PROJECT MANUAL

Eugene School District 4J

KELLY MIDDLE SCHOOL MODULAR CLASSROOMS

Eugene, Oregon

CIP # 201-912-P0003

Issue Date: 14 July 2021

GMA Architects
860 West Park Street, Suite 300
Eugene, OR 97401

PROJECT MANUAL:
KELLY MIDDLE SCHOOL MODULAR CLASSROOMS
Eugene Public School District 4J
Eugene, Oregon
C.I.P. Project No. 201-912-P0003

OWNER:
Eugene School District 4J
715 West 4th Ave.
(Facilities Department)
Eugene, Oregon 97402
Tel (541) 790-7431
Contact: Kirk Gebb, Project Manager

ARCHITECT:
GMA Architects
860 W. Park Suite 300
Eugene, OR 97401
Tel (541) 344-9157
Contact: Joseph E. Moore, AIA
Robert J. Nicholls, AIA

MECHANICAL & ELECTRICAL ENGINEERS:
PAE Engineers
44 West Broadway, Suite 430
Eugene, OR 97401
Tel (541) 735-6222
Contact: Robert Mills, PE

CIVIL ENGINEER:
KPFF Consulting Engineers
800 Willamette St, Suite 400
Eugene, OR 97401
Tel (541) 484-0241
Contact: Anna Backus, PE

DATE: 14 July 2021

KELLY MIDDLE SCHOOL MODULAR CLASSROOMS
CIP # 201-912-P0003
14 JULY 2021

The following is a list of all Divisions, Sections, and Drawings which are included in the Project Manual

DRAWINGS

GENERAL INFORMATION

CIVIL

LANDSCAPE

ARCHITECTURAL

ELECTRICAL

END OF SECTION 00 01 00

Electronic bids will be received by Diana McElhinney, Facilities Management Assistant, for the **Kelly Middle School Modular Site Work project on Thursday, July 29, 2021 until the Deadline for Bid Submission at 2:00 p.m. local time**. Email electronic Bid to: CIP@4j.lane.edu. There will not be a public opening, however Bid results will be posted on the 4j hyperlink listed below, following the deadline for submission of Bids. Late Bids will not be considered. Bidders are encouraged to send a test email to email address above to ensure they have it correct and that we receive it accordingly. For purposed of receipt time, the sent timestamp from the bidder's email account will be used.

Briefly, the work is described as addition of two portable classroom buildings to Kelly Middle School. Work includes selective demolition and new paving, siding patch, door hardware, electrical, grading, site utilities, fencing, landscaping, bicycle parking, and irrigation. Portable classrooms and elevated walkways by Others.

Beginning 7/14/21 Prime Bidders, Sub-bidders and Suppliers may obtain bidding documents at the following hyperlink: http://www.4j.lane.edu./bids/. Hard copies are not provided by the School District. It is the responsibility of all Prime Bidders, Sub-bidders, and Suppliers to obtain Bidding Documents and all Addenda from the hyperlink.

A non-mandatory pre-bid conference and walk-through has been scheduled for Monday, July 19, 2021 at 2:00 p.m. The location of the conference will be in front of the school at 850 Howard Avenue, Eugene, OR 97404. Statements made by the District's representatives at the conference are not binding upon the District unless confirmed by Written Addendum. Pre-qualification of bidders is not required.

Each Bid must be submitted on the prescribed form and accompanied by an electronic copy of a Surety Bond, Cashier's Check, or Certified Check, executed in favor of Eugene School District 4J, in the amount not less than ten percent (10%) of the total bid, based upon the total bid amount for those items bid upon. Bidders are required to mail by USPS the original Surety Bonds, Cashier's Check or Certified Check and post marked within 3 hours after Bid Due Date of July 29, 2021 @ 2:00 p.m. Mail to Facilities Management, Attention CIP, 715 West 4th Avenue, Eugene, Oregon 97402.

Either with the Bid or within two working hours of the Deadline for Submission of Bids, bidders shall electronically submit, on the form provided, information regarding first-tier subcontractors furnishing labor or labor and materials, as provided in ORS 279C.370. Bids for which disclosure forms are required, but not submitted, will be rejected.

No bid for a construction contract will be received or considered unless the Bidder is registered with the Construction Contractors Board or licensed by the State Landscape Contractors Board at the time the Bid is made, as required by OAR 137-049-0230. [A license to work with asbestos-containing materials under ORS 468A.720 is not required for this project.]

For every bid $100,000 or greater, all Contractors and Subcontractors shall have a public works bond, in the amount of $30,000, filed with the Construction Contractors' Board (CCB), before starting work on the project, unless exempt. A copy of the Contractors' BOLI Public Works Bond shall be provided with the executed contract documents.

Each Bid shall contain a statement indicating whether the Bidder is a "resident bidder", as defined in ORS 279A.120.

Each Bid shall contain a statement that the "Contractor agrees to be bound by and will comply with the provisions of ORS 279C.800 through 279C.870 regarding payment of Prevailing Wages".
Contractor shall certify nondiscrimination in obtaining required subcontractors, in accordance with ORS 279A.110(4).

School District 4J reserves the right to (1) reject any or all Bids not in compliance with all public bidding procedures and requirements, (2) postpone award of the Contract for a period not to exceed sixty (60) days from the date of bid opening, (3) waive informalities in the Bids, (4) select the Bid which appears to be in the best interest of the District, or (5) reject any or all bids.

Date: 7/14/21
By: Diana McElhinney, Facilities Management Assistant
Published: Register Guard, Daily Journal of Commerce, and the OregonBuys eProcurement System
Posted: School District 4J Hyperlink: http://www.4j.lane.edu/bids/

BID FORM: Kelly Middle School Modular Classrooms
CIP Number: 201-912-P0003

Submitted to: Facilities Management
Eugene School District 4J
715 West Fourth Avenue
Eugene, Oregon 97402

Bid Deadline: 2:00pm
July 29th, 2021

Submitted by: _____
(Company Name)

BASE BID
The undersigned proposes to furnish all material, equipment, and labor required for the complete project, and to perform all work in strict accordance with the Contract Documents for the lump sum prices indicated below with completion occurring on or prior to the dates indicated:

BASE BID:

Bid: _____ $ _____
(Words) (Figures)

The undersigned agrees, if awarded the Contract, to substantially complete all Base Bid work on or before the dates specified in Section 01 11 00.

BID SECURITY
Accompanying herewith is Bid Security, which is not less than ten percent (10%) of the total amount of the Base Bid plus additive alternates.

STIPULATIONS
The undersigned acknowledges the liquidated damages provision included in the A101 Agreement.

The undersigned agrees, if awarded the contract, to comply with the provisions of Oregon Revised Statutes 279C.800 through 279C.870 pertaining to the payment of prevailing rates of wage.

The undersigned agrees if awarded the contract to comply with Oregon Revised Statutes 326.603 giving the Owner authority to obtain fingerprints and criminal records check of Contractors, their employees, and subcontractors providing labor for the Project.

The undersigned agrees, if awarded the Contract, to execute and deliver to the Owner within ten (10) working days after receiving contract forms, a signed Agreement and a satisfactory Performance Bond and Payment Bond each in an amount equal to 100 percent (100%) of the Contract Sum.

The undersigned agrees, if awarded the Contract, to provide a Schedule of Values for the contract amount within seven (7) days of the Notice to Award. The Schedule of Values shall include separate values for each school for billing and accounting purposes. Payment Applications and Progress Payments will need to include the Schedule of Values as separate work for each school.

For every Agreement of $100,000 or greater in value, all Contractors and Subcontractors shall have a public works bond in the amount of $30,000, filed with the Construction Contractors' Board (CCB), in compliance with ORS 279C.836, before starting work on the project unless exempt. Contractor agrees to provide a copy of the Contractor's BOLI Public Works bond with the signed Agreement as Specified in the Supplementary Conditions.

The undersigned agrees that the Bid Security accompanying this proposal is the measure of liquidated damages which the Owner will sustain by the failure of the undersigned to execute and deliver the above named agreement and bonds; and that if the undersigned defaults in executing that agreement within ten (10) days after forms are

provided or providing the bonds, then the Bid Security shall become the property of the Owner; but if this proposal is not accepted within sixty (60) days of the time set for the opening of bids, or if the undersigned executes and delivers said agreement and bonds, the Bid Security shall be returned.

By submitting this Bid, the Bidder certifies that the Bidder:
a) has available the appropriate financial, material, equipment, facility and personnel resources and expertise, or the ability to obtain the resources and expertise, necessary to meet all contractual responsibilities;
b) has a satisfactory record of past performance;
c) has a satisfactory record of integrity, and is not disqualified under ORS 279C.440;
d) is qualified legally to contract with the Owner; and
e) will promptly supply all necessary information in connection with any inquiry the Owner may make concerning the responsibility of the Bidder.
Prior to award of a Contract, the Bidder shall submit appropriate documentation to allow the Owner to determine whether or not the Bidder is “responsible” according to the above criteria.

The contractor agrees with the provisions of Oregon Revised Statutes 279C.505, which requires that the contractor shall demonstrate it has established a drug-testing program for employees and will require each subcontractor providing labor for the Project to do the same.

The undersigned has received addenda numbers _____ to _____ inclusive and has included their provisions in the above Bid amounts.

The undersigned has visited the site to become familiar with conditions under which the Work is to be performed and has correlated the Bidder's personal observations with the requirements of the proposed Contract Documents.

The undersigned certifies that the Bidder is a _____ Bidder under ORS. ("Resident" or "Non-resident", to be filled in by Bidder)

Names of Firm: _____

Street Address: _____
(City) (State) (Zip)

Telephone Number: _____ FAX Number: _____

Email Address: _____

Signed By: _____ Printed Name:_____
(Signature of Authorized Official. If bid is from a partnership, one of the partners must sign bid).

Date Signed: _____

Official Capacity: _____

If corporation, attest: _____ Date: _____
(Secretary of Corporation)

SEAL (If Corporate)

_____ Corporation
_____ Partnership
_____ Individual

Enclosed: Bid Security

NON-DISCRIMINATION REQUIREMENT

Contractor certifies that the Contractor has not discriminated against minorities, women or emerging small business enterprises in obtaining any required subcontracts.

The Contractor agrees not to discriminate against any client, employee, or applicant for employment or for services, because of race, color, religion, sex, national origin, physical or mental handicap, sexual orientation or age, unless based upon bona fide occupational qualifications, and that they are otherwise in compliance with all federal, state and local laws prohibiting discrimination, with regard to, but not limited to, the following: Employment upgrading, demotion or transfer; Recruitment or recruitment advertising; Layoffs or termination; Rates of pay or other forms of compensation; Selection for training; Rendition of services. It is further understood that any vendor who is in violation of this clause shall be barred forthwith from receiving awards of any purchase order from the School District, unless a satisfactory showing is made that discriminatory practices have terminated and that a recurrence of such acts is unlikely.

FIRM NAME: _____

ADDRESS: _____

TELEPHONE: _____

BY: _____
(Company or Firm Officer)

BY: _____
(Type or Print Name)

NON-COLLUSION AFFIDAVIT

STATE OF _____)

County of _____)

I state that I am _____ of _____
(Title) (Name of Firm)
and that I am authorized to make this affidavit on behalf of my firm, and its owners, directors, and officers. I am the person responsible in my firm for the price(s) and the amount of this bid.

I state that:

(1) The price(s) and amount of this bid have been arrived at independently and without consultation, communication or agreement with any other contractor, bidder or potential bidder, except as disclosed on the attached appendix.

(2) That neither the price(s) nor the amount of this bid, and neither the approximate price(s) nor approximate amount of this bid, have been disclosed to any other firm or person who is a bidder or potential bidder, and they will not be disclosed before bid opening.

(3) No attempt has been made or will be made to induce any firm or person to refrain from bidding on this contract, or to submit a bid higher than this bid, or to submit any intentionally high or noncompetitive bid or other form of complementary bid.

(4) The bid of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or noncompetitive bid.

(5) _____, its affiliates, subsidiaries, officers, directors and
(Name of my Firm)
employees are not currently under investigation by any governmental agency and have not in the last four years been convicted of or found liable for any act prohibited by State or Federal law in any jurisdiction, involving conspiracy or collusion with respect to bidding on any public contract, except as described on the attached appendix.

I state that _____ understands and acknowledges that the above representations
(Name of my Firm)
are material and important, and will be relied on by School District 4J in awarding the contract(s) for which this bid is submitted. I understand and my firm understands that any misstatement in this affidavit is and shall be treated as fraudulent concealment from School District 4J of the true facts relating to the submission of bids for this contract.

_____
(Authorized Signature)

Sworn to and subscribed before me this _____ day of _____, 20

_____
(Notary Public for Oregon)

My Commission Expires: _____

END OF BID FORM

Updated 1/4/18

PROJECT: Kelly Middle School Modular Classrooms
CIP NUMBER: 201-912-P0003

TO: Facilities Management
Eugene School District 4J
715 West Fourth Avenue
Eugene, Oregon 97402

BID SUBMISSION DEADLINE: **Date:** _____ **Time:** _____

SUBMITTAL REQUIREMENTS
Subcontractor disclosure is required on all public improvement contracts greater than $100,000.

This form must be submitted at the location specified in the Invitation to Bid on the advertised bid closing date and within two working hours after the advertised bid closing time.

List below the name of each subcontractor that will be furnishing labor or labor and materials, and that is required to be disclosed, the category of work that the subcontractor will be performing, and the dollar value of the subcontract. Enter "NONE" if there are no subcontractors that need to be disclosed. (ATTACH ADDITIONAL SHEETS IF NEEDED.)

SUBCONTRACTOR	DOLLAR VALUE	CATEGORY OF WORK
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

The above listed first- tier subcontractor(s) are providing labor, or labor and material, with a Dollar Value equal to or greater than:

a) 5% of the total Contract Price, but at least $15,000. [If the Dollar Value is less than $15,000 do not list the subcontractor above.]
b) $350,000 regardless of the percentage of the total Contract Price

Failure to submit this form by the disclosure deadline will result in a non-responsive bid. A non-responsive bid will not be considered for award.

Form submitted by (Bidder Name): _____

Contact Name: _____ **Phone:** _____

Signature: _____

END OF DOCUMENT 00 45 22

PART 1 – GENERAL

1.1 STANDARD FORM

A. The form of Agreement will be executed on AIA Form A101, Standard Form of Agreement Between Owner and Contractor, which is included by reference. The document, as edited by Owner, is available for review at http://www.4j.lane.edu/bids/.

PART 2 – PRODUCTS

2.1 Not Used.

PART 3 – EXECUTION

3.1 Not Used.

END OF DOCUMENT 00 52 13

DRAFT

AIA® Document A101™ – 2017

Standard Form of Agreement Between Owner and Contractor

where the basis of payment is a Stipulated Sum

AGREEMENT made as of the « » day of « » in the year « »
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

Lane County School District 4J
715 West 4th Avenue
Eugene, OR 97402
541-790-7409
Project Manager email: gebb@4j.lane.edu

and the Contractor:
(Name, legal status, address and other information)

« »
« »
« »

for the following Project:
(Name, location and detailed description)

« »
« »
« »

The Architect:
(Name, legal status, address and other information)

« »
« »
« »

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101™–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201™–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[« »] The date of this Agreement.

