrosion and deterioration. Materials showing evidence of damage will be rejected and shall be immediately removed from the site.

B. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

C. Where deck is exposed to view in the completed structure use special care to prevent damage to decking.

D. Each bundle of decking shall be marked or tagged to indicate material grade, style and gage of deck.

PART 2 - PRODUCTS

2.1. MATERIALS

A. Metal Decking

1. ASTM A 653-09 designated as Structural Steel grade 33 or higher with G60 coating.
2. All decking shall have a current ICC Evaluation Report listing allowable vertical load values, diaphragm shear values and ratings for use in fire resistive assemblies.
3. Decking Manufacturer: Canam or accepted equal.

B. Accessories:

1. Cover plates, flashings and closures: Sheet steel ASTM A 653 Grade G60 or ASTM A 611 Grade C to match deck material, 16 gage minimum.

C. Welding Electrodes:

1. Conform to AWS D1.3 and deck manufacturers recommendations. Base selection of electrodes on the actual properties of the metal connected.
2. Electrodes will have a specified minimum tensile strength of at least 60 ksi.
3. Use low hydrogen electrodes.

2.2. PRODUCTS

A. Touch-up Paint.

1. Where painted decking is used touch-up paint shall be same as recommended by the decking manufacturer.
2. Touch up paint for galvanized sheet metal shall be Steel Structures Painting Council (SSPC) Paint-20 Type 1, Inorganic.

2.3. FABRICATION

A. Fabricate deck units in lengths to span three or more spans where possible.

B. Cantilevered units shall have the cantilever and at least the adjacent span in one length.

C. Fabricate such that end joints occur over supporting members.

D. Sheets parallel to and at the perimeter of the deck shall be full width sheets.

E. Each bundle of fabricated elements shall be marked or tagged so as to show material and grade.

F. TOLERANCES:

1. Panel length: Plus or minus ½ inch.

2. Thickness of deck units: Not less than 95 percent of the specified thickness.
3. Panel camber: ¼ inch in 10 foot length.

PART 3 - EXECUTION

3.1. CONDITION OF SURFACES

A. Prior to commencing with the erection of structural steel inspect the job site and verify that the work is sufficiently complete that this installation may properly commence.

B. Discrepancies:
1. In the event of discrepancy, immediately notify the Architect in writing.
2. Do not proceed with construction in the region of the discrepancy until all such discrepancies have been resolved.

3.2. PREPARATION

A. Secure field measurements required for proper and adequate fabrication and installation of the work covered in this Section. Assume responsibility for exact measurements.

3.3. ERECTION

A. General: Install deck units and accessories in accordance with Construction Documents and manufacturer's recommendations.

B. Placing Deck Units:
1. Position on supporting members and adjust to final position with ends bearing a minimum of 2 inches on supporting members.
2. Where feasible, install with ribs at right angles to support members.
3. Place units end-to-end before permanently fastening.
4. Align ribs over entire length of run.
5. Shore and brace decking as necessary for all construction loads.

C. Fastening of Deck Units:
1. Welding shall be in accordance with AWS D1.3.
   a. Contractor is responsible for selection of specific materials and procedures except as specifically noted in contract documents.
   b. When selecting materials and procedures, consideration shall be given to the need for materials and procedures in excess of code requirements.
   c. Weld variables shall be consistent with the recommendations of the electrode manufacturer.
   d. Welding Procedure Specifications shall be readily available to all welders, inspectors, and supervisors.
2. No tack welds not incorporated into a weld will be allowed on the finished structure with the exception of backing plates that are not removed.
3. Sequence the Work as necessary to accommodate testing.

4. Secure decking to supporting members with 3/4-inch diameter puddle welds. If studs are welded through the deck to the structural steel the stud welds can replace the fusion welds on a one per one basis.
5. Use weld washers when base metal thickness is less than 0.028 inch or where required in the Construction Documents. Weld washers shall have a minimum thickness of 16 gage and have a nominal 3/8 inch diameter hole.

D. Closures:

1. Install sheet steel closures and angle flashings to close openings between decks and walls, columns, and opening.
2. Closures shall be of sufficient strength to remain in place without significant distortion. Shore where necessary.

E. Where the underside of decking is exposed in the final structure.

1. Tape or otherwise seal joints to prevent leakage of concrete.
2. Prevent damage to deck that would be observed.

F. Cutting Openings:

1. Where openings do not need reinforcements (exclusive of trim bars in concrete) do not cut deck until concrete has cured.
2. Unless both edges of openings perpendicular to deck span are supported by a beam, do not cut opening until concrete has cured.

3.4. PROTECTION

A. Contractor is responsible for determining of the adequacy of the decking (with or without concrete fill) to support construction loads and for identifying need for temporary construction. Shoring is the responsibility of the Contractor.

B. Do not suspend ducts, piping, ceilings, light fixtures or other items from metal roof decking.

C. Do not place pipes or conduit in concrete fill over deck except as specifically allowed.

D. Decking shall be protected from damage during construction operations. As a minimum this shall include the use of planked runways if buggies are used.

E. Concrete admixtures containing chloride salts shall not be used in concrete fill placed on metal decking.

3.5. TOUCH-UP PAINTING

A. Immediately after erection, clean field welds, bolted connections, and abraded areas of the shop paint, and paint all surfaces exposed to the weather in the complete structure.

B. Use same materials and standards as for shop painting.

3.6. CLEAN-UP

A. Remove grease, oil, and other foreign material from all surfaces.

B. Leave deck in proper condition for bonding with concrete fill where concrete fill will be placed.

3.7. FIELD QUALITY CONTROL

A. Testing and inspection of metal deck installation will be performed by the independent testing agency. Provide the Inspector with the following.

1. A complete set of accepted "Submittals"
2. Representative sample pieces as requested by the testing agency
3. Full and ample means and assistance for testing all material.
4. Access and facilities, including scaffolding, temporary work platforms, etc., for testing and inspection at all places where materials or components are stored or fabricated, and also in their erected position.

B. Scheduling of Tests and Inspections: The Contractor shall notify the Inspector in sufficient time prior to fabrication or erection work to allow testing and inspection without delaying the work.

C. Non-destructive Testing and Inspections

1. As a minimum the inspector will make all tests and inspections as required by the International Building Code, 2015. The Inspector will make all the tests and inspections indicated in the Construction Documents.
2. The Inspector will make all verification tests and inspections as required by AWS D1.3.
3. Inspector shall be present during all welding operations.
4. Verify that welders are certified.
5. Check materials, equipment and procedures. Verify meters on welding equipment are functioning and are accurate.
6. Visually inspect all welds.

D. Inspection Records

1. Make systematic record of all welds, including:
   a. Location and type of weld.
   b. Identification marks of welders.
   c. List of defective welds.
   d. Manner of correction of defects.
2. The Inspector will maintain a daily record of the work that has been inspected and its disposition. One copy of each of the report will be submitted to the Owner on a weekly basis. Test reports will be made on the form suggested in the AWS D1.3.

E. Mill Reports: Testing laboratory will review mill reports for conformance to referenced standard.

End of Section

Section 05 40 00
COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

1.2 SUMMARY

A. Design, engineer, furnish and install metal framing and support system for the following applications:
   1. Load bearing formed steel stud exterior wall and parapet framing.
   2. Framing for exterior soffits and ceilings.
   3. Interior wall framing at double-height spaces, and as additionally indicated.
      a. Atrium breakout space structures, including partition framing and floor framing.
      b. High walls at Auditorium.
   4. Atrium floor system and supports for associated decking.
   5. Support framing for mock-ups.
   6. Metal plate blocking in conjunction with framing of this Section 05 40 00.
   7. Include all connections, bracing, bridging and accessories.
   8. Provide special shapes at bays.
   9. Furring coordinated with attachments at spray-fire-proofed structural steel.

B. Furnish the following products to be installed under the designated Sections:
   1. Placement of anchors securing the work of this section: Section 03 30 00 - CAST-IN-PLACE CONCRETE.
   2. Placement of anchors securing the work of this section: Section 04 20 00 - UNIT MASONRY.

1.3 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Special administrative and procedural requirements related to LEED VERSION 4 FOR BUILDING DESIGN AND CONSTRUCTION" (LEED V4 BD+C) certification goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

C. Section 04 20 00 - UNIT MASONRY: Veneer masonry supported by wall stud metal framing.

D. Section 05 12 00 - STRUCTURAL STEEL FRAMING

E. Section 05 31 00 - STEEL FLOOR DECK

F. Section 05 44 00 - COLD-FORMED METAL TRUSSES

G. Section 05 50 00 - METAL FABRICATIONS

H. Section 06 10 00 - ROUGH CARPENTRY: Wood blocking and curbing.

I. Section 06 16 00 - SHEATHING: Exterior wall sheathing.

J. Section 07 21 00 - THERMAL INSULATION: Insulation within framing members.

K. Section 07 92 00 - JOINT SEALANTS.

L. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Light weight, non- load bearing metal stud framing.

1.4 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. AISI S211 – North American Standard for Cold-Formed Steel Framing, Wall Stud Design.
2. AISI S212 - North American Standard for Cold-Formed Steel Framing, Header Design.
3. AISI S213 - North American Standard for Cold-Formed Steel Framing, Lateral Design.
4. AISI S902-02, Stub-Column Test Method for Effective Area of Cold-Formed Steel Columns, American Iron and Steel Institute, Washington, DC.
5. AISI S905-02, Test Methods for Mechanically Fastened Cold-Formed Steel Connections, American Iron and Steel Institute, Washington, DC.
6. ANSI - Cold-Formed Steel Design Manual.
7. ASTM A 123 - Zinc Coatings on Iron and Steel Products.
8. ASTM A 645 - Steel Sheet, Pressure Vessel Plates, Five Percent Nickel Alloy Steel, Specially Heat Treated.
9. ASTM A 653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
10. ASTM A 780 - Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

11. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
12. ASTM C 955 Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases
13. ASTM C 1513 Standard Specification For Steel Tapping Screws For Cold-Formed Steel Framing Connections
14. AWCI: Specifications Guide for Cold Formed Steel Structural Members.
15. AWS A 2.0 - Standard Welding Symbols.
16. AWS D 1.3 - Light Steel Welding Code.
17. SSPC Steel Structures Painting Manual.
18. SSMA: Cold Formed Steel Details.

B. Inclusionary References: The following reference materials are hereby made a part of this Section by reference thereto:

1. AISI S100 – North American Specification for the Design of Cold-Formed Steel Structural Members.
2. ANSI S200 – North American Standard for Cold-Formed Steel Framing.
3. ANSI S202 – Code of Practice for Cold-Formed Structural Framing.
4. ANSI S220 – North American Standards for Cold-Formed Steel Framing – Non-Structural Members.
5. ASCE 7 (Including Supplements) - Minimum Design Loads for Buildings and Other Structures.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. General: Coordinate the work of this Section with the respective trades responsible for installing interfacing and adjoining work for proper sequence of installation, and ensure that the work performed hereunder is acceptable to such trades for the installation of their work.

B. Sequencing:

1. Field Measurements:
   a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.
   b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

1.6 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and limitations on standard framing members and other products furnished hereunder.