[« »] A date set forth in a notice to proceed issued by the Owner.

[« »] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

« »

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

[« »] Not later than « » (« ») calendar days from the date of commencement of the Work.

[« »] By the following date: « »

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be s ($), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.5 Liquidated Damages

The Contractor shall pay to the Owner Liquidated Damages of $1,000 per day for each day of delay in achieving Substantial Completion.

« »

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « First » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the « Thirtieth » day of the « same » month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than « thirty » (« 30 ») days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

.1 That portion of the Contract Sum properly allocable to completed Work;

.2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and

.3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

.1 The aggregate of any amounts previously paid by the Owner;

.2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;

.3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and

.5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

« 5% »

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

« »

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

« »

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

« »

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

« »

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

« » % « »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »
« »

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[« »] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[« »] Litigation in a court of competent jurisdiction

[« »] Other *(Specify)*

« »

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

« »

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

« »

polston_j@4j.lane.edu

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

« »

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

« »

§ 8.7 Other provisions:

« For all phases of the Project, the Contractor and the Owner shall purchase and maintain insurance, and the Contractor shall provide bonds as set forth in Article 11 of AIA Document A201–2007.
(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

General Insurance: The CONTRACTOR shall maintain in force for the duration of this agreement a Umbrella Insurance Policy with the limits not less than $5,000,000, a Commercial General Liability, Automobile Liability (owned, non-owned and hired) Insurance policy(s) written on an occurrence basis with limits not less than $1,000,000 per occurrence and $2,000,000 in the aggregated naming the DISTRICT, its employees, officials and agents as an additional insured as respects to work or services performed under this agreement. This insurance will be primary to any insurance the DISTRICT may carry on its own. If the DISTRICT requires Professional Liability coverage, the terms, conditions, and limits must be approved by the DISTRICT's Risk Manager.

Workers' Compensation: The CONTRACTOR shall provide and maintain workers' compensation coverage for its employees, officers, agents, or partners as required by applicable workers' compensation laws.
Equipment and Material: The CONTRACTOR shall be responsible for any loss, damage, or destruction of its own property, equipment, and materials used in connection with the work.

Course of Construction: The CONTRACTOR shall maintain an all-risk policy covering the replacement cost of the Work during the course of construction. The policy shall include the interests of the DISTRICT and the Architect. The amount of insurance shall equal the completed value of the contract.

Property Insurance: The CONTRACTOR shall purchase from and maintain in a company or companies authorized to do business in the jurisdiction in which the Project is located, property insurance on an "all risk" policy form, including builder's risk/installation floater, whichever is appropriate, in the amount of the initial Contract Sum, plus the value of subsequent modifications and the cost of materials supplied by others, comprising the total value of the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in The Contract Documents or until no person or entity other than the DISTRICT has an insurable interest in the property required by this paragraph to be covered, whichever is later. The insurance shall include interests of the DISTRICT, Architect and CONTRACTOR, Subcontractors, and sub-Subcontractors in the Project.

Evidence of Coverage: Evidence of the above coverages issued by a company satisfactory to the DISTRICT shall be provided to the DISTRICT by way of a certificate of insurance before any work or services commence. A 30-day notice of cancellation or material change in coverage clause shall be included. It is the CONTRACTOR's obligation to provide the 30 days' notice if not done so by the CONTRACTOR's insurance company(s). Failure to maintain the proper insurance shall be grounds for immediate termination of this Agreement.

Subcontractors: The CONTRACTOR shall require all Subcontractors to provide and maintain general liability, auto liability, professional liability (as applicable), and workers' compensation insurance with coverage equivalent to those required of the general CONTRACTOR in this contract. The CONTRACTOR shall require certificates of insurance from all Subcontractors as evidence of coverage.

Exception or Waivers: Any exception or waiver of these requirements shall be subject to review and approval from the DISTRICT's Risk Manager.

PERFORMANCE BOND AND PAYMENT BOND: The CONTRACTOR shall furnish a Performance bond and a Labor and Materials Payment bond covering faithful performance of the Contract and payment of obligations arising there under. Bonds are to be obtained through a company that is on the US Government Treasury list for approved sureties and/or approved by School DISTRICT 4J's Risk Manager. The cost of the Bond shall be included in the Contract Sum. The amount of each bond shall be equal to 100 percent of the Contract Sum. Submit on AIA Document A312, latest edition. The CONTRACTOR shall deliver the required bonds to the DISTRICT with the executed Agreement. The CONTRACTOR shall require the Attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of their power of attorney.

»

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds

.3 AIA Document A201™–2007, General Conditions of the Contract for Construction
(Insert the date of the E203-2013 incorporated into this Agreement.)

« »

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[« »] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

« »

[« »] The Sustainability Plan:

Title	Date	Pages

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

« »

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
«Ryan Spain, Facilities Director »« »	« »« »
(Printed name and title)	*(Printed name and title)*

PART 1 – GENERAL

1.1 STANDARD FORM

A. General Conditions of the Contract for Construction AIA Document A201, immediately following, are part of these specifications.

B. The Contractor and all Subcontractors shall read and be governed by them.

1.2 CONFLICTS

A. In the case of conflicts between the General Conditions and these Specifications, the Specifications govern.

PART 2 – PRODUCTS

2.1 Not Used.

PART 3 – EXECUTION

3.1 Not Used.

END OF DOCUMENT 00 72 13

DRAFT

AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
« »
« »

THE OWNER:
(Name, legal status and address)
« »« »
« »

THE ARCHITECT:
(Name, legal status and address)
« »« »
« »

TABLE OF ARTICLES

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

DRAFT

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification including a GMP Amendment. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor except as set forth in Section 5.3 and Section 5.4, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE 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 the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.1.9 KNOWLEDGE

The terms "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 of a general commercial contractor. 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 a general commercial contractor.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results. In the event of inconsistencies within or between parts of the Contract Documents, or between the Contract Documents and applicable standards, codes, and ordinances, the Contractor shall (i) provide the better quality or greater quantity of Work or (ii) comply with the more stringent requirement; either or both in accordance with the Architect's interpretation. The terms and conditions of this Section 1.2.1, however, shall not relieve the Contractor of any of the obligations set forth in Sections 3.2 and 3.7.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings. Dimensions not expressly provided in the Contract Documents are to be computed, rather than determined by scale or rule.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means

the Owner or the Owner's authorized representative. Jim Polston is designated by the Owner as its representative and is authorized to act on behalf of the Owner, unless a new representative is subsequently designated in writing by the Owner.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the portion of the Work affected by a material change.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure the building permits and pay for necessary approvals, easements, assessments and charges required for use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 Except to the extent required for execution of the Work and requested by the Contractor in writing, the Owner shall not furnish any surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, but shall provide a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-day period after receipt of written notice from the Owner (except no notice shall be required in the event of an emergency) to commence and continue correction of such default or neglect with diligence and promptness, the Owner may (but shall not be obligated to), without prejudice to other remedies the Owner may have, commence and continue to carry out the Work, including, without limitation, to correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

§ 2.5 EXTENT OF OWNER RIGHTS

The rights stated in this Article 2 and elsewhere in the Contract Documents are cumulative and not in limitation of any rights of the Owner (i) granted in the Contract Documents, (ii) at law, or (iii) in equity.

In no event shall the Owner have control over, charge of, or any responsibility for construction means, methods, techniques, sequences, or procedures or for safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Documents.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Owner or the Architect in the administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.1.4 Unless otherwise directed by the Architect, the Contractor shall perform all Work in accordance with product manufacturers' recommendations or directions for best results. No preparatory step or installation procedure may be omitted unless specifically authorized by the Contract Documents or at the direction of the Architect. Conflicts among manufacturers' directions or the Contract Documents shall be resolved by the Architect.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents. Prior to execution of the Agreement, the Contractor and each Subcontractor have evaluated and satisfied themselves as to the conditions and limitations under which the Work is to be performed, including, without limitation, (i) the location, condition, layout, and nature of the Project site and surrounding areas, (ii) generally prevailing climatic conditions, (iii) anticipated labor supply and costs, (iv) availability and cost of materials, tools, and equipment, and (v) other similar issues. The Owner assumes no responsibility or liability for the physical condition or safety of the Project site or any improvements located on the Project site. Except as set forth in Section 10.3, the Contractor shall be solely responsible for providing a safe place for the performance of the Work. The Owner shall not be required to make any adjustment in either the Contract Sum or the Contract Time in connection with any failure by the Contractor or any Subcontractor to have complied with the requirements of this Section 3.2.1.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the design information contained in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Owner or the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

The exactness of grades, elevations, dimensions, or locations given on any Drawings issued by the Architect, or the work installed by other contractors, is not guaranteed by the Architect or the Owner.

The Contractor shall, therefore, satisfy itself as to the accuracy of all grades, elevations, dimensions, and locations. In all cases of interconnection of its Work with existing or other work, it shall verify at the site all dimensions relating to such existing or other work. Any errors due to the Contractor's failure to so verify all such grades,

elevations, dimensions, or locations shall be promptly rectified by the Contractor without any additional cost to the Owner.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.3.4 The Contractor must notify the District Facilities Director and Owner's Representative prior to the interruption of any utility or operating system, regardless of the area it services. The specific schedule for all interruptions in services must be coordinated through the Owner's Representative.

§ 3.3.5 The Contractor and its Subcontractors may not use the Owner's tools, equipment, or materials unless authorized in advance by the Owner's Representative.

§ 3.3.6 If the Contractor reasonably believes that suspension of the Work is warranted by reason of unforeseen circumstances that could adversely affect the quality of the Work if the Work were continued, the Contractor shall immediately notify the Owner and the Architect and describe with particularity the reasons therefor. Except as stated elsewhere in the Contract Documents or in an emergency, the Contractor shall not suspend the Work until it receives approval from the Owner.

§ 3.3.7 It is understood and agreed that the relationship of Contractor to Owner shall be that of an independent contractor under ORS 670.600. Nothing contained in this Agreement or inferable from this Agreement shall be deemed or construed to (a) make Contractor the agent, servant, or employee of the Owner; or (b) create any partnership, joint venture, or other association between Owner and Contractor. Any direction or instruction by Owner or any of its authorized representatives in respect to the Work shall relate to the results the Owner desires to obtain from the Work, and shall in no way affect Contractor's independent contractor status.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, 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.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the prior written consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.4.4 The Contractor shall only employ or use labor in connection with the Work capable of working harmoniously with all trades, crafts, and any other individuals associated with the Project. The Contractor shall also use best efforts to minimize the likelihood of any strike, work stoppage, or other labor disturbance and shall not be entitled to any increase in the Contract Sum in the event of a labor dispute.

.1 If the Work is to be performed by trade unions, the Contractor shall make all necessary arrangements to reconcile, without delay, damage, or cost to the Owner and without recourse to the Architect or the Owner, any conflict between the Contract Documents and any agreements or regulations of any kind at any time in force among members or councils that regulate or distinguish the activities that shall not be included in the work of any particular trade.

.2 In case the progress of the Work is affected by any undue delay in furnishing or installing any items or materials or equipment required under the Contract Documents because of such conflict involving any such labor agreement or regulation, the Owner may require that other material or equipment of equal kind and quality be provided pursuant to a Change Order or Construction Change Directive.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect or the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. The Contractor agrees to assign to the Owner at the time of final completion of the Work any and all manufacturers' warranties relating to materials and labor used in the Work and further agrees to perform the Work in such manner so as to preserve any and all such manufacturers' warranties. The Contractor further warrants the building envelope and penetration components against defects in materials and workmanship for a period of two-years following the date of Substantial Completion in accordance with ORS 701.340 and shall annually inspect the same. If, after 15 days' written notice, the Contractor fails to proceed to cure any breach of this warranty, the Owner may have the defects corrected and the Contractor and its surety, if any, shall be liable for all expense incurred. In case of an emergency where, in the opinion of the Owner or the Architect, delay would cause serious loss or damage, if any, corrective work may be undertaken without advance notice to the Contractor, but the Contractor and its surety shall remain liable for all expenses incurred.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor and all Social Security and withholding payments that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Except for the building permit which will be paid for by the Owner, the Contractor shall secure and pay for all permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent Project Manager, superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The Project Manager shall represent the Contractor, and communications given to the Project Manager shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed Project Manager and superintendent. The Architect

may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed Project Manager and superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed Project Manager or superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the Project Manager or superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.10.4 The construction schedule shall be submitted together with the GMP and shall be in a detailed precedence-style critical path management ("CPM") or primavera-type format satisfactory to the Owner and the Architect that shall also (i) provide a graphic representation of all activities and events that will occur during performance of the Work; (ii) identify each phase of construction and occupancy; and (iii) set forth dates that are critical in ensuring the timely and orderly completion of the Work in accordance with the requirements of the Contract Documents (hereinafter referred to as "Milestone Dates"). Upon review and acceptance by the Owner and the Architect of the Milestone Dates, the construction schedule shall be deemed part of the Contract Documents and attached to the Agreement as Exhibit 3,10.4. If not accepted, the construction schedule shall be promptly revised by the Contractor in accordance with the recommendations of the Owner and the Architect and resubmitted for acceptance. The Contractor shall monitor the progress of the Work for conformance with the requirements of the construction schedule and shall promptly advise the Owner of any delays or potential delays. The accepted construction schedule shall be updated to reflect actual conditions (sometimes referred to in these Supplementary Conditions as "progress reports") as set forth in Section 3.10.1 or if requested by either the Owner or the Architect. In the event any progress report indicates any delays, the Contractor shall propose an affirmative plan to correct the delay, including overtime and/or additional labor, if necessary. In no event shall any progress report constitute an adjustment in the Contract Time, any Milestone Date, or the Contract Sum unless any such adjustment is agreed to by the Owner and authorized pursuant to Change Order.

§ 3.10.5 In the event the Owner determines that the performance of the Work, as of a Milestone Date, has not progressed or reached the level of completion required by the Contract Documents, the Owner shall have the right to order the Contractor to take corrective measures reasonably necessary to expedite the progress of construction, including, without limitation, (i) working additional shifts or overtime, (ii) supplying additional manpower, equipment, and facilities, and (iii) other similar measures (hereinafter referred to collectively as "Extraordinary Measures"). Such Extraordinary Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the construction schedule.

.1 Unless such Extraordinary Measure are necessitated by acts or omission reasonably out of the Contractor's control, the Contractor shall not be entitled to an adjustment in the Contract Sum in connection with Extraordinary Measures required by the Owner under or pursuant to this Section 3.10.5.