2. Engineering Calculations: Provide calculations for loadings and stresses for all framing under the Professional Structural Engineer's seal. Show how design load requirements and other performance requirements have been satisfied.
3. Manufacturer's installation instructions: Indicate special procedures, and conditions requiring special attention.
4. Shop drawings: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional structural engineer registered in the Commonwealth of Massachusetts.
    a. Large scale design details showing component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and accessories or items required of related work.
        1) Provide detail of building up sections required to accommodate fireproofing.
        2) Indicate all products which interface with framing. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
        3) Indicate resilient hangers, and imposed loading. Coordinate resilient hanger with framing design and imposed loading conditions.
    b. Show profile, size and location of custom punches for MEP distribution.
    c. Detail all conditions which deviate from Contract Documents.
    d. Describe method for securing studs to tracks and for bolted and welded framing connections.
    e. Show loads applied to framing, indicate differential of movement.
    f. Provide elevations showing framing layout. Coordinate framing locations with cladding systems.
5. Prior to prefabrication of framing, submit fabrication and erection drawings for approval. All calculations and details are to be submitted for all members and connections.

B. Submit prior to request for Certificate of Occupancy, to both Architect and local Building Official having jurisdiction, under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, the following
    1. All certifications, reports and programs required by Chapter 17 of the Massachusetts State Building code for work engineered by Contractor's Profession Engineer under the requirements of this Section.

1.7 QUALITY ASSURANCE

A. General:
    1. Calculate structural properties of framing members in accordance with AWCI, MF/SLA and AWS D l.3 requirements.
    2. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Qualifications:

1. Manufacturers: Company specializing in manufacturing the products specified in this section with minimum 3 years documented experience.
2. Installer/Applicator: Company with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
3. Welders Certificates: Utilize only qualified welders employed on the Work. Submit verification that Welder's are AWS D1.1 and D1.4 qualified within the previous 12 months.
4. Professional Engineer Qualifications: Design structural elements under direct supervision of Professional Engineer experienced in design of this Work and licensed in the Commonwealth of Massachusetts

1.8 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:
   1. Do not deliver items to the site, until all specified submittals have been submitted to, and approved by, the Architect.
   2. Deliver materials in original unopened packages, containers or bundles bearing brand name, and identification of manufacturer, with labels and package seals intact and legible.

B. Storage and Handling Requirements:
   1. Store and handle materials following manufacturer's recommended procedures, and in accordance with material safety data sheets.
   2. Protect materials from damage due to moisture, direct sunlight, excessive temperatures, surface contamination, corrosion and damage from construction operations and other causes.

PART 2 - PRODUCTS

2.1 SUSTAINABILITY CHARACTERISTICS

A. Comply with sustainability characteristics for each "Sustainability Focus Material" in accordance with Section 018113 Appendix A and Appendix B.

2.2 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
   1. ClarkDietrich Building Systems, LLC, West Chester, OH.
   2. Marino-Ware Industries Corp., South Plainfield NJ.
   3. Steel Elements, Gorham NH.
   4. The Steel Network (TSN), Las Vegas NV.
   5. Telling Industries, Willoughby, OH.

2.3 PERFORMANCE/DESIGN CRITERIA

A. Structural performance: Design, engineer and provide a complete metal framing and support system having deflection limits as specified herein under the full

inward and outward lateral load prescribed by applicable codes for this project location. Deflection and structural calculations shall not include any structural benefit from the veneer(s), and storefront systems; metal framing alone shall carry the loads. Where a member supports more than one finish, the most restrictive deflection shall govern.

1. Design wall system to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
2. Design wall system to carry all loads transmitted from window systems, including eccentrically applied dead loads at sills.
3. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings. Comply with the following cold-formed steel framing design standards:
    a. Wall Studs: AISI S211.
    b. Headers: AISI S212.
    c. Lateral Design: AISI S213.
4. Deflection limits
    a. Exterior wall framing: Deflection limit for masonry veneer: L/600 where L is the length of the steel member. Design wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
    b. Deflection limit for metal panel systems: L/360 where L is the length of the steel member.
    c. Deflection limit for fiber cement panel systems: L/360 where L is the length of the steel member.
    d. Interior load-bearing wall framing: Horizontal deflection of 1/360 of the wall height.
    e. Floor joist framing: Vertical deflection of 1/480 of the span.

B. Design Loading: Refer to Structural Drawings.

1. Wind Loading: Storefront system and installation shall be designed to conform to the *International Building Code*, 2015 edition, as published by the International Code Council, Inc. (I.C.C.), as revised by *Massachusetts State Building Code*, Ninth edition.
    a. Basic wind speed of 137 miles per hour (3 second gust), both positive (acting inward) and negative (acting outward) wind pressure loading.
        1) Building Risk Category: III.
        2) Building Exposure: C.

C. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

D. Welding: Employ experienced welders who are certified in compliance with AWS Standard Qualification Procedures.

E. Engineering: Provide the services of a Professional Engineer, registered in the Commonwealth of Massachusetts to design and certify that the work of this section

meets or exceeds the performance requirements specified in this section and as required by Massachusetts State Building Code.

2.4 MATERIALS

A. Recycled content of Steel: Use maximum available percentage of recycled steel. Steel framing products incorporated into the work shall contain not less than 30 percent of recycled steel.

B. Steel Sheet: ASTM A1003/A1003M and ASTM A 653/A 653M, structural steel, of grade as follows and having G90 (Z275) galvanized coating:

1. Framing

a. Grade: As required by structural performance but in no case less than 18 gauge.

C. Steel Sheet for Connectors: ASTM A 570/A 570M, hot rolled or ASTM A 611, cold rolled; cleaned, pretreated, and primed with manufacturer's baked-on, lead- and chromate-free, rust-inhibitive primer complying with performance requirements in FS TT-P-664.

1. Grade: As required by structural performance but in no case less than 18 gauge.

a. Coating: G90 (Z275) galvanized coating.

2.5 FRAMING MEMBERS

A. Studs: Manufacturer's standard C-shaped steel studs complying with ASTM C 955. Formed of ASTM A-653/653M steel, G60 (Z180) G90 (Z275) galvanized, channel shaped with lipped flanges, punched web, size as shown on Drawings, thickness and grade as required by structural design calculations but in no case less than 18 gauge, 0.0428 inch (1.09 mm).

B. Z-shape span connectors: Manufacturer’s standard and custom formed Z-shape framing connectors, complying with ASTM C 955. Formed of ASTM A-653/653M steel, G60 (Z180) G90 (Z275) galvanized, having opposing lipped flanges. Sizes as shown on drawings, thickness and grade as required by structural design calculations but in no case less than 14 gauge, 0.0677 inch (1.72 mm).

C. Tracks: Manufacturer's standard U-shaped steel track complying with ASTM C 955. Formed of ASTM A-653/653M steel, same designation, coating, and thickness as studs except as otherwise noted, channel shaped, solid web, depth compatible with studs, size, thickness and grade as required by structural design calculations but in no case less than 18 gauge, 0.0428 inch (1.09 mm).

D. Drift and Vertical Deflection Clips: Manufacturer's standard bypass and head clips as required, capable of isolating wall stud from upward and downward vertical displacement of primary structure using mechanical fasteners.

1. Provide clips with step bushings. Mechanical attachment to structure and screw attachment to stud web using step-bushings to permit frictionless vertical movement. 68 mils (1.72 mm) minimum thickness. Size of clips shall be as required by structural design calculations performed by clip manufacturer, and reviewed by specified Engineering Licensed Professional

stamping Shop Drawings. Clips shall be fabricated/designed for the following conditions:

a. Exterior head of wall.
b. Exterior head of wall pre-assembled with track.
c. By-pass structural pour stop at floor slab.
d. By-pass floor slab or structure.
e. By-pass structure.

2.6 ANCHORS AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Mechanical Fasteners: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.
1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

D. Welding Electrodes: Comply with AWS standards.

2.7 MISCELLANEOUS MATERIALS

A. Liquid zinc coating, for touch-up of welds, scratches, and abrasions in galvanized steel: Low VOC organic zinc-rich coating containing 92% metallic zinc, by weight in the dried film (ASTM D520, Type III) and conforming to SSPC Paint 20, Type II, Level 1. Liquid zinc coating shall be recognized under the Component Program of Underwriter's Laboratories, Inc. as an equivalent to hot-dip galvanizing; conforming to MIL-P-21035B and SSPC Paint 29, Type II, Level I, for repair of hot-dip galvanizing and meeting the requirements for Zinc-Rich Paints.
1. VOC limit: not more than 250 g/L.

2.8 PRE-ERECTION FABRICATION

A. Framing components may be pre-assembled into panels prior to erecting. Fabricate panels square with framing members fitted, reinforced, and braced to suit design requirements; attach components in a manner to prevent racking.

B. Fit and assemble in largest practical sections for delivery to site, ready for installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect previous work, related work, and conditions under which this work is to be performed and notify Contractor in writing of all deficiencies and conditions detrimental to the proper completion of this work.

B. Beginning of installation means acceptance of existing substrates, previous work and conditions.

3.2 PREPARATION

A. Do not disturb or remove fireproofing on adjacent structural steel. Where removal is required to accommodate installation of work of this Section coordinate necessary repairs with the Architect, Contractor, and subcontractor responsible for work under Section 07 81 00 - APPLIED FIREPROOFING.

3.3 ERECTION - GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to ASTM C 1007, unless more stringent requirements are indicated.

C. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed metal framing members by welding or screw fastening, as indicated on approved Shop Drawings, or where not indicated, as standard with fabricator. Wire tying or clip fasteners of framing members is not permitted.
    a. Where welding is indicated or required on approved Shop Drawings: Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to approved Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.

D. Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.

E. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

F. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

G. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

H. Accurately align and attach runners in strict compliance with manufacturer’s recommendations and approved shop drawings. . Allow for main structure deflection at top runner to avoid transferring load stud system.

1. Frame wall openings with additional framing members at perimeter of openings as needed.

2. Align holes in framing members to facilitate electrical conduit and piping work.
3. Provide all needed connections and accessories provide a complete structural system.
4. Provide all needed members for proper fastening interior gypsum wallboard.

I. Bracing: Provide continuous 1-1/2 inch cold-rolled channel horizontal bracing within 10 to 12 inches of tops of stud. Connect bracing to each stud as indicated on approved shop drawings. Provide additional bridging and bracing as recommended by manufacturer, as necessary, and as indicated on approved shop drawings. Provide kick-back bracing perpendicular to plane of framing system and securely anchored to building structure needed to create a complete structural system meeting specified performance requirements.

J. Touch-up damaged metal coatings and cut ends, with specified liquid zinc coating.

3.4 ERECTION OF STUDDING

A. Install components in accordance with manufacturer's instructions and in accordance with approved shop drawings, referenced standards and codes.

B. Align floor and ceiling tracks; locate to wall and partition layout. Secure in place as indicated on approved engineered shop drawings, at maximum 24 inches on center.

C. Squarely seat studs against webs of top and bottom tracks. Fasten both flanges of studs to top and bottom tracks. Space studs as indicated on approved shop drawings; not more than 2 inches from abutting walls and at each side of openings.

D. Construct corners using minimum three studs. Double stud wall openings, door and window jambs.

E. Erect load bearing studs one piece full length. Splicing of studs is not permitted.

F. Erect load bearing studs, brace, and reinforce to develop full strength, to achieve design requirements.

G. Install intermediate studs above and below openings to align with wall stud spacing.

H. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing. Install double deep leg deflection track or specified clip system for vertical deflection of primary building structure.

I. Attach cross studs, furring channels to studs for attachment of fixtures anchored to walls.

J. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

K. Touch-up field welds and damaged galvanized and primed surfaces with primer.

3.5 ERECTION (WIND LOAD ONLY)

A. Handling and lifting of prefabricated panels shall be done in a manner as to not cause distortion in any member.

B. Tracks shall be securely anchored to the supporting structure as shown on the plans.

C. At track butt joints, abutting pieces of track shall be securely anchored to a common structural element or they shall be butt-welded spliced together.

D. Studs shall be plumbed, aligned and securely attached to the flanges or webs of both upper and lower tracks.

E. Jack studs or cripples shall be installed below window sills, above window and door heads, at first standing stair rails, and elsewhere to furnish support and shall be securely attached to supporting members.

F. Wall stud bridging shall be attached in a manner to prevent stud rotation. Bridging rows shall be spaced according to the following schedule. Wall up to 10 foot height; one row at mid-height. Wall exceeding 10 feet in height; bridging rows spaced not to exceed 5 feet on-center.

3.6 ERECTION (AXIAL LOAD-BEARING)

A. Handling and lifting of prefabricated frame panels shall be done in a manner as to not cause distortion in any members.

B. Tracks shall be securely anchored to the supporting structure as shown on the plans, and as designed and detailed on approved shop drawings.

C. Complete uniform and level bearing support shall be provided for the bottom track.

D. At track butt joints, abutting pieces of track shall be securely anchored to a common structural element or they shall be butt welded or spliced together,

E. Studs shall be plumbed, aligned and securely attached to the flanges or webs of both upper and lower tracks.

F. Framed wall openings shall include headers and supporting studs as shown on the plans, and as designed and detailed on approved shop drawings.

G. Jack studs shall be installed below window sills, above window and door heads, at free standing stair rails and elsewhere to furnish support and shall be securely attached to supporting members.

H. Temporary bracing shall be provided until erection is completed.

I. Wall stud bridging shall be installed in a manner to provide resistance to both minor axis bending and rotation. Bridging rows shall be equally spaced not to exceed 4 feet on-center.

J. Provide stud walls at locations indicated on plans as “shear walls” for frame stability and lateral load resistance. Such stud walls shall be braced as indicated on plans and specifications.

K. Splices in axially loaded studs are not be permitted.

L. Provide insulation equal to that specified elsewhere in all doubled jamb studs and double header member which will not be accessible to the insulation contractor.

3.7 ERECTION FLOOR JOISTS

A. Install framing components in accordance with manufacturer's instructions.

B. Make provisions for erection stresses. Provide temporary alignment and bracing.

C. Place joists purlins at spacing indicated on approved shop drawings; locate not more than 12 inches from abutting walls. Connect joists to supports using method indicated.

D. Set floor and ceiling joists parallel and level, with lateral bracing and bridging.

E. Locate joist end bearing directly over load bearing studs or provide load distributing member to top of stud track.

F. Provide web stiffeners at reaction points.

G. Provide joist bridging as required or shown on the plans.

H. Provide an additional joist under parallel partitions when the partition length exceeds one-half the joist span and around all floor and roof openings which interrupt one or more spanning members unless otherwise noted.

I. Provide end blocking where joist ends are not otherwise restrained from rotation.

J. Touch-up field welds and damaged galvanized or primed surfaces with primer.

3.8 TOLERANCES

A. The following allowable installed tolerances are allowable variations from locations and dimensions indicated by the Contract Documents and shall not be added to allowable tolerances indicated for other work.

1. Allowable variation from true plumb, Level, and Line: 1/8 inch in 20 feet.
2. Allowable variation from true wall thickness: 1/8 inch in 20 feet.
3. Allowable variation from true plane of adjacent surfaces: 1/8 inch in 10 feet.

End of Section

Section 05 50 00

METAL FABRICATIONS
(TRADE CONTRACT REQUIRED)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.

1.2 PUBLICLY BID TRADE CONTRACTOR

A. The work of this section is work of a Publicly Bid Trade Contractor and includes the following requirements.

B. Submit bid as directed by and in compliance with the Invitation to Bid, the Instructions to Bidders, and this Article 1.2 - PUBLICLY BID TRADE CONTRACTOR

C. Submit bid on mandatory form, and in manner described in the Instructions to Bidders before the date and time indicated for submission of bids.

D. The Trade Contractor shall perform the complete trade work, including the following listed sub-trade classes of work, with employees on its own payroll unless the Trade Contractor identifies on the bid form, the name of a sub-trade subcontractor that will perform each of the following classes of sub-trade work and the corresponding sub-trade subcontract sum.

1. None.

E. If the Trade Contractor intends to use sub-trade subcontractors to perform any portion of the trade work other than the customary sub-trade classes of work listed in Paragraph 1.2(D), above, the Trade Contractor shall list on the bid form the names of each such sub-trade subcontractor and each respective sub-trade subcontract sum unless: (a) the value of the sub-trade subcontract is less than Twenty-Five Thousand Dollars ($25,000), or (b) the sub-trade subcontract is not subject to the provisions of M.G.L. c. 149, §§ 44A-J.

F. The work to be completed by the Trade Contractor for the work of this Section is shown on the following listed Drawings:

1. The Work of this Trade Contract is shown on the following Drawings: A001, A101, A101A, A101B, A101C, A101D, A102, A102A, A102B, A102C, A102D, A103, A103A, A103B, A103C, A104, A200, A211, A201, A212, A202, A213, A203, A214, A204, A215, A205, A230, A300, A301, A311, A312, A313, A314, A315, A316, A317, A318, A319, A320, A321, A322, A440, A441, A442, A450, A451, A452, A453, A460, A461, A462, A463, A503, A510, A511, A512, A513, A514, A515, A520, A521, A522, A523, A524, A530, A531, A532, A533, A544, A570, A603, A605, A710, A711, A713, A714, S000, S001, S002, S003, S101A, S101B, S101C, S101D, S101L, S102A, S102B, S102C, S102D, S103A, S103B, S103C, S103D, S104B, S104C, S104D, S105B, S105C, S200, S201, S202, S203, S204, S205, S300, S301, S302, S303, S304, S305,

S400, S401, S500, S501, S502, S503, S504, S600, S601, S602, S603, S604, S700, S701, L 1.0, L 1.1, L 1.2, L 1.3, L 1.4, L 1.5, L 1.6, L 3.0, A181, A181A, A181B, A181C, A181D, A182, A182A, A182B, A182C, A182D, A183, A183A, A183B, A183C, A222, A402, A403, A404, A405, A406, A410, A411, A412, A413, A414, A415, A416, A417, A418, A419, A420, A421, A422, A423, A425, A426, A427, A428, A429, A430, A431, A432, A433, A434, A435, A470, A471, A472, A473, A480, A490, A491, A492, A542, A543, A600, A601, A602, A604, A609, A620, A621, A623, A625, A650, A651, A652, A690, A720, A721, A802, VT01, AV000, AV101C, AV101D, AV201C, AV201D, AV300, AV301, AV303, AV400, AV500, AV501, AV502, AV503, AV600, AV601, TE000, TE001, TE111, TE112, TE121, TE122, TE141, TL100, TL111, TL121, TL131

2. The complete List of Drawings for the Project is provided on the Cover Sheet of Contract Drawings.

3. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section The listing of Contract Drawings above does not limit Trade Contractor's responsibility to determine full extent of work of this Section as required by all Drawings listed in the Drawing List on the Drawing Title Sheet, as modified by Addenda.

G. Trade Contracts for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Awarding Authority at a time and place as stipulated in INVITATION TO BID and INSTRUCTIONS TO BIDDERS.

1. The following shall appear on the upper left hand corner of the envelope:

NAME OF TRADE
CONTRACTOR:_____
TRADE CONTRACT FOR TRADE: MISCELLANEOUS & ORNAMENTAL IRON .

2. Each Trade Contract submittal for work under this Section shall be on forms furnished by Awarding Authority, as bound herein, accompanied with the required bid deposit in compliance with MGL Chapter 149 Section 44B in the amount of 5 percent of Trade Contract.

1.3 EXAMINATION OF SITE AND DOCUMENTS

A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Owner will not be responsible for errors, omissions and/or charges for extra work arising from Trade Contractor's failure to familiarize themselves with the Contract Documents and existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.

B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to INVITATION TO BID for time and date.

1.4 SUMMARY

A. General: The work of this Section consists of miscellaneous metals, and ornamental iron where shown on the Drawings, as specified herein, and as required for a complete and proper installation.

B. Furnish and install:

1. Egress Stairs 1 and 2.
2. Monumental Stairs 3 and 6.
3. Steel stair railings, guards and wall-mounted railings.
4. Interior railings and guards, perforated metal guards
5. Elevator pit ladders.
6. Ships ladders.
7. Roof-top ladders including roof-cross-over ladders, equipment platforms, and safety railings.
8. Exterior railing with perforated metal guards.
9. Elevator sill support angles.
10. Masonry relieving angles.
11. Elevator sump pit grating.
12. Steel framing for coiling security draperies and roll-up coiling doors.
13. Above ceiling supports for folding panel partitions, cubical curtain track and similar products furnished under other sections.
14. Steel angle supports for gym divider curtain, baseball practice net, suspened projectors, suspended projection screens, and similar products furnished under other sections.
15. Steel bollards, concrete filled.
16. Removable steel bollards and in-slab inserts.
17. Perforated sheet metal grilles.
18. Steel angle corner guards at overhead door jambs.
19. Supports for Atrium duct pylons duct enclosure.
20. Support clips for metal framed skylight
21. Support for interior sun control devices.
22. Bench supports.
23. Custom Security Gates.
24. Roof top railing system (permanent, fixed in place cable railing system).
25. Aluminum Corner Guards.
26. Steel corner guards
27. Cane detection rails
28. Miscellaneous supports at Breakout Spaces (refer to Drawings).

C. Furnish the following items for installation under related sections:

1. Anchors, bolts, inserts, and sleeves, required to attach miscellaneous metals for embedment into concrete under Section 03 30 00 - CAST-IN-PLACE CONCRETE.
2. Loose steel lintels at door, window, ductwork and similar openings in interior masonry partitions; installed under Section 04 20 00 - UNIT MASONRY.
3. Hot dipped galvanized loose lintels at door, louver, window and similar openings in exterior masonry partitions; installed under Section 04 20 00 - UNIT MASONRY.
4. Anchor bolts, with nuts and washers; inserts; and sleeves; required to attach miscellaneous metal items to masonry, for installation under Section 04 20 00 - UNIT MASONRY.

D. Perform all drilling and cutting in miscellaneous metal items required for the attachment of other items.

E. Core drill concrete stairs and ramps; grout into place railing posts.

F. Perform all shop-painting for all surfaces of exposed to view galvanized and non-galvanized metals, and post-erection touch-up of shop prime coat, using the same material as shop-prime coating.

G. Perform application of liquid zinc touch-up to all welds of galvanized steel items furnished hereunder.

H. No attempt is made in this Section to list all elements of miscellaneous metal required on this project or to describe how each element and component will be installed. It is the responsibility of the Filed-subcontractor to determine for itself the scope and nature of the work required for a complete installation from the information provided herein and in the Drawings.

1.5 RELATED REQUIREMENTS

A. Section 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL: Procedural and administrative requirements for construction and demolition recycling.