.2 The Owner may exercise the rights furnished the Owner under or pursuant to this Section 3.10.5 as frequently as the Owner deems necessary to ensure that the Contractor's performance of the Work will comply with any Milestone Date or completion date set forth in the Contract Documents.

§ 3.10.6 The Owner shall have the right to direct a postponement or rescheduling of any date or time for the performance of any part of the Work that may interfere with the operation of the Owner's premises or any tenants or invitees thereof. The Contractor shall, upon the Owner's request, reschedule any portion of the Work affecting operation of the premises during hours when the premises are not in operation. Any postponement, rescheduling, or performance of the Work under this Section 3.10.6 may be grounds for an extension of the Contract Time, if permitted under Section 8.3.1, and an equitable adjustment in the Contract Sum if (i) the performance of the Work was properly scheduled by the Contractor in compliance with the requirements of the Contract Documents, and (ii) such rescheduling or postponement is required for the convenience of the Owner.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.11.1 The Contractor shall maintain for the Owner one record as-built copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to record field changes and selections made during construction, and one record copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These as-built documents shall incorporate all changes and substitutions to the Work, including without limitation changes or substitutions arising from Change Orders, Construction Change Directives, and details clarified by Requests for Information, Supplemental Instructions or approved Shop Drawings. The Contractor's as-built documentation shall be available to the Architect and the Owner during the course of the Project.

§ 3.11.2 The Contractor shall maintain all approved permit drawings in a manner that will make them accessible at the Project site to governmental inspectors and other authorized agencies. All approved permit drawings shall be wrapped, marked, and delivered to the Owner within sixty (60) days of Substantial Completion.

§ 3.11.3 The Contractor must continuously maintain at the Project site all material safety data sheets, safety records, daily logs, and other Contract documentation necessary to immediately ascertain the safety of the Work and to establish compliance with life safety policies, Hazardous Materials requirements, and the Contract Documents.

§ 3.11.4 The Contractor, with its Subcontractors, will prepare draft record Contract Documents, showing all as-built conditions as required under Section 3.11.1 and the Owner's close-out policies and procedures, and submit them to the Architect for review. Based on the Architect's review and comments, if any, and pursuant to the Owner's close-out policies and procedures, the Contractor will prepare and deliver to the Owner within sixty (60) days of Substantial Completion, final, accurate, and complete record Contract Documents, including without limitation record Drawings and Specifications, showing the exact "as-built" conditions of the Work.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design

concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, 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.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor 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 Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional who shall comply with the reasonable requirements of the Owner regarding qualifications and insurance, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner, Contractor and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

§ 3.13.1 The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.13.2 Only materials and equipment that are to be used directly in the Work shall be brought to and stored on the Project site by the Contractor. After equipment is no longer required for the Work, it shall be promptly removed from the Project site. Protection of construction materials and equipment stored at the Project site from weather, theft, damage, and all other adversity is solely the responsibility of the Contractor. The Contractor shall ensure that the Work, at all times, is performed in a manner that affords reasonable access, both vehicular and pedestrian, to the site of the Work and all adjacent areas. The Work shall be performed, to the fullest extent reasonably possible, in such a manner that public areas adjacent to the site of the Work shall be free from all debris, building materials, and equipment likely to cause hazardous conditions.

§ 3.13.3 The Contractor and any entity for whom the Contractor is responsible shall not erect any sign on the Project site without the prior written consent of the Owner, which may be withheld in the sole discretion of the Owner.

§ 3.13.4 Without limitation of any other provision of the Contract Documents, the Contractor shall use best efforts to minimize any interference with the occupancy or beneficial use of (i) any areas and buildings adjacent to the site of the Work and (ii) the Building in the event of partial occupancy, as more specifically described in Section 9.9. Without prior approval of the Owner, the Contractor shall not permit any workers to use any existing facilities at the Project site, including, without limitation, lavatories, toilets, entrances, and parking areas other than those designated by the Owner.

.1 Without limitation of any other provision of the Contract Documents, the Contractor shall use its best efforts to comply with all rules and regulations promulgated by the Owner in connection with the use and occupancy of the Project site and the Building, as amended from time to time. The Contractor shall immediately notify the Owner in writing if during the performance of the Work, the Contractor finds compliance of any portion of such rules and regulations to be impracticable, setting forth the problems of such compliance and suggesting alternatives through which the same results intended by such portions of the rules and regulations can be achieved. The Owner may, in the Owner's sole discretion, adopt such suggestions, develop new alternatives, or require compliance with the existing requirements of the rules and regulations.

.2 The Contractor shall also comply with all insurance requirements and collective bargaining agreements applicable to use and occupancy of the Project site and the Building.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), including loss of use resulting therefrom, but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

§ 3.18.3 The Contractor's indemnity obligations under this Section 3.18 shall also specifically include, without limitation, all fines, penalties, damages, liability, costs, expenses (including, without limitation, reasonable attorneys' fees), and punitive damages (if any) arising out of, or in connection with, any (i) violation of or failure to comply with any law, statute, ordinance, rule, regulation, code, or requirement of a public authority that bears upon the performance of the Work by the Contractor, a Subcontractor, or any person or entity for whom either is responsible, (ii) means, methods, procedures, techniques, or sequences of execution or performance of the Work, and (iii) failure to secure any pay for permits, fees, approvals, licenses, and inspections as required under the Contract Documents, or any violation of any permit or other approval of a public authority applicable to the Work, by the Contractor, a Subcontractor, or any person or entity for whom either is responsible.

§ 3.18.4 The Contractor shall indemnify and hold harmless the Owner, its members, managers, directors, officers, employees and agents (collectively, the "Indemnitees") from and against any costs and expenses (including reasonable attorneys' fees) incurred by any of the Indemnitees in enforcing any of the Contractor's defense, indemnity, and hold-harmless obligations under this Contract, and no member, ,manager, director, officer, employee or agent of the Owner shall be personally liable for any obligation or liability arising under the Contract Documents.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site to become substantially familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 The Contractor will facilitate and the Architect will participate in weekly meetings with the Contractor and any appropriate consultants at the site to review and discuss progress and any issues. The Contractor will maintain record meeting notes of weekly meetings and will provide these notes to Architect and Owner for their review and comment. On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. If the Architect knows of any Work that does not conform with the Contract Documents, the Architect will promptly notify the Contractor and the Owner in writing of such non-conforming work. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the approved submittal schedule or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the requirements indicated in, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect in connection with the administration of the Contract will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Within 10 days after the date of the submittal of the GMP, the Contractor shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 5 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 5-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall

be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors. Also, the subcontract shall be in writing and shall specifically provide that the Owner is an intended third-party beneficiary of such subcontract.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 If the Work in connection with a subcontract has been suspended for more than thirty (30) days after termination of the Contract by the Owner pursuant to Section 14.2 and the Owner accepts assignment of such subcontract, the Subcontractor's compensation shall be equitably adjusted for any increase in direct costs incurred by such Subcontractor as a result of the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

§ 5.4.4 Each subcontract shall specifically provide that the Owner shall only be responsible to the Subcontractor for those obligations that accrue subsequent to the Owner's exercise of any rights under this conditional assignment.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those

portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, negligence, lack of oversight, inattention to detail, breach of the Contract Documents, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work. Except as permitted in Section 7.3 and Section 9.7.2, a change in the Contract Sum or the Contract Time shall be accomplished only by Change Order. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, and no claim that Owner has been unjustly enriched by any alteration of or addition to the Work, whether or not there is, in fact, any unjust enrichment to the Work, shall be the basis of any claim to an increase in any amounts due under the Contract Documents or a change in any time period provided for in the Contract Documents.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.2.2 Agreement on any Change Order shall constitute a final settlement of all matters relating to the change in the Work that is the subject of the Change Order, including, but not limited to, all direct and indirect costs and consequential damages associated with such change and any and all adjustments to the Contract Sum and the Contract Time/construction schedule.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of

those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others, at the rates established in the Contract Documents;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order to the extent such actual, direct delay will prevent the Contractor from achieving Substantial Completion within the Contract Time and if the performance of the Work is not, was not, or would not have been delayed by any other cause for which the Contractor is not entitled to an extension in the Contract Time under the Contract Documents. The Contractor further acknowledges and agrees that adjustments in the Contract Time will be permitted for a delay only to the extent such delay (i) is not caused, or could not have been anticipated, by the Contractor, (ii) could not be limited or avoided by the Contractor's timely notice to the Owner of the delay or reasonable likelihood that a delay will occur, and (iii) is of a duration not less than one (1) day. For clarity, any extension will be net of any delays caused by or due to the fault or negligence of the Contractor and will also be net of any contingency or "float" time allowance included in the Project Schedule.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

§ 8.3.4 The Contractor shall not in any event be entitled to damages arising out of actual or alleged loss of efficiency; morale, fatigue, attitude, or labor rhythm; constructive acceleration; home office overhead; expectant under-run; trade stacking; reassignment of workers; concurrent operations; dilution of supervision; learning curve; beneficial or joint occupancy; logistics ripple; season change; extended overhead; profit upon damages for delay; impact damages; or similar damages.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, within ten (10) days of the execution of GMP amendment to this Agreement, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.1.3 Each Application for Payment shall be accompanied by the following, all in form and substance satisfactory to the Owner: (i) a current Contractor's lien waiver and duly executed and acknowledged sworn statement showing all Subcontractors and material suppliers with whom the Contractor has entered into subcontracts, the amount of each such subcontract, the amount requested for any Subcontractor and material supplier in the requested progress payment, and the amount to be paid to the Contractor for such progress payment, together with similar sworn statements from all such Subcontractors and material suppliers; (ii) duly executed waivers of mechanics' and material suppliers' liens from all Subcontractors and, when appropriate, from material suppliers and lower tier Subcontractors establishing payment or satisfaction of payment of all amounts requested by the Contractor on behalf of such entities or persons in any previous Application for Payment; and (iii) all information and materials required to comply with the requirements of the Contract Documents or reasonably requested by the Owner or the Architect.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work. The Owner reserves the right to settle any disputed mechanic's or material supplier's lien claim by payments to the lien claimant or by such other means as the Owner, in the Owner's sole discretion, determines is the most economical or advantageous method of settling the dispute. The Contractor shall promptly reimburse the Owner, upon demand, for any payments so made.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot

be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a separate contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- **.7** repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.5.4 If the Contractor disputes any determination by the Architect with regard to any Certificate of Payment, the Contractor nevertheless shall expeditiously continue the Work.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

§ 9.7.1 If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents. Notwithstanding the foregoing, failure of payment does not exist under Section 9.7.1 if the Owner exercises authority granted by the Contract documents to withhold payment notwithstanding certification by the Architect.

§ 9.7.2 If the Owner is entitled to reimbursement or payment from the Contractor under or pursuant to the Contract Documents, such payment shall be made promptly upon demand by the Owner. Notwithstanding anything contained in the Contract Documents to the contrary, if the Contractor fails to promptly make any payment due the Owner, or if the Owner incurs any costs and expenses to cure any default of the Contractor or to correct defective Work, the Owner shall have an absolute right to offset such amount against the Contract Sum and may, in the Owner's sole discretion, elect either to (i) deduct an amount equal to that which the Owner is entitled from any payment then or thereafter due the Contractor from the Owner, or (ii) issue a written notice to the Contractor reducing the Contract Sum by an amount equal to that which the Owner is entitled.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 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 that the Owner can occupy or utilize the Work for its intended use; provided, however, that as a condition precedent to Substantial Completion, the Owner has received all certificates of occupancy and any other permits, approvals, licenses, and other documents from any governmental authority having jurisdiction thereof necessary for the beneficial occupancy of the Project.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if

any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) three (3) bound volumes of all guarantees and warranties on material furnished by all manufacturers and suppliers to the Contractor and all its Subcontractors, with duly executed instruments properly assigning the guarantees and warranties to the Owner, which guarantees and warranties in each bound volume shall be grouped together by trade and properly indexed, and (6), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that

portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents; or
- **.3** terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including installing fencing, posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities. The Contractor shall also be responsible, at the Contractor's sole cost and expense, for all measures necessary to protect any property or improvements within or adjacent to the Project. Any damage to such property or improvements shall be promptly repaired by the Contractor.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.2.9 Without limiting any other requirement of this Section 10.2, the Contractor shall, at its sole cost and expense, promptly repair any unintended damage or disturbance to walls, utilities, sidewalks, curbs, and the property of third parties (including utility companies and governments) resulting from the performance of the Work, whether caused by the Contractor or by its Subcontractors at any tier. The Contractor shall maintain streets in good repair and traversable condition.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from such hazardous material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless due to the negligence of the Owner, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- **.1** Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- **.2** Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- **.3** Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- **.4** Claims for damages insured by usual personal injury liability coverage;
- **.5** Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- **.6** Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- **.7** Claims for bodily injury or property damage arising out of completed operations, which coverage shall be maintained for no less than four (4) years after final payment; and
- **.8** Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3

§ 11.1.3.1 The Contractor hereby agrees to deliver to the Owner, within ten (10) days of the date of the Owner-Contractor Agreement and prior to bringing any equipment or personnel onto the site of the Work or the Project site, certified copies of all insurance policies procured by the Contractor under or pursuant to this Section 11.1 or, with consent of the Owner, Certificates of Insurance in form and substance satisfactory to the Owner evidencing the required coverages with limits not less than those specified in Article 8 of the Agreement. The coverage afforded under any insurance policy obtained under or pursuant to this Section 11.1 shall be primary to any valid and collectible insurance carried separately by any of the Indemnitees. The Contractor shall provide written notification to the Owner of the cancellation or expiration of any insurance required by Section 11.1. The Contractor shall provide such written notice within five (5) business days of the date the Contractor is first aware of the cancellation or expiration, or is first aware that the cancellation or expiration is threatened or otherwise may occur, whichever comes first.

§ 11.1.3.2 In no event shall any failure of the Owner to receive certified copies or certificates of policies required under Section 11.1 or to demand receipt of such certified copies or certificates prior to the Contractor's commencing the Work be construed as a waiver by the Owner or the Architect of the Contractor's obligations to obtain insurance

pursuant to this Article 11. The obligation to procure and maintain any insurance required by this Article 11 is a separate responsibility of the Contractor and independent of the duty to furnish a certified copy or certificate of such insurance policies.

§ 11.1.3.3 If the Contractor fails to purchase and maintain, or require to be purchased and maintained, any insurance required under this Section 11.1, the Owner may, but shall not be obligated to, upon five (5) days' written notice to the Contractor, purchase such insurance on behalf of the Contractor and shall be entitled to be reimbursed by the Contractor upon demand.

§ 11.1.3.4 When any required insurance, due to the attainment of a normal expiration date or renewal date, shall expire, the Contractor shall supply the Owner with Certificates of Insurance and amendatory riders or endorsements that clearly evidence the continuation of all coverage in the same manner, limits of protection, and scope of coverage as was provided by the previous policy. In the event any renewal or replacement policy, for whatever reason obtained or required, is written by a carrier other than that with whom the coverage was previously placed, or the subsequent policy differs in any way from the previous policy, the Contractor shall also furnish the Owner with a certified copy of the renewal or replacement policy unless the Owner provides the Contractor with prior written consent to submit only a Certificate of Insurance for any such policy. All renewal and replacement policies shall be in form and substance satisfactory to the Owner and written by carriers acceptable to the Owner.