B. Section 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS: Special administrative and procedural requirements related to LEED VERSION 4 FOR BUILDING DESIGN AND CONSTRUCTION" (LEED V4 BD+C) certification goals of energy conservation and efficiency, indoor air quality, and natural resource efficiency.

C. Section 03 30 00 - CAST-IN-PLACE CONCRETE: Installation of anchors into concrete, pouring concrete stair treads and landings.

D. Section 04 22 00 - CONCRETE UNIT MASONRY

E. Section 05 12 00 – STRUCTURAL STEEL FRAMING:

1. Metal stair stringer and riser assembly, tread pans and all supporting structure.
2. Elevator hoist beam.

F. Section 05 31 00 - STEEL FLOOR DECK

G. Section 05 40 00 - COLD-FORMED METAL FRAMING

H. Section 06 10 00 - ROUGH CARPENTRY: Wood framing, blocking, subflooring and underlayment.

I. Section 08 33 23 - OVERHEAD COILING DOORS

J. Section 08 34 57 - SECURITY WOVEN MESH COILING DRAPERY

K. Section 09 22 16 - NON-STRUCTURAL METAL FRAMING: Non-loadbearing metal framing systems for interior partitions and ceilings.

L. Section 09 91 00 - PAINTING: Applied finish coatings other than those specified herein.

M. Section 09 96 00 - HIGH PERFORMANCE COATINGS: Applied high build coatings.

N. Section 11 40 00 - FOODSERVICE EQUIPMENT: Stainless steel hoods, through-wall tray and food service equipment.

O. Section 14 24 23 - HYDRAULIC ELEVATORS:

1. Elevator guide rails
2. Hoist way entrance door sills.

1.6 REFERENCES

A. Referenced Standards: Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. The standards referenced herein are included to establish recognized minimum quality only. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern. Equivalent quality and testing standards will be acceptable, subject to their timely submission, review and acceptance by the Architect.

1. ASTM A 36 - Structural Steel.
2. ASTM A 53 – Pipe, Steel, Black and Hot-Dipped, Zinc-coated, Welded and Seamless Steel Pipe.
3. ASTM A 108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.
4. ASTM A 123 - Zinc Coatings on Products Fabricated From Rolled, Pressed and Forged Steel Shapes, Plates, Bars, and Strip.
5. ASTM A 153 - Zinc-Coating on Iron and Steel Hardware.
6. ASTM A 283 - Carbon Steel Plates, Shapes, and Bars.
7. ASTM A 307 - Carbon Steel Externally Threaded Standard Fasteners.
8. ASTM A 325 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
9. ASTM A 361 - Zinc Coated (Galvanized) Iron or Steel Roofing sheets.
10. ASTM A 385 – Providing High Quality Zinc Coatings.
11. ASTM A 380 – Standard Practice for Cleaning, Descaling and Passivation of Stainless Steel Parts, Equipment and Systems.
12. ASTM A 386 - Zinc Coating on Assembled Steel Products.

13. ASTM A 446 - Zinc Coated (Galvanized) Steel Sheets of Structural Quality, Coils and Cut Lengths.
14. ASTM A 500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
15. ASTM A 501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
16. ASTM A 525 - Specification for Sheet Steel, Zinc Coated (Galvanized).
17. ASTM A 780 – Repair of Hot-Dip Galvanizing.
18. ASTM A1011/A1011M - Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
19. ASTM B117 Standard Practice for Operating Salt Spray (Fog) Apparatus.
20. ASTM B 209 - Specification for Aluminum Alloy, Sheet and Plate.
21. ASTM B 221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
22. ASTM A 575 Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
23. ASTM A576 Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.
24. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
25. AGAI - Inspection Manual for Hot-Dipped Galvanized Products.
26. AISC - Code of Standard Practice for Steel Buildings and Bridges.
27. AISC - Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings.
28. AWS - Standard Code for Arc and Gas Welding in Building Construction.
29. FS QQ-A-250d - Aluminum and Aluminum Alloy, Plate and Sheet.
30. IPA (Industrial Perforators Association) - Voluntary Standard Tolerances.
31. MIL-P-21035B - Paint High Zinc Dust Content, Galvanizing Repair (Metric) (superseding DOD-P-21035A)
32. SSPC referenced standards.
33. NAAMM publication AMP 500 – Metal Finishes Manual
34. NAAMM publication AMP 510 – Metal Stairs Manual.
35. NAAMM publication AMP 521 – Pipe Railing Manual
36. NAAMM publication AMP 555 – Code of Standard Practice for The Architectural Metal Industry.
37. SSPC standards referenced herein, including:
    a. SSPC-SP1, Surface Preparation – Solvent Cleaning,
    b. SSPC-SP2, Surface Preparation – Hand Tool Cleaning.
    c. SSPC-SP3, Surface Preparation – Power Tool Cleaning
    d. SSPC-SP8, Surface Preparation - Pickling.

e. SSPC-Paint 20, Zinc-Rich Coating (Type 1) Inorganic and (Type II) Organic.

f. SSPC-Paint 29, Zinc Dust Sacrificial Primer Performance.

B. Definitions:

1. AESS: Architectural Exposed Structural Steel. Includes all exposed-to-view fabricated steel elements furnished under the scope of this Section 05 50 00.

1.7 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate work of this Trade Contract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.

2. Be responsible for establishing locations and levels for all work of this Section, except such parts as may be delivered to others and set by them. In such cases assist them in properly locating said parts.

B. Pre-Installation Meetings: At least two weeks prior to commencing fabrication work of this Section, conduct a pre-installation conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.

1. Required attendees: Architect, Contractor, Installer's Project Superintendent, and representatives of other related trades as directed by the Architect or Contractor.

2. Agenda:

a. Scheduling of metal fabrications operations.

b. Quality control for AESS fabricated components.

c. Finish and installation requirements for AESS fabricated components.

d. Review of staging and material storage locations.

e. Coordination of work by other trades.

f. Installation procedures for ancillary equipment.

g. Protection of completed Work.

C. Sequencing:

1. Coordinate work of this Filed-Subcontract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.

2. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Trade Contract, have been received and approved by the Architect.

3. Before proceeding with installation work, inspect all project conditions and all work of other trades to ensure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

4. Field Measurements

a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of Work.

b. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay Work.

D. Scheduling:

1. Coordinate the work of this Section with the respective trades responsible for installing inserts and anchorages furnished by this Section; make arrangements for delivery, receipt and installation of inserts and anchorages to prevent delay of the Work.

1.8 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Product Data: Manufacturer's complete product data and specifications for all prefabricated items, shop primer paints, liquid zinc coating, and hydraulic cements, to be furnished hereunder.

a. For epoxy anchoring systems: Furnish ICC-ES Code approvals and performance data that includes recommended loading for each application.

2. Shop Drawings, bearing registration stamp of a Professional Structural Engineer registered in Commonwealth of Massachusetts.

a. General requirements:

1) Include large scale details of items of all metal fabrications to be furnished hereunder, showing proposed methods of anchorage to surrounding structure and conditions.

2) Indicate on the shop drawings all erection marks for various places of miscellaneous metals, and ensure that the actual field pieces bear corresponding marks.

3) Indicate shop built components, and field-built components.

4) Indicate and detail all field installation connections.

5) Indicate weld types and length.

6) Indicate blocking locations.

7) Indicate seam locations in high-strength steel members

b. Include large scale details of metal fabrications supporting work of other trades.

3. Selection Samples:

a. Sample card indicating Manufacturer's full range of colors of shop applied finishes available for selection by Architect.

4. Verification Samples: Accepted samples will be used to establish the quality standard for fabrication, workmanship and finish.

a. Factory/shop finishes: 3 inch by 6 inch samples of factory-applied coatings and colors proposed for use for approval prior to coating application.

b. Provide minimum 24 by 24 inch (or equivalent for shapes) of fabricated and finished ornamental metal components, demonstrating the quality of fabrication work, and finish.

c. Provide 12 inch sections of fabricated and finished AESS metal components, demonstrating the quality of welds and finish.

d. Provide a sample board of weld, joining and termination conditions to be used for all AESS fabrications and for samples of exposed to view welding conditions demonstrating NOMMA Weld Level 1 (no visible welds).

5. Certificates:

a. Certificate of Compliance from Galvanizer: Submit notarized Certificate of Compliance with application for payment for galvanizing, signed by galvanizer, indicating compliance with requirements of specifications. Include scope of services provided, and quantity and itemized description of items processed.

b. Welders certificates as specified under Article entitled “QUALITY ASSURANCE”.

6. Delegated Design Submittals: Provide calculations for loading and stresses for the work of this section, bearing the Professional Structural Engineer’s seal. Show how design load requirements and other performance requirements as required by the Massachusetts State Building Code have been satisfied.

a. Work scope requiring loading and stress calculations includes, but is not limited to the following:

1) Stairs, intermediate landings and railings.
2) Metal fabrications supporting work of other trades.
3) Seismic restraints.
4) Ledge and shelf angles.
5) Access ladders roof top cross-overs, and roof-top ladders.
6) Mechanical equipment platforms.
7) Overhead supports.
8) Areaway gratings.
9) Wall mounted television brackets.
10) Threaded rods and universal supporting framing in Fab. Lab and Makerspace.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1. Special Inspections: Submit prior to request for Certificate of Occupancy, to both Architect and local Building Official having jurisdiction, the following:

a. All certifications, reports and programs required by Chapter 17 of the Massachusetts State Building code for work engineered by Contractor’s Professional Engineer under the requirements of this Section.

b. All certifications, reports and programs required by Chapter 17 of the Massachusetts State Building code for work engineered by File Subcontractor’s Professional Engineer under the requirements of this Section.

1.9 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1. Galvanizer's tagging: The galvanizer shall mark all lots of material with a clearly visible stamp or tag indicating the name of the galvanizer, the weight of the zinc coating, and the applicable ASTM Specification Numbers.

B. Exposed Fabricated Steel Elements including stairs, railings, ornamental fabrications and exposed to view fabrications shall be fabricated and finished as Architectural Exposed Structural Steel (AESS) meeting tolerances and fabrication requirements as specified herein.

C. Qualifications:

1. Fabricator/Installer: Minimum of 5 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
2. Welders: Utilize only qualified welders employed on the Work. Submit verification that Welder's are AWS D1.1 and D1.4 qualified within the previous 12 months.
3. Licensed Professionals: Provide the services of a Professional Structural Engineer, registered in the Commonwealth of Massachusetts to design and certify that the work of this section meets or exceeds the performance requirements specified in this section and as required by Massachusetts State Building Code, Ninth Edition.
    a. Prepare Shop Drawings for under direct supervision of a same Engineer experienced in design of this work.

1.10 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Filed-Subcontract, have been received and approved by the Architect.

B. Storage and Handling Requirements:

1. Handle and store materials under cover in a manner to prevent defacement, deformation, or other damage to the materials and to shop finishes, and to prevent the accumulation of foreign matter on the metal work. All such work shall be repaired and cleaned prior to erection.

1.11 WARRANTY

A. General: Submit the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS, and in compliance with Section 01 78 36 – WARRANTIES.

B. Manufacturer's Warranty (for factory prefabricated products): In addition to the specific guarantee requirements of the GENERAL CONDITIONS and SUPPLEMENTAL GENERAL CONDITIONS, the Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition

to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

C. Galvanizer's Warranty: Provide galvanizer's standard warranty that materials will be free from 10 percent or more visible rust for a period of 20 years.