§ 11.1.3.5 Any aggregate limit under the Contractor's liability insurance shall, by endorsement, apply to this Project separately.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims made under the Contractor's completed operations coverage. The Contractor shall also cause each Subcontractor to (i) procure insurance reasonably satisfactory to the Owner and (ii) name the Indemnitees as additional insureds under the Subcontractor's comprehensive general liability policy. The additional insured endorsement included on the Subcontractor's comprehensive general liability policy shall state that coverage is afforded the additional insureds with respect to claims arising out of operations performed by or on behalf of the Contractor. If the additional insureds have other insurance that is applicable to the loss, such other insurance shall be on an excess or contingent basis. The amount of the insurer's liability under this insurance policy shall not be reduced by the existence of such other insurance.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 The Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, 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 and Contractor's services and expenses required as a result of such insured loss. The Contractor shall make seperate arrangements for any insurance it may require on such construction equipment, and any policy obtained shall include a waiver of subrogation in accordance with the requirements of Section 11.3.7.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Evidence of the above coverage issued by a company satisfactory to the District shall be provided to the District by way of Certificate of Insurance before any work commences. A 30 day notice of cancellation or material change in coverage clause shall be included. It is the Contractor's obligation to provide 30 days notice if not done so by Contractor's insurance company. Failure to maintain the proper insurance shall be grounds for immediate termination of this Agreement.

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent of actual recovery of any insurance proceeds under any property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Contractor as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Contractor's property insurance shall be adjusted by the Contractor as fiduciary and made payable to the Contractor and Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Contractor in good faith shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Contractor's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Contractor as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract. Except as otherwise required by statute, the form and substance of such bonds shall be satisfactory to the Owner in the Owner's sole judgment.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense. If prior to the date of Substantial Completion the Contractor, a Subcontractor, or anyone for whom either is responsible uses or damages any portion of the Work, including, without limitation, mechanical, electrical, plumbing, and other building systems, machinery, equipment, or other mechanical device, the Contractor shall cause such item to be restored to "like new" condition at no expense to the Owner. In addition, the Contractor shall promptly remedy damage and loss arising in conjunction with the Project caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or anyone for whose acts they may be liable and for which the Contractor is responsible.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the

Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 Upon completion of any Work under or pursuant to this Section 12.2, the one (1) year correction period in connection with the Work requiring correction shall be renewed and recommence. The obligations under Section 12.2 shall cover any repairs and replacement to any part of the Work or other property that is damaged by the defective Work.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2 or elsewhere in the Contract Documents, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Except as expressly provided in the Contract Documents, duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

§ 13.8 GENERAL PROVISIONS

§ 13.8.1 All personal pronouns used in this Contract, whether used in the masculine, feminine, or neuter gender, shall include all other genders; and the singular shall include the plural and vice versa. Titles of articles, sections, and subsections are for convenience only and neither limit nor amplify the provisions of this Contract. The use herein of

the word "including," when following any general statement, term, or matter, shall not be construed to limit such statement, term, or matter to the specific items or matters set forth immediately following such word or to similar items or matters, whether or not non-limiting language (such words as "without limitation," or "but not limited to," or words of similar import) is used with reference thereto, but rather shall be deemed to refer to all other items or matters that could reasonably fall within the broadest possible scope of such general statement, term, or matter.

§ 13.8.2 Wherever possible, each provision of this Agreement shall be interpreted in a manner as to be effective and valid under applicable law. If, however, any provision of this Agreement, or portion thereof, is prohibited by law or found invalid under any law, only such provision or portion thereof shall be ineffective, without in any manner invalidating or affecting the remaining provisions of this Agreement or valid portions of such provision, which are hereby deemed severable.

§ 13.8.3 Each party hereto agrees to do all acts and things and to make, execute and deliver such written instruments, as shall from time to time be reasonably required to carry out the terms and provisions of the Contract Documents.

§ 13.8.4 Any specific requirement in this Contract that the responsibilities or obligations of the Contractor also apply to a Subcontractor is added for emphasis and is also hereby deemed to include a Subcontractor of any tier. The omission of a reference to a Subcontractor in connection with any of the Contractor's responsibilities or obligations shall not be construed to diminish, abrogate, or limit any responsibilities or obligations of a Subcontractor of any tier under the Contract Documents or the applicable subcontract.

§ 13.9 NO ORAL WAIVER

The provisions of the Contract Document shall not be changed, amended, waived, or otherwise modified in any respect except by a writing signed by Owner. No person is authorized on behalf of Owner to orally change, amend, waive, or otherwise modify the terms of the Contract Documents or any of the Contractor's duties or obligations under or arising out of the Contract Documents. Any change, waiver, approval, or consent granted to the Contractor shall be limited to the specific matters stated in the writing signed by Owner, and shall not relieve Contractor of any other of the duties and obligations under the Contract Documents. No "constructive" changes shall be allowed.

§ 13.10 NOTICES REGARDING LIENS

Contractor shall provide all notices required or permitted by Oregon law for protection of Owner from liens and claims of lien if permitted or required by applicable law. Contractor shall be responsible for filing in the appropriate court or other governmental office records all such notices as required or permitted by the laws of Oregon. Contractor shall provide Owner with copies of all notices received by Contractor from subcontractors, sub-subcontractors, and/or suppliers to Contractor.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped; or

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- **.1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- **.3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- **.4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- **.1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- **.2** Accept assignment of subcontracts pursuant to Section 5.4; and
- **.3** Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- **.1** that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
- **.2** that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- **.1** cease operations as directed by the Owner in the notice;
- **.2** take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 Upon such termination, the Contractor shall recover as its sole remedy payment for Work properly performed in connection with the terminated portion of the Work prior to the effective date of termination and for items properly and timely fabricated off the Project site delivered and stored in accordance with the Owner's instructions. The Contractor hereby waives and forfeits all other claims for payment and damages, including, without limitation, anticipated profits. The Owner shall be credited for (i) payments previously made to the Contractor for the terminated portion of the Work, (ii) claims that the Owner has against the Contractor under the Contract, and (iii) the value of the materials, supplies, equipment, or other items that are to be disposed of by the Contractor that are part of the Contract Sum.

§ 14.4.4 The Owner may terminate a portion of the Work for the Owner's convenience and without cause, in which case the provisions of this Section 14.4 shall apply only to the portion of the Work terminated and the Contractor shall continue with performance of the remaining Work that is not terminated.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker; provided, however, that the claimant shall use its best efforts to furnish the Initial Decision Maker and the other party, as expeditiously as possible, with notice of any Claim including, without limitation, those in connection with concealed or unknown conditions, once such claim is recognized, and shall cooperate with the Architect and the party against whom the claim is made in any effort to mitigate the alleged or potential damages, delay, or other adverse consequences arising out of the condition that is the cause of such a Claim. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, a decision by the Initial Decision Maker shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.2.9 The decision of the Initial Decision Maker in response to a Claim shall not be a condition precedent to mediation and binding dispute resolution in the event (1) the positions of the Initial Decision Maker and Architect are vacant, or (2) the Claim relates to a construction lien.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof. In no event shall any mediator in connection with a Claim be permitted to serve as an arbitrator for that, or any other, Claim that is not resolved pursuant to mediation.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by Arbitration Services of Portland ("ASP") in accordance with the ASP Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. Exclusive venue for arbitration hearings shall be in Lane County, Oregon.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 The Contractor and Owner waive all objections to joinder of the Contractor or Owner as a party to any Project-related mediation, arbitration or litigation in which either the Contractor or Owner is joined or is otherwise positioned as a party in which the Contractor's conduct or its performance is the source of the dispute.

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

PART 1– GENERAL

1.1 PREVAILING WAGE RATES

A. The Prevailing Wage Rates dated January 01, 2021 including any subsequent corrections or amendments issued by the Oregon Bureau of Labor and Industries, are included as a portion of the Contract Documents by reference. Copies are available for review at the office of Facilities Management, School District 4J, and can be viewed online at www.boli.state.or.us. Click on Prevailing Wages, then PWR Rate Publications, and then Prevailing Wage Rates for Public Works Contracts in Oregon (subject only to state law).

PART 2 – PRODUCTS

2.1 Not Used.

PART 3 – EXECUTION

3.1 Not Used.

END OF DOCUMENT 00 73 43

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Add two portable classroom buildings to Kelly Middle School. Work includes selective demolition and new paving, siding patch, door hardware, electrical, grading, site utilities, fencing, landscaping, bicycle parking, and irrigation. Portable classrooms and elevated walkways by Others.

1. Project Location:
   a. Kelly Middle School 850 Howard, Ave, Eugene, OR 97404.
2. Owner:
   a. Eugene School District 4J, 715 West Fourth Avenue, Eugene, OR 97402.

B. Architect Identification: The Contract Documents, dated July 14th, 2021 were prepared for Project by GMA Architects, 860 W Park Street, Eugene, OR 97401.

C. Project Manager: Kirk Gebb has been appointed by Owner to serve as Project Coordinator.

1.3 CONTRACT

A. Project will be constructed under a general construction contract.

1. The form of Agreement will be executed on AIA Form A101, Standard Form of Agreement Between Owner and Contractor.

1.4 WORK SEQUENCE

A. Do not commence Work until after execution of Agreement and receipt of Notice-to-Proceed from Owner. Work on site shall commence August 5, 2021. Site investigation that does not impact operations may occur at an earlier date with prior approval from Owner.

B. Perform work in order to achieve Substantial Completion by August 26, 2021.

C. Achieve Final Completion within seven (7) days following the date of Substantial Completion.

1.5 USE OF PREMISES

A. Work Area Access: Buildings will be occupied during work. Access to the work area will be available on a week-day basis from approximately 7:00 am to 4:00 pm. Coordinate all other work hour schedules with Owner so as not to interfere with Owner's use of the building.

B. Limit use of the premises to construction activities in areas indicated; allow for Owner occupancy and use by the public, subject to approval by a District Safety Specialist.

C. Site Access: Maintain drives and building entrances and exits clear and protected at all times to Owner's, employees, and public access and for use by emergency personnel. Do not use these areas for parking or storage. Schedule deliveries to minimize space and time requirements for storage of materials at site.

D. Parking: Contractor may use existing parking areas as indicated on Drawings.

E. Contractor Staging Areas: Limit staging to areas indicated on Drawings.

F. Construction Operations: Limited to areas indicated on Drawings.

1.6 WORK UNDER SEPERATE CONTRACTS

A. Separate Contract: Owner will award a separate contract for performance of certain construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract. This contract will include the following:
1. Modular Building Design and Drawings, including foundation and anchorage.
2. Elevated exterior walkway, stair, and ramp.
3. Fiber cabling

B. Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

1.7 FUTURE WORK

A. Future Contract: Owner may award a separate contract for additional work to be performed at the site after Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.

1.8 MISCELLANEOUS PROVISIONS

A. BACKGROUND CHECK –

1. Individuals with whom the District contracts with, or any employee, agent, subcontractor or provider who will have direct, unsupervised contact with students, shall be required to submit a 4J Volunteer Background check and undergo a state nationwide fingerprinting and criminal history records check, in accordance with the provisions of ORS 326.603 and ORS 326.607. Individuals or Proposer, and not the District, shall be responsible for the fees associated with fingerprinting and the criminal history records check, not to exceed the actual costs (ODE $59.00 and outside fingerprinting vendor $12.50). Individuals contracting with the District will be required to fill out and submit a background check by logging on the following site: https://www.4j.lane.edu/hr/icbackgroundprocess/ and follow the process.

B. DRUG AND ALCOHOL POLICY

1. The possession, use, or distribution of illicit drugs and alcohol on school premises is prohibited. Prescription medications brought to the project site shall be in the original container bearing the name of the drug, the name of the physician and the prescribed dosage.

C. USE OF TOBACCO PRODUCTS

1. Smoking and the other use of tobacco products is prohibited on all school district property pursuant to OAR 581-021-0110.

D. SAFETY REQUIREMENTS

1. Safety must not be sacrificed for the sake of productivity or expedience. Safety of students, staff, and the public is critical. Take all reasonable precautions to prevent endangerment or injury. Advise and coordinate operations with the school office.
2. All contractors who perform work on District property, and their employees, are expected to know the District's expectations for safe work and to adhere to those expectations.

3. Contractors are to adhere to the regulations of Oregon OSHA for all projects within the School District.

E. GENERAL SAFE WORK PRACTICES

1. Students, public and school staff shall not be put at risk by the activities of contractors or their employees.
2. Safe vehicle operation rules are to be followed at all times. These include positioning vehicles to minimize the necessity of backing and providing a "spotter", someone who will make sure that people do not run into the path of a vehicle when driving on a playground or field that is occupied by students.
3. Tools shall never be left out when an unsecured work area is vacated.
4. Ladders and scaffolding will be taken down when an unsecured work area is vacated.
5. Open holes and other tripping hazards shall be fenced or barricaded when an unsecured work area is vacated.
6. Operations resulting in vapors, emissions or flying objects shall be conducted in such a way as to prevent exposure to any unprotected parties or property.
7. "Secured Work Area" is defined as an area having a perimeter cyclone fence at least 6 feet in height, with gates which close and lock so that no casual entrance is possible by unauthorized adults or children.
8. Contractor to follow all OR-OSHA rules for Confined Spaces, where applicable.

F. COMMUNICATIONS REGARDING UNSAFE PRACTICES

1. Upon perceiving a problem, the District will immediately communicate the concern to the Contractor or Contractor's representative on the work site.
2. If agreement on correction of unsafe conditions cannot be reached, the concerns of the District shall prevail and safety concerns shall be addressed in accordance with the District requirements.

G. ELECTRICAL PANELS - LOCKOUT/TAGOUT

1. Contractor shall implement a Lockout/Tag-out program for his employees who take equipment out of service or place equipment back into service. Contractor shall review the District's Energy Control Program prior to commencing work. Rules applying to this procedure are Oregon Occupational Safety and Health Code OAR 437, Division 2, Subdivision J, General Environmental Controls Lockout/Tag-out (1919.147), or latest edition.

H. ARC FLASH – ELECTRICAL SAFETY

1. Contractor shall comply with NFPA 70E (Electrical Safety in the Workplace), current edition. Contractor shall comply with Oregon OSHA 1910.137 (Personal Protective Equipment). The Contractor shall review with the School District Project Manager the 'Eugene School District Electrical Safety Program' before any work commences. The Contractor shall comply with all 'Arc Flash' and 'Electrical Safety' protocols referenced in any and all NFPA, OSHA, OROSHA, NEC, NESC, UL, IBC, IFC and ANSI documents (current editions).

I. POTENTIALLY HAZARDOUS PRODUCTS

1. The District attempts to maintain a safe and healthy environment for students and staff. The Contractor is therefore required to follow District guidelines controlling the use of potentially hazardous products and to use these products in a safe manner. Guidelines include the use of materials (adhesives, coatings, carpeting, etc.) which are known to emit little or no airborne pollutants.
2. MSDS information is required for all potentially hazardous products. The Project Manager and a District Safety Specialist will review these and determine what, if any, mitigation procedures will be required.
3. Contractor is to maintain and post copies of all MSDS information at the project site and adhere to the required controls.

4. Contractor is to ensure that work area by students and teachers is restricted. The District will provide signage appropriate for this purpose. The Contractor is to construct and maintain appropriate barriers. This shall include provision of physical separation barriers between "construction" and "occupied" spaces.
5. Contractor to adopt means of maintaining the construction space in negative air pressure in relation to occupied spaces.
6. Where there is a new or existing ventilation system in an affected space, the system shall be adjusted to provide the maximum amount of outside air possible with the system.
7. Efforts shall be made to install and operate new ventilation systems as soon in the construction process as practical.

J. ASBESTOS CONTAINING MATERIALS WARNING

1. Asbestos containing materials are known to exist in areas of the Work. The Contractor shall not, in any way, disturb materials which are known to contain asbestos, assumed to contain asbestos, or otherwise have not been tested and confirmed to be asbestos free.
2. Where access to concealed spaces is required, or it is necessary to disturb building materials such as for drilling of holes, cutting, etc., notify the Owner so that proper investigation and/or removal procedures are followed.
3. Prior to commencing Work, the Contractor shall meet with the District Safety Specialist and review the Owner's Asbestos Management Plan for the locations of asbestos-containing materials and/or materials assumed to contain asbestos. After reviewing the Owner's Asbestos Management Plan, the Contractor is required to sign Form 01 11 00A, Asbestos-containing Materials Notification Statement, provided at the end of this Section.
4. Contractor must not install any asbestos-containing materials when performing the Work of this project. At the completion of the Work, Contractor will be required to furnish a statement stating that no asbestos-containing materials were installed during the course of the Work. Refer to Sample Form 01 11 00B at the end of this Section.

K. FULL TIME SUPERINTENDENT DISCLOSURE STATEMENT

1. Prior to or in conjunction with the Preconstruction Conference, the Contractor shall submit the disclosure statement which identifies the Full Time Superintendent for this Project. The form for this statement, Form 01 11 00C, is provided at the end of this Section.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - SCHEDULE OF PRODUCTS ORDERED IN ADVANCE

PART 5 - ASBESTOS FORMS, [FULL TIME SUPERINTENDENT DISCLOSURE STATEMENT]

Updated 1/4/18

Form 01 11 00A

ASBESTOS-CONTAINING MATERIALS NOTIFICATION STATEMENT FOR CONTRACTORS

This form must be completed and signed by the Contractor prior to beginning work in any Eugene School District 4J building.

The presence of known and assumed asbestos containing materials is documented in the AHERA Management Plan for each building. Copies of the AHERA Management Plan are available in the main office of each building and in the Facilities Management Office at 715 West Fourth Avenue, Eugene, Oregon. The District Asbestos Specialist must be informed of the Contractor's activities in each building prior to the start of work so that the Contractor can be informed on how to use the AHERA Management Plan and to determine if any asbestos-containing materials are likely to be impacted by the work of the Contractor.

The Contractor is responsible for notifying all employees and subcontractors of the presence of asbestos in the building. The Contractor shall not disturb known or assumed asbestos-containing materials. If the Contractor discovers suspected asbestos-containing materials that have not been identified, the Contractor must stop any work impacting the suspected materials and notify the District Asbestos Specialist so that the material can be sampled. Any asbestos-containing materials that must be removed to allow the Contractor to complete the Contractor's work will be removed by the District under separate contract. If the Contractor disturbs asbestos-containing materials, the Contractor will be responsible for the cost of the cleanup and decontamination.

I _____, Representing _____,
(Print Name of Representative) (Business Name)

have been notified of the location of the AHERA Management Plan and agree to avoid impacting all known or assumed asbestos-containing materials in the performance of the Work.

_____ _____
Signature of Representative Date

_____ _____
Work Site CIP #

Form 01 11 00B

The Environmental Protection Agency (AHERA) rules require the School District obtain a signed statement from the Site Superintendent that, to the best of his/her knowledge, no asbestos-containing building materials were installed during the Work. Therefore, the following statement must be submitted on the Contractors letterhead prior to Project Closeout.

SAMPLE FORM
(To be submitted on the Contractor's letterhead)

ASBESTOS-CONTAINING MATERIALS STATEMENT

EUGENE SCHOOL DISTRICT 4J

_____
(Name of Project and CIP Number)

We the undersigned, (Name of Company), hereby warrant that to the best of our knowledge all materials furnished for the above referenced project contain 0% asbestos.

_____
(Name of Construction Company)

_____
(Signature and Date)

_____
Printed Name

_____
Job Title

END OF SECTION 01 11 00

Form 01 11 00 C

FULL TIME SUPERINTENDENT DISCLOSURE STATEMENT

Prior to or in conjunction with the Preconstruction Conference, the Contractor shall submit this disclosure statement which identifies the Full Time Superintendent for this Project.

Project Title: Kelly Middle School Modular Classrooms
Eugene School District 4J
Eugene, Oregon
CIP No. 461.524.003

CONTRACTOR INFORMATION

Company Name: _____

Company Address: _____

City, State, Zip: _____

List below the name, address, telephone, cellular phone FAX numbers and e-mail address (if available) for the full time Superintendent for this Project:

Superintendent's Name: _____

Address: _____
(if different from Contractor's)

_____

Phone: _____ Fax: _____
Cell: _____ e-mail: _____

The undersigned acknowledges that this project requires and will provide a full-time superintendent throughout this project.

Signature: _____
Authorized Signature

Printed Name: _____

Title: _____

Signature Notarized by:

Subscribed and sworn before me this _____ day of _____, 20__.

Notary Public: _____
Signature

My commission expires: _____

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections include the following:

1. Division 0 Document 00 52 13 “Form of Agreement” for monetary values of established Unit Prices and Alternates.
2. Division 0 Document 00 72 13 “General Conditions” for additional requirements for Changes in the Work, Contract Sum, and Contract Time.
3. Division 1 Section 00 73 00 “Supplementary Conditions” for allowable percentages for Contractors’ Overhead and Profit.
4. Division 1 Section 01 33 00 “Submittal Procedures” for Schedule of Values requirements.
5. Division 1 Section 01 60 00 "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.
6. Division 1 Section 01 78 39 “Project Record Documents” documentation requirements.

1.3 MINOR CHANGES IN THE WORK

A. Architect, with the concurrence of the Owner, will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.4 CHANGE REQUEST/PROCEED ORDER (CONSTRUCTION CHANGE DIRECTIVE)

A. Architect or Owner may issue a Change Request/Proceed Order on form included at end of Part 3.

1. Change Request contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
2. Proceed Order, when signed by the Owner, instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Proceed Order.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

C. Authorization Required: When a Change Request is approved and signed by the Owner, it becomes a Proceed Order authorizing the change requested. Do not proceed with any change without the Owner’s signature on the Change Request/Proceed Order.

D. Owner-Initiated Change Requests: Architect will issue a Change Request, which will include a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Change Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Change Request after receipt of Change Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a complete cost breakdown including a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor, supervision, overhead, and profit directly attributable to the change.
    d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

E. Contractor-Initiated Requests: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to the Architect.

1. Changes requested by the Contractor will be authorized only by signature of the Owner on the prescribed. Do not proceed with any changes without this authorization.
2. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
3. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
4. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
5. Include costs of labor, supervision, overhead, and profit directly attributable to the change.
6. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
7. Comply with requirements in Division 1 Section 01 60 00 "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

F. Change Request Form: Use forms provided by Owner. Sample copies are included at end of Section 3.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Change Request, and at intervals to be determined, Architect will collect Change Requests and issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

CHANGE REQUEST/PROCEED ORDER
Capital Improvement Program
Eugene School District 4J

……

CHANGE REQUEST NOTICE

Change Request No.: _____

Project No.:_____ Contract No.:_____ Date:_____

Project Title:_____

Contractor:_____

1. **REQUEST INFORMATION**

   Estimated $_____Time_____ Days_____ Initiated by _____

   Reason for change:

_____

_____

2. **DESCRIPTION**

   Describe changes:

_____

_____

   Describe affected work:

_____

   List plan and spec sections:

_____

   Describe impacted activities:

_____

   Comment:

_____

3. **DATES**

   Need for change first known _____ By whom _____

   Contractor first notified _____ How _____

   Owner first notified _____

   Date approved or rejected _____ By whom _____

4. **RECOMMENDATION (cost and time)** _____

……

PROCEED ORDER

PROCEED ORDER NO.: _____ Date: _____

1. **PAYMENT/COST**

Actual amount of change $_____ The contract time will be:

Contractor amount $_____ ( ) increased ( ) decreased by _____ days

Subcontractor amount $_____ ( ) will remain unchanged

Type of payment (LS/T&M) _____

2. **MISCELLANEOUS**

Subcontractors involved:

_____

Major materials:

_____

The cost is not to exceed $_____ Date: _____

3. **CHANGE REQUEST ACCEPTED BY:**

Contractor: _____ Date: _____

Architect: _____ Date: _____

4J CIP Project Manager: _____ Date: _____

4J CIP Program Manager: _____ Date: _____

4J Facilities Director: _____ Date: _____

Without the signature of Facilities Director, or the acting Director, this Proceed Order is neither accepted or authorized, except by written authorization of other specific delegation.

END OF SECTION 01 25 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections include the following:

1. Division 1 Section 01 25 00 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

2. Division 1 Section 01 32 00 "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

3. Division 1 Section 01 77 00 “Closeout Procedures” for final Application for Payment.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with Continuation Sheets.

b. Submittals Schedule.

c. Contractor's Construction Schedule.

2. Submit the Schedule of Values to Architect and Owner at earliest possible date but no later than seven days before the date scheduled for submittal of initial Application for Payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values:

a. Project name and location.

b. Name of Architect.

c. Architect's project number.

d. Contractor's name and address.

e. Date of submittal.

2. Submit draft of AIA Document G703 Continuation Sheets.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

    a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.

6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

7. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

10. Submit separate Schedule of Values for each School or otherwise identify Work at each School separately.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.

C. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

    1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.

    2. Include amounts of Change Orders issued before last day of construction period covered by application.

    3. Transmittal: Submit 2 signed and notarized original copy of each Application for Payment to Architect by a method ensuring receipt within 24 hours.

D. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

    1. List of subcontractors.

    2. Schedule of Values (draft submitted previously).

    3. Contractor's Construction Schedule (preliminary if not final).

4. Products list.
5. Schedule of unit prices.
6. Submittals Schedule (based Architect's list or required submittals).
7. List of Contractor's staff assignments.
8. Initial progress report.
9. Report of preconstruction conference.

E. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

F. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout procedures (See itemized list in Section 01 77 00 "Closeout Procedures").
2. Updated final statement, accounting for final changes to the Contract Sum.
3. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
4. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
5. AIA Document G707, "Consent of Surety to Final Payment."
6. Evidence that claims have been settled.
7. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. Administrative and supervisory personnel.
   2. Project meetings.

B. Related Sections include the following:
   1. Division 1 Section 01 32 00 "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
   2. Division 1 Section 01 73 00 "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
   3. Division 1 Section 01 77 00 "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, which depend on each other for proper installation, connection, and operation.

   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.
   4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

   1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

   1. Preparation of Contractor's Construction Schedule.
   2. Preparation of the Schedule of Values.
   3. Installation and removal of temporary facilities and controls.

4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.4 SUBMITTALS

A. Key Personnel Names: Within 15 days of Notice-to-Proceed, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including pager, cell, and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1.5 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Schedule meeting dates and times with Owner and Architect.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Architect will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, within three days of receiving them from the Architect.

B. Preconstruction Conference: Owner’s Project Manager will schedule a preconstruction conference before starting construction, no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Owner’s Project Manager, Architect, and their consultants, as required; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following (see sample agenda at the end of Part 3):

a. Introduction of persons present.
b. Tentative construction schedule.
c. Phasing.
d. Critical work sequencing and long-lead items.
e. Designation of key personnel and their duties.
f. Procedures for processing field decisions and Change Orders.
g. Procedures for requests for interpretations (RFIs).
h. Procedures for testing and inspecting.
i. Procedures for processing Applications for Payment.

j. Distribution of the Contract Documents.
k. Communications.
l. Role of District's Project Manager.
m. Submittal procedures, including MSDS information.
n. Energy design requirements.
o. Preparation of Record Documents.
p. Use of the premises and existing building.
q. Work hours and restrictions.
r. Owner's occupancy requirements.
s. Responsibility for temporary facilities and controls.
t. Construction waste management and recycling.
u. Parking availability.
v. Office, work, and storage areas.
w. Equipment deliveries and priorities.
x. Safety and first aid.
y. Security.
z. Progress cleaning.

3. Minutes: Architect will record and distribute meeting minutes.
4. Statements made by the Contracting Agency's representative at the pre-construction conference are not binding upon the Contracting Agency unless confirmed by Written Addendum.

C. Preinstallation Conferences: When required by individual specification sections, conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Owner's Project Manager a minimum of four days prior to scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract documents.
b. Related requests for interpretations (RFIs).
c. Related Change Orders.
d. Purchases.
e. Deliveries.
f. Submittals.
g. Possible conflicts.
h. Compatibility problems.
i. Time schedules.
j. Weather limitations.
k. Manufacturer's written recommendations.
l. Warranty requirements.
m. Compatibility of materials.
n. Acceptability of substrates.
o. Space and access limitations.
p. Regulations of authorities having jurisdiction.
q. Testing and inspecting requirements.
r. Installation procedures.
s. Coordination with other work.
t. Required performance results.

u. Protection of adjacent work.

3. Contractor to record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Distribute minutes of the meeting to each party present and to parties who should have been present, within three working days.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at weekly intervals. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to the Owner's Project Manager and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Provide in a format no larger than 11x17" and discuss a 3 week look-ahead schedule. The look-ahead schedule is required to be directly from the Project Master Schedule and to only show 3 weeks of work. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Work hours.
10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Status of correction of deficient items.
14) Field observations.
15) Requests for interpretations (RFIs).
16) Status of proposal requests.
17) Pending changes.
18) Status of Change Orders.
19) Pending claims and disputes.
20) Documentation of information for payment requests.