D. Galvanizer's Warranty for Finish Coating System: Warranty for the finish gloss and color shall be 10 years in accordance with the following performance specifications.

1. Fade: Loss of gloss shall not exceed 35 units of gloss which shall be measured in accordance with ASTM D 523-89 with 60 degree geometry.
2. Color Shift: Shall not exceed 15 Delta E CIE LAB units for whites and light colors. Dark colors shall not exceed 25 Delta E CIE Lab units as measured by ASTM D 2244. (Yellows, Oranges and Reds are excluded.)

PART 2 - PRODUCTS

2.1 SUSTAINABILITY CHARACTERISTICS

A. Comply with sustainability characteristics for each "Sustainability Focus Material" in accordance with Section 018113 Appendix A and Appendix B.

2.2 MATERIALS

A. General: All materials shall be new stock, free from defects impairing strength, durability or appearance, and of best commercial quality for each intended purpose. Unless specifically called for otherwise, work shall be fabricated from the following:

1. Aluminum: Provide alloy and temper recommended by aluminum producer or finisher for the type of use and finish indicated
   a. Extruded bar and shapes: ASTM B 221, alloy 6063--T6 or alloy 6463--T52.
   b. Extruded pipe and tube: ASTM B 429, alloy 6063-T6.
   c. Drawn Seamless tube: ASTM B 483, alloy 6063-T832.
   d. Plate and sheet: ASTM B209, alloy 6063--T6 or Alloy 3003-H14
2. Carbon Steel:
   a. Steel shapes, plates and bars: ASTM Designation A 36.
   b. Steel pipe: ASTM A53, grade A, seamless pipe, black finish unless otherwise noted.
   c. Structural steel tubing, square and rectangular shapes: ASTM A500, Grade B.
   d. Steel tubular shapes: ASTM A 501.
   e. Steel plates to be bent or cold-formed: ASTM A283, grade C.
   f. Steel bars and bar-size shapes: ASTM A36.
   g. Cold-finished steel bars: ASTM A108.
   h. Galvanized carbon steel sheets: ASTM A526, with G90 zinc coating in accordance with ASTM A525.

B. Recycled content of Ferrous Metals: Use maximum available percentage of recycled steel. Steel incorporated into the work shall contain not less than 25 percent of recycled steel.

C. Steel materials: to be hot dip-galvanized: Provide steel chemically suitable for metal coatings complying with the following requirements: Carbon below 0.25 percent, silicon below 0.24 percent, phosphorous below 0.05 percent, and manganese below 1.35 percent. Notify galvanizer if steel does not comply with these requirements to determine suitability for processing.

D. Metal surfaces, general: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.

E. Welding rods: AWS E70XX grade, or select in accordance with AWS specifications for the metal alloy to be welded and in accordance with the recommendation of the welding rod manufacturer.
   1. Where stainless steel is welded to mild steel, select rods to minimize dilution effects on the stainless steel component.

2.3 FASTENERS

A. General: Provide all fasteners and attachments as required for work specified herein and as indicated on the Drawings.
   1. In general,
      a. Provide all fasteners and attachments of the same material and finish as the metal to which it is applied unless otherwise noted.
         1) Provide Type 304 stainless-steel fasteners for exterior use.
         2) Provide Type 304 stainless-steel fasteners for fastening aluminum.

B. Steel Bolts, Nuts and Washers: ASTM A307, galvanized to ASTM A153 for galvanized components.

C. Fasteners at blind structural tubes, or other blind conditions: Lindaptor North America, Ann Arbor MI, product: “Type HB Hollo-Bolt”, or approved equal.
   1. Acceptable Manufacturers, or approved equal.
      a. Lindaptor North America, Ann Arbor MI.
      b. Simplified Building Components, Rochester NY.
      c. Avdel USA LLC., Stanfield NC.
   2. Head type: Countersunk.
   3. Material: Stainless steel.

D. Anchor Bolts: ASTM F 1554, Grade 36.
   1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

E. Eyebolts: ASTM A 489.

F. Machine Screws: ASME B18.6.3.

G. Lag Bolts: ASME B18.2.1.

H. Wood Screws: Flat head, ASME B18.6.1.

I. Plain Washers: Round, ASME B18.22.1.

J. Lock Washers: Helical, spring type, ASME B18.21.1

2.4 PERFORATED METALS

A. Type 1:
1. Basis of design: Accurate Perforating Company, Product: " RS049."
2. Material: Steel, gauge as calculated by fabricator for size of perforated sheet, and impact anticipated.
3. Perforation size: 0.140 (nominal 9/64) inch.
4. Perforation shape: Round.
5. Arrangement of perforations: Staggered.
6. Spacing of perforations: 0.187(3/16) inch.
7. Open area: 51.00 percent.
8. Margins:
   a. Side margins: as indicated on Drawings.
   b. End margins: Standard unfinished end pattern.
9. Finish: Shop-applied thermoset powder coat, two coats in "white" color matching Architect's control sample.

B. Type 2:
1. Basis of design: Accurate Perforating Company, Product: " RS066."
2. Material: Steel, gauge as calculated by fabricator for size of perforated sheet, and impact anticipated.
3. Perforation size: 0.187 (nominal 3/16) inch.
4. Perforation shape: Round.
5. Arrangement of perforations: Staggered.
6. Spacing of perforations: 0.312 (nominal 5/16) inch.
7. Open area: 33.00 percent.
8. Margins:
   a. Side margins: as indicated on Drawings.
   b. End margins: Standard unfinished end pattern.
9. Finish: Shop-applied thermoset powder coat, two coats in "custom metallic" color matching Architect's control sample.

C. Type 3:
1. Material: Steel, 1/8 inch thickness.
2. Perforation size: 1.00 inch.

3. Perforation shape: Round.
4. Spacing of perforations: 1.250 inch.
5. Arrangement of perforations: Round Staggered.
6. Margins:
   a. Side margins: as indicated on Drawings.
   b. End margins: Standard unfinished end pattern.
7. Finish: Shop-applied thermoset powder coat, two coats in “custom metallic” color matching Architect’s control sample.

D. Type 4:
1. Basis of design: Accurate Perforating Company, Product: “ RS078.”
2. Material: Steel, gauge as calculated by fabricator for size of perforated sheet, and impact anticipated.
3. Perforation size: 0.250 (nominal 1/4) inch.
4. Perforation shape: Round.
5. Arrangement of perforations: Staggered.
6. Spacing of perforations: See BOD
7. Open area: 51.00 percent.
8. Margins:
   a. Side margins: as indicated on Drawings.
   b. End margins: Standard unfinished end pattern.
9. Finish: Shop-applied thermoset powder coat, two coats in “white” color matching Architect’s control sample.

2.5 ACCESSORIES

A. Safety Chain at Loading Dock: 1/4 inch diameter proof coil chain with hammer lock clasp at one end.

B. Adhesive for attaching anchors and for direct pinning: high-modulus, high strength, moisture tolerant, epoxy adhesive, two-component 100 percent solids, epoxy resin complying with ASTM C 881.
1. Minimum performance properties (as cured at 70 degrees F. and 50 percent relative humidity):
   a. Minimum Compressive Strength, tested per ASTM D-695:
      1) at 3 days: 11300 psi (31.0 MPa).
      2) at 7 days: 11800 psi (44.8 MPa).
      3) at 28 days: 12200 psi (58.6 MPa).
   b. Shear Strength, tested per ASTM D-732 at 14 days: 6200 psi (43 MPa)
   c. Minimum Flexural Strength tested per ASTM D-790 at 14 days: 10700 psi (74 MPa).
   d. Minimum Bond Strength tested per ASTM C-882 at 14 days:
      1) Plastic Concrete to Hardened Concrete 2200 psi (13.8 Mpa).
      2) Plastic Concrete to Steel 2000 psi (13.8Mpa).

e. Maximum Water Absorption, tested per ASTM D-570: 24 hour 0.27%

f. Minimum Tensile properties tested per ASTM D-638: Tensile Strength 6900 psi (48 Mpa).

2. Products which may be considered as equal include the following, or approved equal:

a. Sika Corporation, Lyndhurst NJ., product: “Sikadur 32 Hi-Mod Gel.

b. Simpson Strong Tie, Pleasanton, CA., product “SET High Strength Epoxy”.

c. Symons Corporation, Des Plaines, IL., product “Rescon Gel anchor 304”.

C. Grout: Ready mixed, non-metallic high-strength controlled expansion grout of flowable consistency, conforming to ASTM C 1107 with minimum compressive strength of 8,000 pounds per square inch (55.2 MPa) at 28 days.

1. Products which may be considered as equal include the following, or approved equal:

a. Five Star Products, Inc., Fairfield CT, product “Five Star Grout.”

b. L&M Construction Chemicals, Omaha NE, Product: “Crystex.”

c. BASF Construction Chemicals, Cleveland, OH., product “Masterflow 713”.

d. Sika Corporation, Lyndhurst, NJ., product “SikaGrout 212”.

e. ChemMasters, Madison, OH., product “Conset”.

D. Metal paste filler: 2 component epoxy, high strength, structural adhesive putty:

1. Products which may be considered as equal include the following, or approved equal:

a. Abatron, Inc. Gilberts IL, product: “Ferrobond-P”.

b. Dynatron/Bondo Corp., Atlanta, GA, product: “Bondo Plastic Filler”.

c. U.S. Chemical & Plastics Company., Massillon OH, product “Metal filled epoxy”.

E. Liquid zinc coating, for touch-up of welds, field cuts, scratches, and abrasions in galvanized steel: Low VOC organic zinc-rich coating containing 92% metallic zinc, by weight in the dried film (ASTM D520, Type III) and conforming to SSPC Paint 20, Type II, Level 1. Liquid zinc coating shall be recognized under the Component Program of Underwriter's Laboratories, Inc. as an equivalent to hot-dip galvanizing; conforming to MIL-P-21035B and SSPC Paint 29, Type II, Level I, for repair of hot-dip galvanizing and meeting the requirements for Zinc-Rich Paints.

1. VOC limit: not more than 250 g/L.

F. Primer for non-galvanized steel surfaces, modified alkyd rust-inhibitive, high solids primer:

1. Products which may be considered as equal include the following, or approved equal:

a. Benjamin Moore product: “Metal Primer KP14-70”, Gray Primer.

b. Rust-Oleum: 6100, Gray Primer.

c. Sherwin Williams: Kem Flash 500 Primer, Gray Primer E61A750.

d. Tnemec: V10-1009 Gray Primer.

2.6 SCAFFOLDS AND STAGING

A. General: Trade Contractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in the Construction Manager's GENERAL PROJECT REQUIREMENTS – APPLICABLE TO ALL TRADE AND NON-TRADE SUBCONTRACTORS and herein.

1. Scaffolding and staging required for use by this Trade Contractor pursuant to requirements of the Construction Manager's GENERAL PROJECT REQUIREMENTS – APPLICABLE TO ALL TRADE AND NON-TRADE SUBCONTRACTORS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contractor requiring such scaffolding.
2. Each Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the Construction Manager.
3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility this Trade Contractor.

B. Weather protection and temporary enclosures: Comply with requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and the following:

1. Each individual Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the Construction Manager pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).
   a. Construction Manager is responsible to provide, maintain and remove temporary enclosures of the work from November 1, to March 31 pursuant to Mass. General Laws.
   b. Trade Contractor is responsible to provide, maintain and remove temporary enclosures of the work for protection from inclement weather from April 1, to October 31, at no additional cost to the Owner.

2.7 HOISTING MACHINERY AND EQUIPMENT

A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated and maintained in safe conditions by this Trade Contractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

2.8 FABRICATION - GENERAL

A. Metal surfaces shall be clean and free from mill scale, flake, rust and rust pitting; well formed and finished to shape and size, true to details with straight, sharp lines, and angles and smooth surfaces. Curved work shall be to true radii. Exposed sheared edges shall be eased.

B. Shop fabricate items wherever practicable, accurately fitting all parts and making all joints tight. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.

C. Do all cutting, punching, drilling, and tapping required for attachment of anchor bolts and other hardware and for attachment of work by other trades. All such work shall be done prior to hot-dip galvanizing of the various components.

D. Grind all edges of bars and plates completely free from nicks and machine marks, prior to galvanizing and/or shop priming.

1. Fabricate AESS with exposed surfaces smooth, square and of surface quality consistent with the approved mock up or samples (as appropriate).

E. Grind all exposed-to-view welds completely smooth and flush to the surface plane of the base metals. Perform welding work prior to galvanizing in all cases, except where field welding is necessary, in which case, completely coat all such welds with two coats of specified liquid zinc coating, after performing grinding operations.

1. Finish welds on exposed to view components to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.

F. Use screws and bolts only where welding cannot be performed, of sufficient size to ensure against loosening from normal usage of miscellaneous metal items furnished hereunder.

1. Countersink all screw heads and bolt heads as far as practicable. Use not less than two screw, bolts, or other anchorage items, at each connection point.
2. Draw up all threaded connections tightly, after buttering same with pipe joint compound, to exclude water.

G. Provision for Thermal Movement: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Design, fabricate and install for temperature change range of 120 degrees F, ambient temperature and 180 degrees F, material surfaces.

H. Carefully coordinate the installation of metal fabrications with the work of trades responsible for the installation of interfacing work, and for the installation of work into the various assemblies furnished hereunder, and permit the installation of the related materials to be made at the appropriate times.

I. Fit and assemble metal fabrications in largest practical sections for delivery to site, ready for installation.

1. Galvanized assemblies: Where size of assembly is too large for galvanizing kettle, galvanize components prior to fabrication and assemble after galvanizing.

2.9 FABRICATION - AESS

A. In addition to special care used to handle and fabricate AESS, employ the following fabrication techniques:

1. Fabrication Tolerance: Fabricate steel to one half the normal tolerance as specified in the Code of Standard Practice Section 10.
2. Welds ground smooth: Fabricator shall grind welds of AESS smooth. For groove welds, the weld shall be made flush to the surfaces each side and be within plus 1/16 inch, minus 0 inch of plate thickness.
3. Contouring and blending of welds: Where fillet welds are indicated to be ground-contoured, or blended, oversize welds as required and grind to provide a smooth transition and to match profile on approved mock-up.
4. Continuous Welds: Where welding is noted on the drawings, provide continuous welds of a uniform size and profile.
5. Minimize Weld Show Through: At locations where welding on the far side of an exposed
6. connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.
7. Coping and Blocking Tolerance: Maintain a uniform gap of 1/8" ± 1/32" at all copes and blocks.
8. Joint Gap Tolerance: Maintain a uniform gap of 1/8" ± 1/32".
9. Piece Marks Hidden: Fabricate such that piece marks are fully hidden in the final structure or made with such media to permit full removal after erection.
10. Mill Mark Removal: Fabricator shall deliver steel with no mill marks (stenciled, stamped, raised or other forms of marks) in exposed locations. Mill marks shall be omitted by cutting of mill material to appropriate lengths where possible. Where not possible, the fabricator can fill and/or grind to a surface finish consistent with the approved mock up.
11. Grinding of sheared edges: Fabricator shall grind all edges of sheared, punched or flamecut steel to match approved samples.
12. Rolled Members: Member specified to be rolled to a final curved shape shall be fully shaped in the shop and tied during shipping to prevent stress relieving. Distortion of the web or stem, and of outstanding flanges or legs of angles shall be visibly acceptable to the Architect from a distance of 20' under any lighting condition determined by the Architect. Tolerances for the vertical and horizontal walls of rectangular HSS members after rolling shall be the specified dimension plus or minus ½ inch.
13. Seal weld open ends of round and rectangular hollow structural section with 3/8 inch thick closure plates. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where AESS is exposed to weather.

2.10 FABRICATION - ALUMINUM

A. Fabricate aluminum members in accordance with the approved Shop Drawings. Where practical, fabricate and assemble in the shop. Comply with NAAMM publication AMP 521 – *Pipe Railing Manual*, and NAAMM publication AMP 555 – *Code of Standard Practice for The Architectural Metal Industry*, as requirements specified herein.

B. Shop fabricate aluminum assemblies to maximum extent possible. Railings and guardrails shall be shop fabricated up to 20'-0" lengths.

1. Where milling is indicated on approved shop drawings, machine the contact surfaces true to obtain full and complete contact.
2. Remove burrs and roughness from exposed cut edges of fabricated elements.

C. Reinforce joints and splices with tight fitting internal sleeve connectors.

D. Continuously weld components all around in accordance with AWS standards to fuse materials without undercut, overlap or distortion of rail material.
1. Grind exposed welds smooth and flush, matching and blending adjacent contours and surfaces without weakening base metal.
2. Discoloration of anodized aluminum assemblies due to welding is not acceptable.

E. Fabricate joints which will be exposed to weather so as to exclude water, or provide weeps where water may accumulate.

F. Form bends to uniform radius, free of buckles, twists, cracks, grain separation or distortion of cross section or surface.

G. Where aluminum will contact dissimilar metals, protect against galvanic action.
1. Where aluminum members are in contact with porous materials, masonry or concrete, apply to the contact surfaces of the aluminum members a heavy coat of alkali resistant bituminous paint.
2. Where aluminum members are embedded in concrete containing admixtures which are corrosive to aluminum, or in concrete subjected to highly corrosive environments, prime the aluminum with one coat of paint.

H. Refer to the Drawings for location and details of steel stairs and railings (handrails and guardrails) to be furnished and installed hereunder.
1. Verify heights shown in Drawings comply with referenced codes and regulations.
2. Verify field measurements with approved Shop Drawings prior to fabrication.

2.11 FABRICATION - SUPPORTS

A. Design, engineer and fabricate structural overhead support for equipment, furnishings, and products furnished under Sections, which includes, but is not limited to:
1. Equipment furnished under individual specification sections.
2. Owner’s furnished equipment.
3. Above ceiling support for products furnished under other sections.

B. Fabricate support system to carry the entire load of supported products to building structure above without transferring any horizontal or vertical load to ceiling system(s). Provide frequently spaced holes for multiple adjustment. Provide diagonal bracing. Use of a “Universal Grid” system members is acceptable.

C. Fabricate supports for equipment, fixtures, and appurtenances utilizing a “Universal Grid” system with rails extending wall-to-wall, perpendicular to the path of travel of the same.

1. Design, engineer and fabricate supporting framework to support a concentrated load at any single point along the exposed rails, as exerted by the equipment to be purchased by the Owner.
    a. Installed framework shall have a minimum loading safety factor of 2.5, based upon ultimate strength under static loading conditions.
    b. The concentrated load shall be the maximum that will be encountered by positioning the equipment at the extremities of its travel (maximal load configurations).
    c. Base loads on the most severe conditions as may be encountered by any of the manufacturers producing equipment for the type of services of the rooms indicated.
2. Rail shall be on centers as required by equipment manufacturer and allow continuous attachment along any point on the rail.
3. System shall be true, plumb and level to the tolerances indicated, with no more than 1/720th of the span maximum deflection in either plane, when maximum loading conditions are applied due to equipment operations.

2.12 FABRICATION - STAIRS AND RAILINGS

A. Refer to the Drawings for location and details of steel stairs and railings (handrails and guardrails) to be furnished and installed hereunder.
    1. Verify heights shown in Drawings comply with referenced codes and regulations.
    2. Verify field measurements with approved Shop Drawings prior to fabrication.

B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.
    1. Concrete pan filled stairs:
        a. Egress stairs: NAAMM Stair Standard, Commercial class having exposed ‘anti-slip’ concrete-filled pan treads. (Stairs 1 and 2)
        b. Monumental stairs: NAAMM Stair Standard, Architectural class with rubber treads and risers (Stairs 3, 4, 5, and 6).

C. Performance requirements; conform to all requirements of those codes and regulations referenced under Section 01 41 00 - REGULATORY REQUIREMENTS.
    1. Stairs: Design, fabricate and install stairs to safely support a minimum live load of 100 pounds per square foot and a concentrated load of 300 pounds on any area of four square inches as required under Section 1607 of the 2015 International Building Code with Massachusetts Building Code, Ninth Edition amendments..
    2. Railings: Design, fabricate and install all railings in a manner which will ensure the railings will be capable of withstanding loads as follows and as required under Section 1607 of the 2015 International Building Code with Massachusetts Building Code, Ninth Edition amendments..
        a. Resist a load of 50 pounds per linear foot (0.73 kN/m) applied in any direction at the top and to transfer load through railing supports to structure.

b. Resist a single concentrated load of 200 pounds (0.89kN) applied in any direction at any point along the top, and to transfer load through railing supports to structure. Concentrated loading requirements are not concurrent with other loading requirements.

c. Intermediate rails, balusters and panel fillers shall resist a horizontally applied load of 50 pounds (0.89 kN) on an area equal to 1 square foot (.093m2), including openings and space between rails. Reactions due to this loading are not required to be superimposed with loadings specified for top rail.

D. Sizes of all headers, stringers, and other structural members; and gauges and configurations of all riser tread and landing plates and pans, railings, stringers, and posts shall be as indicated on the approved shop drawings, and in accordance with the standards of the National Association of Architectural Metal Manufacturers.

E. General fabrication: Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure. Indicate on shop drawings sizes of all members, gages and configurations of stairs and railings.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.
3. Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain.
4. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
5. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
6. Form exposed work with accurate angles and surfaces and straight edges.
7. Weld connections to comply with the following:
   a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   b. Obtain fusion without undercut or overlap.
   c. Remove welding flux immediately.
   d. Weld exposed corners and seams continuously unless otherwise indicated.
   e. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.
8. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.
9. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
10. Fabricate stringers of steel channels or tubes as indicated on Drawings.

a. Provide closures for exposed ends of channel and tube stringers

11. Construct platforms of steel channel headers and miscellaneous framing members as needed to comply with performance requirements.
12. Weld stringers to headers; weld framing members to stringers and headers.
13. Where stairs are enclosed by gypsum board or shaft-wall assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.
14. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

F. Fabrication, Metal Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.067 inch (1.7 mm).

1. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.
2. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.