3. Minutes: Architect will record and distribute to Contractor the meeting minutes.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

PRECONSTRUCTION CONFERENCE AGENDA (SAMPLE)

Eugene School District 4J
[Enter Project Name]

[Date]

AGENDA

1. ( ) Introduction of Persons Present
   - ( ) District 4J
   - ( ) Consultants
   - ( ) Contractor (including job foreman)
   - ( ) Subcontractors

2. ( ) Availability of Contract Documents

3. ( ) Building Permit Status
   - ( ) Plan check and Building Permit paid by District
   - ( ) Pick up Permit at City of Eugene by Contractor
   - ( ) Location of site stored approved contract documents
   - ( ) Utility permits
   - ( ) LRAPA Permit

4. ( ) Prevailing Wage Requirements
   - ( ) Submittal schedule
   - ( ) Conformance with requirements

5. ( ) Communications
   - ( ) Notification of problems

6. ( ) Role of District's representative
   - ( ) Limits of authority
   - ( ) Visitation schedules

7. ( ) Work Description and Schedule
   - ( ) General work description
   - ( ) Proposed start date: _____
   - ( ) Proposed completion date: _____
   - ( ) Proposed project schedule and phasing
   - ( ) Progress schedule updates
   - ( ) Methods to be employed to maintain schedule
   - ( ) Work requiring Shop Drawings or submittals shall not commence until review is complete.

8. ( ) Submittals Required per Contract Documents
   - ( ) MSDS Information
   - ( ) Written proof of Asbestos Worker Certification
   - ( ) Name, Experience and Qualifications of Asbestos Supervisor
   - ( ) Copy of Contractor's Asbestos Abatement License
   - ( ) Other information as required by Section 01 31 00.
   - ( ) Schedule of values
   - ( ) List of subcontractors including name of contact person, telephone number, and address

9. ( ) Construction
    - ( ) Working hours
    - ( ) Use of premises/set up locations
    - ( ) Protection of existing facilities
    - ( ) Traffic and protection
    - ( ) Excavation and clean-up
    - ( ) Weather restrictions
    - ( ) Deviation from details and/or specifications

10. ( ) Correction of Defects
    - ( ) Daily and/or as observed

11. ( ) Weekly On-Site Progress Meetings
    - ( ) Establish day and time: Day _____Time _____
    - ( ) Provide updated project schedules
    - ( ) Discuss project progress, problems, etc.
    - ( ) Review applications for payment
    - ( ) Required attendance
    - ( ) Observation report distribution

12. ( ) Change Order Requests and Change Order Procedures
    - ( ) Written Change Order requests required
    - ( ) Supporting back-up will be required for all Change Orders
    - ( ) Mark-up limitations on Change Orders
        - ( ) Contractor - 15 percent
        - ( ) Subcontractors - 10 percent
    - ( ) Progressive requests and Change Orders
    - ( ) Processing time required

13. ( ) Applications for Payment
    - ( ) Use AIA documents G702 and G703 latest edition
    - ( ) Owner accepts electronic copy; plus provide one hard copy original signed and notarized.
    - ( ) Wage certifications to be attached

14. ( ) Safety and Emergency Procedures

15. ( ) Clean-up Daily
    - ( ) Project completion

16. ( ) Project Closeout
    - ( ) Inspections for
        - ( ) Air Clearance
        - ( ) AHERA Close Out Requirements
        - ( ) Substantial completion
            - ( ) Contractor provided list of items to be completed
            - ( ) Inspection with job foreman
        - ( ) Final Acceptance
            - ( ) Written notice from Contractor that all work is done and ready for inspection
            - ( ) Inspection with job foreman
        - ( ) Responsibility for cost of additional inspections
        - ( ) Submittals for Closeout
            - ( ) Final application for payment

( ) Final set of wage certifications
( ) Release of liens from all Subcontractors and General Contractor

17. ( ) Tour of Project Sites to Examine and Document Existing Conditions

18. ( ) Additional Comments

The undersigned acknowledges that the items listed above were discussed during this preconstruction conference and are fully understood.

Date:

A/E Firm:

Contractor:

Subcontractors:

END OF SECTION 01 31 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Preliminary Construction Schedule.
2. Contractor's Construction Schedule.
3. Submittals Schedule.

B. Related Sections include the following:

1. Division 1 Section 01 29 00 "Payment Procedures" for submitting the Schedule of Values.
2. Division 1 Section 01 31 00 "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
3. Division 1 Section 01 33 00 "Submittal Procedures" for submitting schedules and reports.
4. Division 1 Section 01 40 00 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 SUBMITTALS

A. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format.

1. Scheduled date for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational).
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Architect's final release or approval.

B. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.

1.4 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
2. Initial Submittal: List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.

B. Activities: Treat each floor or separate area as a separately numbered activity for each principal element of the Work

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

D. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 1 Section 01 11 00 "Summary of Work." Delivery dates indicated stipulate the earliest possible delivery date.

E. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 1 Section 01 11 00 "Summary of Work." Delivery dates indicated stipulate the earliest possible delivery date.

F. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion**.**

G. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart Contractor’s Construction Schedule within 10 days of date established for the Notice to Proceed. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project. This schedule will be considered the Baseline Project Master Schedule for use throughout the project.

B. Preparation:

1. Each task to include the following minimum, data field/columns information:

a. line/task ID or unique number, task name/description, task duration, start date, finish date, predecessor, successor, % complete.
b. additional data field/columns may be included upon approval of Owner's Project Manager.

2. All tasks and milestones are to have a text description next to the Gantt bar and are required to show the logic bar ties to predecessor and successor tasks.
3. Any task with a duration longer than 10 working days and more than one trade working on the task, needs to be separated into tasks by individual trades.
4. Split the schedule up, at a minimum, by floor and sector, unless approved by Owner's Project Manager. Further separation of the schedule for sequencing needs the parent/blanket task description to indicate gridlines and level(s) included. No parent/blanket tasks for multiple levels or sectors unless they have no impact to the critical patch and the task description indicates the extent of work included.
5. Show any materials, equipment, contractors and submittals that have the potential to delay construction activities and indicate what work they have potential to impact by logic ties (predecessor and successor relationships).
6. Schedule is to be based on working days with the allotted hours necessary. If overtime is necessary to complete a task then it must be indicated.
7. Schedule must identify which items are on the critical path.
8. Hard copies for distribution are to be no larger than 11x17 format.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: The schedule produced in section 2.3 is to be used for updating the Project Master Gantt schedule throughout the entire project. At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
   1. The baseline is to be indicated for all tasks tied to the critical path. Any tasks that subsequently become part of the critical path need to indicate the baseline activities also. Any change in critical path needs to be identified and discussed during the weekly project meeting.
   2. Update each task to indicate the actual completion percentage at the time of schedule update, in 5% increments.
   3. Hard copies are to be no larger than 11x17 format.
   4. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
   5. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.

B. Distribution: Distribute copies of approved schedule to Architect, Owner's Project Manager, testing and inspection agencies and other parties identified by the Contractor and owner with a need-to-know schedule responsibility.
   1. Post copies in Project meeting room at the temporary field offices in a large enough format to be able to read the text and see the entire schedule without flipping sheets.

END OF SECTION 01 32 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, Information Submittals, Delegated Design and other submittals.

B. Related Sections include the following:

1. Division 1 Section 01 29 00 "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
2. Division 1 Section 01 31 00 "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
3. Division 1 Section 01 32 00 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
4. Division 1 Section 01 40 00 "Quality Requirements" for submitting test and inspection reports and for mockup requirements, if any.
5. Division 1 Section 01 77 00 "Closeout Procedures" for submitting warranties.
6. Division 1 Section 01 78 23 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
7. Division 1 Section 01 78 39 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
8. Divisions 2 through 49 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's responsive action.

B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

B. Submittals Schedule: Comply with requirements in Division 1 Section 01 32 00 "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time

will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 14 calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.

D. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.

E. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

F. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, if received from sources other than Contractor without prior consent.

1. Transmittal Form: Provide locations on form for the following information:

a. Project name.
b. Date.
c. Destination (To:).
d. Source (From:).
e. Names of subcontractor, manufacturer, and supplier.
f. Category and type of submittal.
g. Submittal purpose and description.
h. Specification Section number and title.
i. Drawing number and detail references, as appropriate.
j. Submittal and transmittal distribution record.
k. Remarks.
l. Signature of transmitter.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked “Reviewed without Exceptions."

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Use only final submittals with mark indicating “Reviewed without Exceptions” taken by Architect.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Standard color charts.
e. Manufacturer's catalog cuts.
f. Wiring diagrams showing factory-installed wiring.
g. Printed performance curves.
h. Operational range diagrams.
i. Compliance with specified referenced standards.
j. Testing by recognized testing agency.
k. Application of testing agency labels and seals.
l. Notation of coordination requirements.
m. MSDS information, where applicable.

4. Submit Product Data before or concurrent with Samples.
5. Number of Copies: Submit the number required by the Contractor plus four (4) copies of Product Data, unless otherwise indicated. Architect will return two copies to Contractor and one to Owner. Mark up and retain one returned copy as a Project Record Document.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Dimensions.
b. Identification of products.
c. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
d. Schedules.
e. Design calculations.
f. Compliance with specified standards.
g. Notation of coordination requirements.
h. Notation of dimensions established by field measurement.
i. Relationship to adjoining construction clearly indicated.
j. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.

3. Number of Copies: Submit four opaque copies of each submittal, unless copies are required for operation and maintenance manuals. Submit five copies where copies are required for operation and maintenance manuals. Architect will retain two **c**opies, including one for the Owner's Project Manager; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

    a. Generic description of Sample.
    b. Product name and name of manufacturer.
    c. Sample source.
    d. Number and title of appropriate Specification Section.
3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

    c. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies.
2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section 01 40 00 "Quality Requirements."

B. Coordination Drawings: Comply with requirements specified in Division 1 Section 01 31 00 "Project Management and Coordination."

C. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section 01 32 00 "Construction Progress Documentation."

D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

J. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

K. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

L. Schedule of Tests and Inspections: Comply with requirements specified in Division 1 Section 01 40 00 "Quality Requirements."

M. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

N. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

O. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

P. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section 01 78 23 "Operation and Maintenance Data."

Q. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

R. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.

S. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

T. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.

2.3 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. Reviewed without Exceptions.
2. Reviewed, with Exceptions Noted.
3. Revise and Resubmit.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01 33 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections include the following:

1. Division 1 Section 01 32 00 "Construction Progress Documentation" for developing a schedule of required tests and inspections.
2. Divisions 2 through 49 Sections for specific test and inspection requirements.

1.3 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.

3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.5 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made by Owner.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor**,** and the Contract Sum will be adjusted by Change Order.

B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 1 Section 01 33 00 "Submittal Procedures."

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.6 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of the Owner.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Sections include the following:

1. Division 1 Section 01 11 00 "Summary of Work" for limitations on utility interruptions and other work restrictions.
2. Division 1 Section 01 33 00 "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
3. Division 1 Section 01 73 00 "Execution Requirements" for progress cleaning requirements.
4. Divisions 2 through 49 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

1.5 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.6 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.7 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.76-mm-) thick, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts**,** with 1-5/8-inch- (42-mm-) OD top rails.

B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide concrete bases for supporting posts.

C. Lumber and Plywood: Comply with requirements in Division 6

D. Gypsum Board: Minimum 1/2 inch (12.7 mm) thick by 48 inches (1219 mm) wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-6 (1.2-m-) square tack board.
3. Drinking water and private toilet.
4. Coffee machine and supplies.
5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
6. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

D. Do not store materials within ten (10) feet of exterior walls, awnings, or other building overhangs.

E. Secure staging area with portable chain-link fencing.

F. Secure playground area with portable chain-link fencing prior to equipment installation by others.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Heating: Provide temporary heating 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.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

G. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.

H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Connect temporary service to Owner's existing power source, as directed by Owner.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Install lighting for Project identification sign.

J. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install two telephone line(s) for each field office.

1. At each telephone, post a list of important telephone numbers.

a. Police and fire departments.
b. Ambulance service.
c. Contractor's home office.
d. Architect's office.
e. Engineers' offices.
f. Owner's office.
g. Principal subcontractors' field and home offices.

2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines. Comply with NFPA 241.
2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas **as** indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Arrange for temporary parking areas for construction personnel.

E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

F. Project Identification and Temporary Signs: Provide Project identification and other signs as indicated on Drawings. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.

1. Provide temporary, directional signs for construction personnel and visitors.
2. Maintain and touchup signs so they are legible at all times.

G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 1 Section 01 77 00 "Execution Requirements" for progress cleaning requirements.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Division 1 Section 01 11 00 "Summary of Work."

B. Temporary Erosion and Sedimentation Control: Comply with requirements specified in Division 2 Section "Site Clearing", and requirements of authority having jurisdiction.

C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

E. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.

F. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

I. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
2. Insulate partitions to provide noise protection to occupied areas.
3. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
4. Protect air-handling equipment.
5. Weather strip openings.
6. Provide walk-off mats at each entrance through temporary partition.

J. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

END OF SECTION 01 50 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

B. Related Sections include the following:
1. Division 1 Section 01 77 00 "Closeout Procedures" for submitting warranties for Contract closeout.
2. Divisions 2 through 49 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.4 SUBMITTALS

A. Substitution Requests: Instructions to Bidders specify time restrictions for submitting requests for Substitutions during the bidding period, in compliance with this Section.

B. After execution of Agreement, the Owner may, at the Owner’s option, consider formal requests from the Contractor for substitution of products for those specified. One or more of the following conditions must be documented:
1. Compliance with final interpretation of code requirements or insurance regulations which require that the use of a substituted Product.
2. Unavailability of a specified Product through no fault of the Contractor.
3. Inability of specified Product to perform properly of fit in designated place.
4. Manufacturer’s or Fabricator’s refusal or inability of certify or guarantee performance of a specified Product in the application intended.

C. A Substitution Request constitutes a representation that the Bidder/Contractor:

1. Has investigated the proposed Product and determined that it meets or exceeds the quality level of the specified Product.

2. Will provide the same warranty for the Substituted Product as for the specified Product.
3. Will coordinate installation and make changes to the Work which may be required for the Work to be completed with no additional cost to the Owner.
4. Waives claims for additional costs or time extension which may subsequently become apparent.
5. Will reimburse the Owner for review or redesign services associated with re-approval by authorities.

D. Substitutions will not be considered when they are indicated or implied on Shop Drawings or Product Data Submittals, without separate request on the form provided, or when acceptance will require revision to the Contract Documents.

E. Submit three copies of each request for consideration. Limit each request to one proposed Substitution. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use form provided at end of Section.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

    a. Statement indicating why specified material or product cannot be provided.
    b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
    c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
    d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    e. Provide MSDS information to confirm that the product is no more harmful that he products specified.
    f. Samples, where applicable or requested.
    g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
    h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    i. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
    j. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
    k. Cost information, including a proposal of change, if any, in the Contract Sum.
    l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
    m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Form of Acceptance: Change Order.
b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.
9. Provide bonded and insured off-site storage and protection when site does not permit on-site storage and protection.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Submittal Time: Comply with requirements in Division 1 Section 01 77 00 "Closeout Procedures."