G. Fabrication, Metal Grating-type Stairs:

1. Fabricate treads and platforms from welded steel grating with openings in gratings no more than 5/16 inch (8 mm) in least dimension.
2. Surface: Plain.
3. Fabricate grating treads with cast abrasive nosing and with steel angle or steel plate carrier at each end for stringer connections. Secure treads to stringers with bolts.
4. Fabricate grating platforms with nosing matching that on grating treads. Provide toe-plates at open-sided edges of grating platforms. Weld grating to platform framing.
5. Weld connections to comply with the general requirements specified herein, and:
   a. At metal grating stairs and related railings for exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 3 welds: Partially dressed weld with spatter removed.

H. Fabrication, Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads and deflection criteria.

1. Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
   a. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.
2. Form changes in direction of railings as indicated on drawings, with radius bends of radius indicated. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration

required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

3. Close exposed ends of railing members with prefabricated end fittings.
4. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
5. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
    a. Connect posts to stair framing by direct welding unless otherwise indicated.

2.13 FINISHES - HOT-DIP GALVANIZING

A. Surface preparation prior to galvanizing: Pickle steel prior to galvanizing in conformance with SSPC-SP8. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter.

B. Hot-Dip Galvanizing: For steel exposed to the elements, weather or corrosive environments and other steel indicated to be galvanized, provide coating for iron and steel fabrications applied by the hot-dip process.

1. Basis-of-Design: “Duncan Galvanizing, Everett, MA., product ”Duragalv.”
2. Comply with ASTM A 123 for fabricated products and ASTM A 153 for bolts, nuts, washers, and other rough hardware. Provide thickness of galvanizing specified in referenced standards.
3. Wherever possible, perform galvanizing after assembly of items.
4. Galvanized items shall be straightened to remove all warpage and distortion caused by the galvanization process.
5. Fill vent holes after galvanizing (if applicable), and grind smooth.
6. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating as specified herein above. Apply liquid zinc by brush or spray on all damaged areas in two coats to a total dry film thickness of not less than 3 mils. Apply first coat within two hours after damage to hot-dip film to prevent undue oxidation of exposed surface. On all welds remove weld spatter by power wire brushing or equivalent before applying liquid zinc coating. Repair material should extend at least 3 inches beyond all edges of the damaged galvanized area as possible to assure continuity of galvanic protection.
7. Touch-up of galvanized surfaces with aerosol spray, silver paint, bright paint, brite paint, or aluminum paints is not acceptable.

2.14 FINISHES - SHOP APPLIED COATINGS

A. Schedule: Shop applied coatings as indicated on Drawings, and as additionally specified and scheduled in this Section.

B. For non-galvanized steel surfaces:

1. Surface preparation prior to priming: Thoroughly clean all steel of all loose mill scale by power wire brushing or sandblasting. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter by wire-brushing or scraping (power wire-brushing, if necessary). Grind smooth any sharp projections.
2. Shop apply specified primers thoroughly and evenly on the surfaces and worked into the joints and other open areas on the surfaces. Surfaces inaccessible after assembly shall be given two coats. Dry film thickness of primer shall be not less than 2.4 mils per coat.

C. For hot-dipped galvanized steel items scheduled for field applied painted finish:
1. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating as specified above under the Article entitle “Hot Dip Galvanizing”.
2. Factory-Applied Primer over Galvanized Steel: Provide factory-applied prime coat, certified OTC/VOC compliant less than 2.8 lbs/gal. and conforming to EPA and local requirements. Apply primer within 12 hours after galvanizing at the same galvanizer’s plant in a controlled environment meeting applicable environmental regulations and as recommended by the primer coating manufacturer. Primer coat shall exhibit a rugosity (smoothness) not greater than 4 rug (16-20 microns of variation) when measured by a profilometer over a 1 inch straight line on the surface of architectural and structural elements that are less than 24 pounds per running foot. Profilometer shall be capable of operating in 1 micron increments. Blast cleaning of the surface is unacceptable for surface preparation. Primer shall have a minimum two year re-coat window for application of finish coat. Coatings must meet or exceed the following performance criteria as stipulated by the coatings manufacturer:
   a. Basis-of-Design: Primergalv by Duncan Galvanizing, Everett, MA.
   b. Abrasion Resistance: ASTM D 4060 (CS17 Wheel, 1,000 grams load).1kg load, 200 mg loss.
   c. Adhesion: ASTM D4541, 1050 psi.
   d. Corrosion Weathering: ASTM D5894, 13 cycles, 4,368 hours; rating 10 per ASTM D714 for blistering and rating 7 per ASTM D610 for rusting.
   e. Direct Impact Resistance: ASTM D2794, 160 in. lbs.
   f. Flexibility: Method: ASTM D522, 180 degree bend, 1 inch mandrel, passes.
   g. Pencil Hardness: ASTM D3363, 3B.
   h. Moisture Condensation Resistance: ASTM D4585, 100 degrees F, 2000 hours; passes, no cracking or delamination.
   i. Dry Heat Resistance: Method: ASTM D2485, 250 degrees F.
3. Touch-up finish in conformance with manufacturer's recommendations. Provide touch-up such that repair is not visible from a distance of 6 feet.

D. For hot-dipped galvanized steel items scheduled for shop applied coating (a multicoat mica finish with clear top coat for all exterior painted metals provided under this Section 05 50 00):
1. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating as specified above under the Article entitled “Hot Dip Galvanizing”, herein above.

2. Primer over Galvanized Steel: Provide factory-applied polyamide thermosetting epoxy prime coat over hot-dipped galvanized steel.
    a. Basis-of-Design: Duncan product “Primergalv Thermoset 10”.
    b. Primer shall be a polyamide epoxy powder primer with 0 VOC.
    c. Apply primer within 12 hours after galvanizing or blasting at the same galvanizer's plant in a controlled environment meeting applicable environmental conditions and as recommended by the primer coating manufacturer. Cure schedule shall be as recommended by the manufacturer.
    d. Polyamide epoxy powder primer shall be applied at 1.8-3 mils DFT and certified OTC/VOC compliant and conform to EPA and local requirements.
    e. Polyamide epoxy powder primer shall meet or exceed the following performance criteria as stipulated by the coatings manufacturer:
        1) Cure Schedule: 10 min. at 400¬∞F
        2) Specific Gravity: 1.58 +/- .05
        3) Coverage at 1.0 Mil 121.7 sq. ft./ lb.
        4) 60¬∞ Gloss: 55-65 (ASTM D-523)
        5) Adhesion: 5B (ASTM D-3359)
        6) Flexibility: Pass 1/8 " Mandrel Bend (ASTM D-522)
        7) Pencil Hardness: 2H-3H (ASTM D-3363)
        8) Impact Resistance: 80 in-lbs direct (ASTM D-2794) 80 in-lb reverse
        9) Typical Environmental Properties:On Bonderite 1000 Panels
        10) Salt Fog 1000 hours (ASTM B-117)
        11) Salt Fog (top-coated)* 5000+ hours (ASTM B-117)
        12) Humidity 1000 hours PASSED
3. High-Performance Fluoropolymer Powder Color-coat: Provide coating matching approved samples. Factory-applied metal coatings shall be applied in a facility acceptable to the coating manufacturer. Full cure of the coatings shall be verified by the coating manufacturer’s recommended test methods.
    a. Coatings must meet or exceed the criteria for the following categories as stipulated by the coating manufacturer. All testing must be on lab prepared panels.
        1) Adhesion: ASTM D 3359, no loss.
        2) Hardness: ASTM D 3363 (pencil), H min.
        3) Falling Sand ASTM D 968 40L/mil.
        4) Salt Fog Resistance: ASTM B 117, passes 4000 hrs.
        5) Humidity: ASTM D 2247, 4000 hours, few #8 blisters.
        6) Impact Resistance (3mm): ASTM D 2794, no loss.
        7) Color Retention: ASTM D 2244, 10 year less than or equal to 5 delta E.
        8) Chalk Resistance: ASTM D 4214, #8 rating.
        9) Gloss Retention: ASTM D 523, greater than or equal to 50 percent retention.
        10) Erosion Resistance: ASTM B 244, less than 10 percent film loss.
        11) Compliance: AAMA 2605.

4. Clear Coat: Provide Super Durable Polyester Powder Urethane Clear-Coat in the gloss range specified.
    a. Super Durable Polyester Powder Urethane Clear-Coat shall be applied over the color coat per the manufacturer's recoat schedule at the same galvanizer's plant in a controlled environment meeting applicable environmental conditions as recommended by the coating manufacturer. Cure schedule shall be as recommended by the manufacturer.
    b. Super Durable Urethane Polyester Powder Urethane Clear-Coat shall be applied at 2-3 mils DFT and certified OTC/VOC compliant and conform to EPA and local requirements.
    c. Super Durable Urethane Clear-Coat shall meet or exceed the following performance criteria as stipulated by the coatings manufacturer:
        1) Cure Schedule 10 min @400¬ſF
        2) Specific Gravity (g/ml): 1.17
        3) Coverage at 1.0 Mil (ft2/lb) 165.2
        4) 20¬ſ Gloss (ASTM D-523) 99
        5) 60¬ſ Gloss (ASTM D-523) 110
        6) Adhesion (ASTM D-3359) 5B
        7) Flexibility : Pass 1/8 " Mandrel Bend (ASTM D-522)
        8) Pencil Hardness: (ASTM D-3363) H-2H
        9) Impact resistance ASTM D-2794) Direct 100 in-lbs Reverse 100 in-lbs
        10) Humidity (ASTM D-4585) Slight gloss and color change
        11) Salt Spray (ASTM B-117) Max 1/8" Creepage
5. Engage the services of a galvanizing facility which will assume single-source responsibility for galvanizing and finish coating.
    a. Touch-up finish in conformance with manufacturer's recommendations. Provide touch-up such that repair is not visible from a distance of 6 feet.

E. Field touch-up: Shall be the responsibility of the installing contractor and shall include the filling, and touch-up of exposed job made bolt or screw holes, refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and marks, and final cleaning up of the finished surfaces.
    1. Touch-up finishes shall be fully compatible with, and exactly match shop applied finish, color, texture and sheen.

PART 3 - EXECUTION

3.1 ERECTION - GENERAL

A. General: Accurately set all work to established lines and elevations, and rigidly fasten in place with suitable attachments to the construction of the building. At the completion of the work, check all work, re-adjust as required, and leave in perfect condition. Grind all exposed to view welds smooth to the touch.

B. Setting bearing and leveling plates:
    1. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

2. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
    a. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
    b. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

C. Miscellaneous framing and supports: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and additional requirements indicated on Shop Drawings.
    1. Anchor supports for operable partitions, and similar products, securely to and rigidly braced to building structure.

3.2 FIELD WELDING

A. Field weld components indicated on approved shop drawings in accordance with AWS D1.1. Weld profile, quality, and finish shall be consistent with approved samples and mock-ups.
    1. Welds ground smooth: Erector shall grind welds smooth in the connections of AESS members. For groove welds, the weld shall be made flush to the surfaces of each side and be within + 1/16”, -0” of plate thickness.
    2. Contouring and blending of welds: Where fillet welds are indicated to be ground contoured, or blended, oversize welds as required; grind to provide a smooth transition and to match profile on approved mock-up .
    3. Continuous Welds: Where noted on the drawings, provide continuous welds of a uniform size and profile.
    4. Minimize Weld Show Through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.

B. Immediately after welding, touch-up welds, burned areas and damaged surface coatings.
    1. Thoroughly remove all spatter by power wire-brushing (or if inaccessible, wire brushing) per SSPC, surface preparation specification SP2 or SP3. Allow surface to cool to ambient temperature. Clean surface with solvent wipe to remove oils, grease and dirt in accordance with SSPC surface preparation specification SP1.
    2. Apply one coat of liquid zinc to attain a minimum of 1.5 mils dry film thickness. Coating should extend at least two inches beyond either side of weldment to ensure complete coverage of welded area.

3.3 FIELD BOLTING

A. Accurately drive all bolts into holes, protecting the bolt heads so as not to damage the thread during the driving. Ensure that bolt heads and nuts rest squarely against the metal. Where structural members have sloping flange faces, provide approved

beveled washers at the bolted connections to afford square seating for bolt heads or nuts. Nick bolt threads for unfinished bolts to prevent the nuts from backing off.

1. Bolt Head Orientation: All bolt heads shall be oriented as indicated on the contract documents. Where bolt-head alignment is specified, the orientation shall be noted for each connection on the erection drawings. Where not noted, the bolt heads in a given connection shall be oriented to one side.

B. Use an approved calibrated manual or power torque wrench to obtain the proper torque and tension as recommended by the bolt manufacturer for all ASTM A 325 bolts.

3.4 INSTALLATION OF STAIRS

A. Preparation:

1. Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
2. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
3. Perform cutting, drilling, and fitting required for installing metal stairs.

B. Stair Installation: Construct and install stairs in strict accordance with the details, the approved shop drawings, and requirements of all codes, laws, and ordinances bearing on the work. Additionally comply with manufacturer's instructions for prefabricated stair systems, as applicable. Set stair units accurately in location, alignment, and elevation, measured from established lines and levels and free from distortion or defects.

1. Fit exposed connections accurately together to form hairline joints.
2. Weld stair framing to steel structure or to cast-in-placed weld plates, unless otherwise indicated on Drawings.
3. Weld connections that cannot be shop welded because of shipping size limitations.
    a. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
4. General requirements for field welding: As specified herein above, and the following additional requirements:
    a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
    b. Obtain fusion without undercut or overlap.
    c. Remove welding flux immediately.
    d. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
5. Stair installation tolerances:
    a. Maximum Variation from Plumb: 1/4 inch (6 mm) for full height of stair.
    b. Maximum Variation from Level: 1/8 inch (3 mm) in 10 feet (3000 mm).

c. Maximum Angular Variation of the Tread from True Position: 3 degrees.

C. Grouted baseplates (as applicable):

1. Clean cementitious bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of baseplates.
2. Set steel stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
   a. Use nonmetallic, nonshrink grout, unless otherwise indicated.
   b. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

D. Concrete-filled-metal-pan stairs: Place and finish concrete fill for treads and platforms to comply with Section 03 30 00 - CAST-IN-PLACE CONCRETE.

3.5 INSTALLATION OF PIPE BOLLARDS

A. Fixed in Place Bollards: Anchor bollards in concrete by means of pipe sleeves preset and anchored into concrete. After bollards have been inserted into sleeves, fill annular space between bollard and sleeve solid with nonmetallic, nonshrink grout, mixed and placed to comply with grout manufacturer's directions.

B. Removable Bollards: Anchor bollards in sleeves, minimum 8 inches deep. Refer to Drawings for details. Do not grout in place, do not fill bollards with concrete.

3.6 TOUCH-UP

A. Touch-up all welds, burned areas, scratches, abrasions, on galvanized metals, using specified liquid zinc coating.

B. Touch-up all welds, scratches, abrasions, and other surface damaged on shop-primed or painted metals, using the same coatings as specified under shop applied finishes, herein above.

3.7 SUPPLEMENTAL SCHEDULES

A. General: Items listed herein below provide further description of those already indicated in the Drawings. This list does not represent a complete list of miscellaneous metal components or types required to complete the Work.

1. Carefully review all Drawings and furnish and install metal fabrications required by the various trades, whether or not specifically listed herein, such as miscellaneous clip angles, miscellaneous steel bracketing, and other miscellaneous metal items as indicated on the Drawings, reasonably implied therefrom, or reasonably necessary for the thorough completion of the work.

B. Steel pan stair and related support components, as detailed on the Drawings and specified herein above.

C. Ship’s ladder: Factory engineered and prefabricated aluminum ship’s ladder, as manufactured by, or., or approved equal, conforming to the following:

1. Basis of Design: Alaco Ladder Company, Chino, CA.

a. Acceptable Manufacturers or approved equal:
   1) Alaco Ladder Company, Chino, CA.
   2) O'Keefes Inc., San Francisco CA.
   3) Precision Stair Corporation, Morristown TN.

2. Extrusion: Aluminum alloy 6063-T-5.
3. Rungs: Deeply serrated Not less than 1-1/4 inch in section.
4. Rung load capacity: 1000 pounds without failure.
5. Stringers: Not less than 5 by 2 inch aluminum channel having wall thickness engineered for design loading.
6. Railings: Nominal 1-1/2 inch diameter aluminum tubing.
7. Nominal ladder width between stringers: 36 inches (CUSTOM SIZE).
8. Finish: Mill finish aluminum.

D. Interior railings, as detailed on the Drawings. Connections and sizing to conform to engineering and code requirements specified herein above.

E. Exterior railings: 1inch (I.D.) steel pipe (nominal 1-1/4 inch outside diameter) as detailed on the Drawings. Fabricated assemblies shall be hot-dipped galvanized, shop primed and shop finished.

1. Pipe railings: To prevent unnecessary damage to the galvanized coating by field welding, provide slip-fit method of connecting pipe railings. Fabricate pipe railing from mechanical steel tubing internally vented with holes 3/4 the size of the pipe's internal diameter.

F. Elevator pit and interior access ladders: Stringers 3/8-inch by 1-1/2 inch flat bar, rungs 3/4 inch diameter solid steel rods. Offset ladder from wall surface by 7 inches to centerline of rungs, with brackets.

1. Fabricate ladders in accordance with OSHA requirements, and ANSI A14.3 standards.
2. Hot dip galvanized finish assembled elevator pit ladders.

G. Exterior areaway and exterior roof access ladders (unless otherwise indicated) shall be 3 by 3/8 inches solid section continuous side rails 18 inches apart with 3/4 inch diameter solid steel bar rungs spaced 12 inches on centers with ends shouldered into side rails.

1. Fabricate ladders in accordance with OSHA requirements, and ANSI A14.3 standards.
2. Provide extended side rails at least 42 inches above top rung and return to wall or structure. Securely anchor each ladder siderail with clip angles at top, bottom and intermediate points spaced not more than 5'-0" on center. Provide 7 inches clearance from walls to centerline of rungs.
3. Fit rungs in holes drilled in side rails. Weld and grind smooth to touch. Provide rungs with non-slip top surface.
4. Hot dip galvanized finish assembled ladders.

H. Ladder safety cages: Provide for all ladders greater than 20 feet in height.

1. General: Fabricate ladder safety cages to comply with ANSI A14.3. Assemble by welding or riveting, and comply with the following additional specified requirements:
    a. Primary Hoops: 5/16 by 4 inch (8 by 100 mm) steel flat bar hoops. Provide at tops and bottoms of cages and spaced not more than 20 feet (6 m) on center
    b. Secondary Intermediate Hoops: 5/16 by 2 inch (8 by 50 mm) steel flat bar hoops, spaced not more than 48 inches (1200 on center between primary hoops.
    c. Vertical Bars: 5/16 by 2 inch (8 by 50 mm) steel flat bars secured to each hoop, spaced approximately 9 inches (230 mm) on center.
    d. Hot dip galvanize interior and exterior ladder safety cages, including fasteners.
2. Fasten assembled safety cage to ladder rails and adjacent construction by welding or riveting, unless otherwise indicated.

I. Elevator Sump Pit Grating: Provide either Welded Steel Grating or Pressure-Locked Steel Grating fabricated by either pressing rectangular flush-top crossbars into slotted bearing bars or swaging crossbars between bearing bars.
1. Grating Characteristics:
    a. Bearing Bar Spacing: 15/16 inches on center.
    b. Bearing Bar Depth: 1 inch.
    c. Bearing Bar Thickness: 3/16 inch.
    d. Crossbar Spacing: 4 inches on center.
    e. Traffic Surface: Plain.
    f. Steel Finish: Hot-dip galvanized with a coating weight of not less than 1.8 oz./sq. ft. of coated surface.
2. Perimeter support angles: Hot dipped galvanized steel, size as indicated on Drawings, furnished to Section 03 30 00 for embedment into concrete.

J. Elevator sill support angles: 4 by 4 inch by 3/8 inch thick, shop primed.

K. Masonry relieving angles: As scheduled on Structural Drawings.

L. Lintels: As scheduled on Structural Drawings.
1. Provide lintels 12 inches longer than masonry openings. Where lintel abuts column, provide structural clip connection.
2. Lintels occurring in exterior walls shall be galvanized in conformance with the requirements of ASTM A 143, and ASTM A 123.

M. Supports for Atrium duct pylons duct enclosure:
1. 2 inch high strength steel as detailed, tight and in-plane with 2-1/2 inch metal stud framing.

N. Bollards (non removable):
1. Provide removable bollards as indicated on the Drawings.

2. Bollards shall be concrete filled, full depth and capped with rounded hand rubbed concrete.
    a. Concrete fill for bollard, provided under Section 03 30 00 – Cast-in-Place Concrete.
    b. Foundation as detailed, provided under Section 03 30 00 – Cast-in-Place Concrete.
3. Bollards: 6 inch diameter galvanized steel, “Extra Strong” pipe conforming to ASTM A 53, Type S, Grade B, with a wall thickness of 0.432-inch, 8 foot length, showing 4’-0" above grade, and concrete filled.
4. Bollard sleeve/cover: Polyethylene Thermoplastic (HDPE) tubes having ultra-violet light resistance, and anti-static properties, nominal thickness 0.25 inch. Color: OSHA yellow. Surface of sleeve to be smooth with round top; ribbed or two piece systems are acceptable. Size cover for pipe diameter, and custom height.
    a. Acceptable manufacturer’s/suppliers include, but are not limited to:
        1) Ideal Shield, Detroit MI.
        2) Eagle Manufacturing Company, Wellseburg VA.
        3) Encore Commercial Products, Southfield, MI.
        4) Reliance Foundry, Surrey, British Columbia, Canada.
    b. Secure sleeve with manufacturer’s standard neoprene adhesive tape. Screws or existing clamping will not be acceptable.

O. Removable Bollards: Bollard and locking sleeve sets, TrafficGuard, Inc., Geneva, IL., product “Helix Lock” series, model HL2003L, nominal 3-1/2 to 4 inchs diameter, by 36 inch height.
1. Acceptable manufacturer’s/suppliers include, but are not limited to:
    a. TrafficGuard, Inc., Geneva, IL.
    b. Bollard Warehouse, Inc., Batavia IL.
    c. Global Industrial, Port Washington, NY.
    d. Park Warehouse, Boca Raton FL.
2. Install ground sleeves set flush with finish surface.
    a. Provide 3 inches of gravel base prior to installation to ensure drainage of bollard.
    b. Install bollard when ground sleeve is leveled and fully cured.

P. Aluminum Corner Guards: Extruded Aluminum, 2 inches by 2 inches by 0.123 inch wall thickness, by 8 feet high having powder coat finish in custom color, matching Architect’s Sample. Locate where indicated on Drawings.

End of Section