PART 2 - PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

SUBSTITUTION REQUEST FORM

TO: GMA Architects
860 W. Park St Suite 300
Eugene, OR 97401

DEADLINE: July 21st, 2021

PROJECT: Kelly Middle School Modular Classrooms
CIP # 201-912-P0003
Eugene School District 4J

SPECIFIED ITEM: _____ _____ _____
Section No. Paragraph Description

The Undersigned requests consideration of the following substitution:

_____

The Undersigned states that the following paragraphs are true, except where noted otherwise:

1. The function, appearance and quality of the proposed substitution are equivalent or superior to the specified item;
2. The proposed substitution does not affect dimensions shown on the Drawings;
3. The Undersigned will pay for changes to the building design, including engineering and design services, detailing and construction costs caused by the requested substitution;
4. The proposed substitution will have no adverse effect on other trades, the construction schedule, or specified warranty requirements;
5. Maintenance and service parts will be locally available for the proposed substitution;
6. The Undersigned has attached data concerning the proposed substitution, including: Manufacturers product description, specifications, drawings, photographs, performance and test data, adequate for evaluation of the request, with applicable portions of the data clearly indicated. Attachments also include description of changes to Contract Documents which the proposed substitution will require for its proper installation.

Submitted by: _____ Signature: _____ Firm: _____ Address: _____ Date: _____ Tel: _____ Fax: _____ Attachments: _____	For use by Architect: ☐ Approved ☐ Approved as noted. ☐ Not Approved ☐ Received too late By: _____ Date: _____ For use by 4J Project Manager: ☐ Approved ☐ Approved as noted. ☐ Not Approved ☐ Received too late By: _____ Date: _____

END OF SECTION 01 60 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. General installation of products.
4. Coordination of Owner-installed products.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.
8. Correction of the Work.

B. Related Sections include the following:

1. Division 1 Section 01 31 00 "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
2. Division 1 Section 01 33 00 "Submittal Procedures" for submitting surveys.
3. Division 1 Section 01 77 00 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 SUBMITTALS

A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

B. Final Property Survey: Submit 2 copies showing the Work performed and record survey data.

1.4 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

a. Description of the Work.
b. List of detrimental conditions, including substrates.
c. List of unacceptable installation tolerances.
d. Recommended corrections.

2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. PROCEEDING WITH THE WORK INDICATES ACCEPTANCE OF SURFACES AND CONDITIONS.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other

construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Owner's Project Manager promptly.
   1. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

C. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect and Owner's Project Manager.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

   1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
   2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
   3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
4. Maintain minimum headroom clearance of seven feet in spaces without a suspended ceiling.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated. Bring any conflicts to the Architect for review.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints where possible. Obtain Architect and Owner’s Project Manager approval for all questionable conditions.

H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction forces.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction forces at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to applicable regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for safety and proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section 01 40 00 "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. Related Sections include the following:

1. Division 1 Section 01 31 00 – “Project Management and Coordination” for pre- construction and pre-installation conferences.
2. Division 2 Section "Demolition" for demolition of selected portions of the building.
3. Divisions 2 through 49 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

A. Cutting and Patching Proposal: Submit a written request describing procedures prior to the time cutting and patching will be performed, requesting approval to proceed, for cutting or alteration which affects:
1. Structural integrity of any element of Project.
2. Integrity of weather-exposed or moisture-resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of site-exposed elements.
5. Work of Owner or separate contractor.

B. Include the following information:
1. Identification of Project and CIP number
2. Location and description of the affected Work.
3. Necessity for cutting or alteration.
4. Description of proposed Work and Products to be used.
5. Alternatives to cutting and patching.
6. Effect on work of Owner or separate contractor.
7. Written permission of affected separate contractor, if any.
8. date and time work will be executed.

1.5 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

1. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
2. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety**.**

B. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01 73 29

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Warranties.
3. Final cleaning.

B. Related Sections include the following:

1. Division 1 Section 01 29 00 "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
2. Division 1 Section 01 73 00 "Execution Requirements" for progress cleaning of Project site.
3. Division 1 Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.
4. Division 1 Section 01 78 39 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
5. Divisions 2 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.

14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect and Owner's Project Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit the following completed forms, items and documents:
    a. AIA Document G706 Contractor's Affidavit of Payment of Debts and Claims.
    b. AIA Document G706A Contractor's Affidavit of Release of Liens.
    c. AIA Document G707 Consent of Surety Company to Final Payment.
    d. Operation and Maintenance Manuals
    e. Warranties and Bonds. Submit original documents, including Contractor's General Warranty,
    f. Record Documents.
    g. Keys.
    h. Testing and Start-Up records.
    i. Affidavit of Prevailing Wages paid.
    j. Complete list of Contractor and all Subcontractors with address, phone numbers, and work
    k. Asbestos-Containing Materials Statement (Form 01100B).
    l. Proof of final acceptance and compliance from governing authorities having jurisdiction.
    m. Certificate of insurance evidencing continuation of liability coverage including coverage for completed operations until the expiration of the specified warranty periods.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect and Owner's Project Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

2. Cost of additional re-inspections by Architect and Owner's Project manager will be deducted from Final Payment to the Contractor.

1.5 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Partial Occupancy: Submit properly executed warranties within 10 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark 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 Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.

f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

h. Sweep concrete floors broom clean in unoccupied spaces.

i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.

j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

k. Remove labels that are not permanent.

l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

    1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

n. Replace parts subject to unusual operating conditions.

o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

q. Clean ducts, blowers, and coils if units were operated without filters during construction.

r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

s. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 77 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Maintenance manuals for the care and maintenance of products, material, finishes, systems, and equipment.

B. Related Sections include the following:

1. Division 1 Section 01 33 00 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Division 1 Section 01 77 00 "Closeout Procedures" for submitting operation and maintenance manuals.
3. Division 1 Section 01 78 39 "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
4. Divisions 2 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

A. Initial Submittal: Submit 2 draft copies of each manual at least 15 working days before requesting inspection for Final Completion. Include a complete operation and maintenance directory. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.

B. Final Submittal: Submit one copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
1. Correct or modify each manual to comply with Architect's comments. Submit 2 hard copies and one electronic copy of each corrected manual within 15 days of receipt of Architect's comments.

1.5 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. List of all subcontractors and material suppliers, including names, addresses and phone numbers.
5. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name, address, and telephone number of Contractor.
6. Name and address of Architect.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

    a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include a Table of Contents for each volume with a list of products and major components of equipment included in the section on the face of each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 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.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.
6. Contact information.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard printed maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training videotape, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
3. Electronic Copy: Provide a single PDF file with bookmarks matching tabbed sections in Binders.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

1. Do not use original Project Record Documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared Record Drawings in Division 1 Section 01 78 39 "Project Record Documents."

G. Comply with Division 1 Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Sections include the following:
1. Division 1 Section 01 77 00 "Closeout Procedures" for general closeout procedures.
2. Division 1 Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Divisions 2 through 49 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit copies of Record Drawings as follows:
   a. Final Submittal: Submit one set of marked-up Record Prints (not “Job Shack” set).

B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one copy of each Product Data submittal.

1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
   b. Accurately record information in an understandable drawing technique.

c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations below first floor.
d. Locations and depths of underground utilities.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Duct size and routing.
i. Locations of concealed internal utilities.
j. Changes made by Change Order.
k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Record Transparencies: Organize into unbound sets matching Record Prints. Place transparencies in durable tube-type drawing containers with end caps. Mark end cap of each container with identification. If container does not include a complete set, identify Drawings included.
3. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect and Owner’s Project Manager.
e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's and Owner’s Project Manager’s reference during normal working hours.

END OF SECTION 01 78 39

PART 1 – GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Cutting and Patching

B. Temporary Facilities and Controls

1.2 EXTENT OF WORK

A. Perform demolition required for completion of new work as shown on drawings or specified. Remove existing construction at areas shown for new work. Remove loose material caused by or remaining from demolition work.

1.3 ALTERATIONS TO EXISTING CONSTRUCTION

A. Remove portions of existing work only as required to install new materials as specified and as shown on drawings. Repair or replace those portions of existing work outside of new work damaged as result of new work. Repairs or replacement work shall reinstate damaged areas to match original conditions.

1.4 REQUIREMENTS OF REGULATORY AGENCIES

A. Coordinate work with Utility companies, Municipal and State agencies as required.

B. Comply with applicable jurisdictional standards, including but not limited to:

1. Occupational Safety and Health Administration (OSHA)
2. Oregon Occupational and Health Administration (OR-OSHA)
3. National Emission Standards for Hazardous Air Pollutants (NESHAPS)
4. National Institute for Occupational Safety and Health (NIOSH)
5. Department of Environmental Quality (DEQ)
6. Lane Regional Air Pollution Authority (LRAPA)

C. Comply with Oregon Administrative Rules (OAR) Chapter 437, for hazardous material communication procedures. Post Material Data Safety Sheets (MSDS) on site in conspicuous location.

D. Dispose of materials contaminated with lead, asbestos, mercury and other heavy metals according to Federal, State and Local jurisdictional regulations.

1.5 CODES AND STANDARDS

A. Conform with applicable portions of National Electric Code, latest edition, and other applicable codes within the jurisdiction of the work.

1.6 PERMITS

A. Obtain and pay for necessary permits and inspections required by local and state authorities having jurisdiction. Make such tests as may be required by law.

1.7 ENVIRONMENTAL CONDITIONS

A. Conduct demolition to minimize interference with adjacent building areas.

B. Provide, erect and maintain temporary barriers and safety devices to ensure protection including ground protection to prevent soil contamination.

1.8 COORDINATION

A. Coordinate with other trades affecting or affected by Work of Section.

B. Coordinate demolition with Owner's Representative.

1.9 PROTECTION

A. Protect portions of existing building and facilities against damage and discoloration.

B. Protect active utilities and maintain in continuous operation.

C. Provide barriers as required to protect public from areas under demolition.

PART 2 – PRODUCTS

2.1 SALVAGE

A. All salvage except items specifically noted becomes property of Contractor. Salvage may be reused on Work if so specified or scheduled or if Architect judges it equal to new products specified, with the appropriate adjustment in contract sum. Remove material from site.

PART 3 – EXECUTION

3.1 REVIEW OF EXISTING CONDITIONS

A. Visit project site and review existing conditions affecting Work before submitting Bid Proposal.

3.2 PREPARATION

A. Erect and maintain temporary barriers to prevent spread of dust, fumes, noise, and smoke.

B. Protect existing items that are not indicated to be altered.

3.3 DEMOLITION

A. Demolish in orderly and careful manner.

B. Protect existing work to remain.

C. Except where noted otherwise, immediately remove demolished material from site.

D. Remove materials to be reinstalled or retained in manner to prevent damage.

E. Remove, store, and protect for reinstallation materials and equipment listed on the drawings accordingly.

F. Remove and promptly dispose of contaminated, vermin infested, or dangerous materials encountered.

G. Remove demolished materials from site as work progresses.

H. Do not burn or bury materials on site.

I. Leave areas of work in clean condition.

3.4 CLEANING AND REPAIRING

A. Do not allow debris to accumulate in building or on site - haul away from site as soon as removed and dispose of at Contractor's expense.

B. Clean, repair, touch up, or replace when directed, adjacent surfaces which have been soiled, discolored, or damaged by work of Section.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nonsag gunnable joint sealants.
2. Self-leveling pourable joint sealants.
3. Joint backings and accessories.

B. Related Requirements:

1. Section 07 84 00 - Firestopping: Firestopping sealants.
2. Section 08 71 00 - Door Hardware: Setting exterior door thresholds in sealant.
3. Section 08 80 00 - Glazing: Glazing sealants and accessories.
4. Section 09 21 16 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.
5. Section 09 22 16 - Non-Structural Metal Framing: Sealing between framing and adjacent construction in acoustical and sound-rated walls and ceilings.
6. Section 09 30 00 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

1.2 REFERENCE STANDARDS

A. Reference Standards: Current edition at date of Bid.

B. American Standards for Testing and Materials (ASTM) International:

1. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2015.
2. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012.
3. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2000 (Reapproved 2011).
4. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
5. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2013.

C. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.

D. SWRI (VAL) - SWR Institute Validated Products directory; Sealant, Waterproofing and Restoration Institute; online at http://www.swrionline.org/ValidatedSealants.

1.3 SUBMITTALS

A. See Section 01 30 00 for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.

1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
2. List of backing materials approved for use with the specific product.
3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.

4. Substrates the product should not be used on.
5. Substrates for which use of primer is required.
6. Substrates for which laboratory adhesion and/or compatibility testing is required.
7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
8. Sample product warranty.
9. Certification by manufacturer indicating that product complies with specification requirements.
10. SWRI Validation: Provide currently available sealant product validations as published by SWRI for specified sealants.

C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and approved by manufacturer.

1.5 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

B. Provide joints properly dimensioned to receive the approved sealant system. Provide joint surfaces that are clean, dry, sound and free of voids, deformations, protrusions and contaminants which may inhibit application or performance of the joint sealant. Where expansion joints having preformed joint fillers are scheduled to be sealed, provide a reservoir to accept the sealant such as by a molded breakaway joint cap or a removable block out.

1.6 WARRANTY

A. See Section 01 77 00 - Closeout Procedures, for additional warranty requirements.

B. Correct defective work within a five year period after the Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Joint Sealant:

1. Dow Corning:www.dowcorning.com.
2. GE Silicones: www.gesilicone.com.
3. Pecora Corporation: www.pecora.com.
4. Sika: www.sika.com
5. Sonneborn Division of Degussa: www/chemrex.com.
6. Tremco Sealant/Weatherproofing Division: www.tremcosealant.com.

7. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 JOINT SEALANT APPLICATIONS

A. Scope:

1. Exterior Joints: Seal open joints, whether or not the joint is indicated on the drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.

a. Wall expansion and control joints.

b. Joints between door, window, and other frames and adjacent construction.

c. Joints between different exposed materials.

d. Openings below ledge angles in masonry.

e. Other joints indicated below.

2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.

a. Joints between door, window, and other frames and adjacent construction.

b. Other joints indicated below.

3. Do not seal the following types of joints.

a. Intentional weepholes in masonry.

b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.

c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.

d. Joints where installation of sealant is specified in another section.

e. Joints between suspended panel ceilings/grid and walls.

2.3 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 61 16.

B. Colors: As selected by Architect from manufacturers standard colors.

2.4 EXTERIOR JOINT SEALANT - VERTICAL

A. Porous or Non-Porous Materials Adhered to Porous or Non-Porous Materials, Weatherproofing Sealant, Non-Paintable. Neutral curing.

1. Joint Movement Capabilities: 100 percent extension and 50 percent compression in accordance with ASTM C719 as specified in ASTM C920.

2. Single Component Silicone: ASTM C920, Type S, Grade NS, Class 100/50, Use NT, M, G, A, and O.

a. Dow Corning 790 Silicone Weatherproofing Sealant.

b. GE Silpruf SCS 2700.

c. Pecora 890.

d. Sika SikaSil-C995.

e. Tremco Spectrem 1.

2.5 INTERIOR JOINT SEALANTS

A. Exposed Joint Sealants - General Use:

1. Paintable Siliconized Acrylic Latex Joint Sealant: ASTM C834.

a. ChemLink TrimCaulk.

b. GE RCS20 Siliconized Acrylic Latex.

c. Pecora AC-20 + Silicone Acrylic Latex.

d. Sonneborn Sonolac, acrylic latex.

e. Tremco Tremflex 834.

2.6 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.

1. Open Cell: 40 to 50 percent larger in diameter than joint width.

2. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

F. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

2.7 COLORS AND FINISHES

A. Sealant colors shall be selected by the Architect from each manufacturer’s complete line of preformulated colors. The Architect may select a color for each different condition for the Project.

1. Joints Separating Materials of Same Color.

2. Joints Separating Materials of Different Color.

3. Joint Sealants between Glass and Non-Porous Materials.

4. Structural Sealant between Glass and Glass and between Glass and Metal.

5. Joint Sealants between Natural / Unfinished Metals.

6. Sanded Sealants at Masonry and Concrete Joints.

7. Colors of Joint Sealants to be painted.

B. Sanded Finish at Concrete and Masonry Joints: Apply sand of color, appearance, and texture matching mortar sand. Completely cover joint sealant.

1. Provide 5 feet length of mock-up for each type of texture finish for Architect approval. See Part 1 of this Section for mock-up requirements.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.2 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Remove lacquers and protective films from metal surfaces.

C. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

D. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

E. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

F. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

G. Take measures to prevent intrusion of dust, moisture, and other harmful substances into joints during installation.

H. Existing Joints: Remove existing debris and joint sealant, clean with solvent, and prime for new joint sealants as necessary to achieve permanent bonding of new joint sealant as instructed by manufacturer.

3.3 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.

1. Where not otherwise instructed, conform to following:

    a. Where more than 3/4 inch wide install backer to within 1/2 inch of surface.

    b. Where less than 1/2 inch wide install backer to within 1/4 inch of surface.

    c. Where less than 1/2 inch deep, apply bond breaker tape to bottom of joints to prevent adhesion of sealant to bottom of joint.

D. Install bond breaker backing tape where backer rod cannot be used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

G. Nonsag Sealants: Tool surface as detailed, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

H. Seal interior joints to make watertight and exterior joints to make watertight and weathertight. Refer to requirements of individual Sections. Include:

1. Exterior double weather seal consisting of pre-compressed foam sealant, backer rod and sealant around windows, doors, wall louvers, and other openings in walls.
2. Interior air/ moisture seal consisting of backer rod and sealant around windows, doors, wall louvers, and other openings in walls.
3. Around windows, relights, doors, wall louvers, and other openings in walls.
4. Joints between dissimilar materials.
5. Horizontal joints, including exterior paving joints over joint filler.
6. At joints in sheet metal, flashing, and trim.
7. At joints in concrete, precast concrete, and cast stone.
8. Expansion joints and control joints at masonry and concrete. Moving cracks and joints subject to movement, except where firestopping is required as specified Section 078400.

3.4 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

C. Repair destructive test location damage immediately after evaluation and recording of results.

3.5 CLEANING

A. Clean adjacent soiled surfaces.

3.6 PROTECTION

A. Protect sealants until cured.

3.7 POST-OCCUPANCY

A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at the low temperature in the thermal cycle. Report failures immediately and repair.

END OF SECTION

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Hardware for exterior chainlink fence.

1.2 REFERENCES

A. ADA - Americans with Disabilities Act, Accessibility Guidelines for Buildings and Facilities.

B. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.

C. UL 305 - Panic Hardware.

1.3 SUBMITTALS

A. Submit in digital (PDF) format to Architect following Contractor's review for coordination and compliance with Contract Documents under provisions of Section 01 30 00. Mark with approval stamp prior to submitting to Architect.

B. Product Data including manufacturer's names and identification of product. Include catalog cuts and/or technical data sheets, manufacturer's parts lists, templates, and other pertinent data as required to indicate compliance with specifications.

C. Shop Drawings: submit complete and detailed with respect to quantities, dimensions, specified performance, and design criteria, materials and similar data to enable Architect to review information as required.

1. Indicate locations and mounting heights of each type of hardware, including Owner-furnished items.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with the following requirements:

1. ADA - Accessibility Guidelines for Buildings and Facilities.

2. ANSI 117.1 2003 Accessible and Usable Buildings and Facilities.

3. NFPA 101, 80 and 252.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified with minimum three years documented experience.

B. Hardware Supplier: Company specializing in supplying commercial door hardware with three years documented experience.

C. Hardware Supplier Personnel: Employ an Architectural Hardware Consultant (AHC) to assist in the work of this section.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable code for requirements applicable to fire rated doors and frames.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

1.8 COORDINATION

A. Coordinate work under provisions of Section 01 30 00.

B. Coordinate work with owner's locksmith and electrician.

C. Coordinate work with other directly affected sections involving manufacture, fabrication, or installation.

1.9 MAINTENANCE MATERIALS

A. Provide special wrenches and tools applicable to each different or special hardware component.

B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

1.10 PREINSTALLATION CONFERENCE

A. Convene Preinstallation Conference with Owner's Locksmith, Owner's Project Manager, and Architect one week prior to work of this Section.

B. Preinstallation Conference shall coincide with pick-up of prepared hardware as indicated under Item 3.2, below.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Panic Devices: Von Duprin, Precision.

2.2 KEYING

A. Door Locks: Grand master keyed. Keyed to Owner's instructions.

B. Supply keys in the following quantities:

1. Two (2) construction keys.

2. Additional keys or quantities as requested by Owner.

C. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings.

B. Do not proceed with installation of work until unacceptable conditions are corrected.

C. Verify that electric power is available to power operated devices and of the correct characteristics.

3.2 PREPARATION

A. Deliver following hardware items to Owner for preparation and keying by Owner. Label each item by Opening Number as indicated on Door Schedule.

1. Closers

2. Panic Hardware

3. Lever Locksets

B. Provide Schedule indicating Opening Numbers, Function, and Hardware included with delivery to Owner.

3.3 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and recommendations for installing products in applications indicated. Bring any conflicts to Architect for review.

B. Adjust and reinforce attachment substrates as necessary for proper installation and operation.

C. Use templates provided by hardware item manufacturer.

D. Drill & Tap new hardware. Do not use self-drilling fasteners.

E. Mounting heights for hardware from finished floor to center line of hardware item:

1. Locksets: 40-5/16 inches.
2. Push/Pulls: 45 inches.
3. Dead Locks: 48 inches.
4. Exit Devices: 40-5/16 inches.

3.4 ADJUSTING AND CLEANING

A. Clean exposed finishes to a dirt-free condition, free of stains, films, and similar foreign substances.

B. Touch-up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored.

C. Adjust hardware for proper operation without binding.

3.5 PROTECTION AND CORRECTION WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching-up with matching materials, and properly adjusting equipment and hardware.

B. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

C. Protect finished Work during construction.

END OF SECTION

MANUFACTURERS
VD – VON DUPRIN

HARDWARE SET 01: PEDESTRIAN GATE

Qty	Description	Catalog Number	Finish	Mfr	Notes
1	RIM PANIC	LD/9852EO X 990EO WH – 299 STRIKE	626	VD	
1	ROLLER STRIKE	699	626	VD	
	*BALANCE OF HARDWARE BY CHAINLINK SUPPLIER				

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
B. Bicycle Racks and Bicycle Storage

1.2 REFERENCES

A. ASTM A36 – Carbon Structural Steel.
B. AAMA 2603 – Pigmented Organic Coatings on Aluminum Extrusions and Panels.

1.3 SUBMITTALS

A. Manufacturer's Product Data.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect racks and accessories during delivery, storage, and handling to comply with manufacturer's instructions and prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. American Bicycle Security Company, P.O. Box 7359, Ventura, CA 93006.
(800) 245-3723 FAX: (805) 933-1865, or equal

2.2 HOOP STYLE BICYCLE RACK:

A. General - Provide steel inverted U hoops, free from pitting stains and discoloration. Basis of design: American Bicycle Security Company – Hoop Rack.
B. Pipe - Schedule 40, 1.9 inch outside diameter by 24 inches width by 35 inches height
C. Powder-coated paint finish, color as selected by Architect
D. Anchorage - surface mounted plate via drilled fasteners, minimum two (2) bolts per leg.

PART 3 - EXECUTION

3.1 CONDITIONS

A. Review site conditions for compliance with requirements for installation and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Use Manufacturer's recommended tamper resistant anchorage devices and fasteners.
B. Replace units which are damaged, cracked, chipped, deformed or marred. Only limited field touch-up of minor imperfections will be acceptable.

3.3 CLEANING

A. Clean racks in accordance with manufacturer's instructions to remove dust, dirt, adhesives, and other foreign materials prior to Substantial Completion.
B. Restore finished damaged during installation with no evidence of corrective work.

3.4 PROTECTION

A. Protect finishes of bike racks from damage during construction period with temporary protective coverings. Remove protective coverings at time of Substantial Completion

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

A. The intent of Division 26, Electrical Specifications and Drawings is to provide a complete and workable facility, with complete systems as required by applicable codes, as indicated, and as specified.

B. Include work specified in Division 26, Electrical and as indicated on Drawings. Include appurtenances, connections, fasteners, and accessories required to make a complete working system, whether indicated or not indicated.

C. Refer to Division 01, General Requirements.

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 26, Electrical

1.3 REFERENCES

A. The latest adopted revisions of the publications listed below apply to these Specifications as referenced:

1.	IBC	International Building Code
2.	NEC	National Electrical Code
3.	NFPA	National Fire Protection Association
4.	NEMA	National Electrical Manufacturers Association
5.	NECA	National Electrical Contractors Association
6.	ANSI	American National Standards Institute
7.	IEEE	Institute of Electrical and Electronic Engineers
8.	UL	Underwriters Laboratories
9.	OAR	Oregon Administrative Rules

1.4 SYSTEM DESCRIPTION

A. Ground Systems:

1. Provide complete ground systems indicated.
2. Include conduit system, transformer housings, switchboard frame, and neutral bus, motors, and miscellaneous grounds required by Contract Documents and by applicable codes.

B. System Identification:

1. Clearly identify elements of the Project electrical system to indicate the loads served, or the function of each item of equipment, connected under this work.
2. Comply with requirements of Division 26, Electrical, and with applicable codes.

C. Drawings:

1. Drawings are diagrammatic. They do not show every offset, bend, tee, or elbow, which may be required to install work in the space, provided and avoid conflicts with other construction.
   a. Prior to installing work, take field dimensions, and note conditions available for, installation.
   b. Follow the Drawings as closely as practical to do so, and install additional bends, offsets, and elbows where required by installation conditions.
      1) Additional offsets, bends, and other connectors are subject to approval by Project Engineer.
      2) Install additional offsets, bends, and other connectors without additional cost to Owner.
   c. The right to make any reasonable changes in outlet location prior to roughing in is reserved to the Owner's Representative.
2. Luminaire Designations:
   a. Lower case letters adjacent to devices or luminaires indicate switching arrangement or circuit grouping.

b. Numbers adjacent to devices indicate circuit connection.

3. Circuits and Switching:
   a. Do not change branch circuiting and switching indicated; nor combine homeruns, without Engineer's prior approval.
   b. Do not combine or change feeder runs.
4. Circuit Conductors:
   a. Cross or hash marks on conduit runs indicate quantity of No. 12 copper branch circuit conductors, unless otherwise noted.
   b. Where such marks do not appear, provide quantity of circuit conductors to the outlets shown to perform the control or circuiting indicated.
   c. Include ground, travelers, and switch legs required by the circuiting arrangement indicated.
   d. Provide a dedicated neutral conductor with each circuit. Do not use a shared neutral conductor between phases unless, requested or directed.

1.5 SUBMITTALS

A. Comply with Division 01, General Requirements.

B. Contractor Responsibilities:
1. Submit submittals one time and in proper order.
2. Ensure equipment will fit in the space provided.
3. Deviations from the Drawings and Specifications specifically noted in the submittals. Failure to comply will automatically void any implied approval for use of the equipment on this project.

C. Shop Drawings and Equipment Data:
1. Combine electrical shop drawings and equipment data in Submittal binders.
2. Include in Submittal binders:
   a. Complete index of materials and equipment as required by Specifications to be documented by submittals.
   b. Fully describe equipment furnish per manufacturer's detailed specifications.
   c. All deviations from the Drawings and Specifications, noted on the submittals. Failure to comply will automatically void any implied approval for use of the equipment on this project.

D. Installation Drawings:
1. Submit prior to starting installation.
2. Show outlets, devices, terminal cabinets, conduits, wiring, and connections required for the complete system described.

E. Record Drawings:
1. Keep record drawings up to date as the work progresses.
2. Show changes, deviations, addendum items, change orders, corrections, and other variations from the Contract Drawings.
3. Keep record drawings at the jobsite and available for the Architect's review.
4. At the completion of the work, incorporate all deviations from the installation drawings to indicate as-built conditions.

F. Operation and Maintenance Data:
1. As specified in Division 01, General Requirements.
2. Provide a separate manual or chapter for each system as follows:
   a. Low Voltage Distribution System
   b. Fire Alarm System
   c. Security System
3. Description of system.

4. Operating Sequence and Procedures:
    a. Step-by-step procedure for system start-up, including a pre-start checklist.
        1) Refer to controls and indicators by nomenclature consistent with that used on panels and in control diagrams.
    b. Detailed instruction in proper sequence, for each mode of operation (i.e., day-night, staging of equipment).
    c. Emergency Operation:
        1) If some functions of the equipment can be operated while other functions are disabled, give instructions for operations under those conditions.
        2) Include here only those alternate methods of operations (from normal) which the operator can follow when there is a partial failure or malfunctioning of components or other unusual condition.
    d. Shutdown Procedure:
        1) Include instructions for stopping and securing the equipment after operation.
        2) If a particular sequence is required, give step-by-step instructions in that order.
5. Preventive Maintenance:
    a. Schedule for preventive maintenance.
        1) State the recommended frequency of performance of each preventive maintenance task such as cleaning, inspection, and scheduled overhauls.
    b. Cleaning: Provide instructions and schedules for all routine cleaning and inspection with recommended lubricants.
    c. Inspection: If periodic inspection of equipment is required for operation, cleaning, or other reasons, indicate the items to be inspected and give the inspection criteria.
    d. Provide instructions for lubrication and adjustments required for preventive maintenance routines. Identify test points and given values for each.
6. Manufacturers' Brochures:
    a. Include manufacturers' descriptive literature covering devices and equipment used in the system, together with illustrations, exploded views, and renewal parts lists.
    b. Clearly define manufacturers' standard brochures so that the information applying to the actual installed equipment.
7. Results of performance testing, as specified in PART 3 of this Section.

G. Submittals Procedures:
1. Review and recommendations by the Architect or Engineer are not to be construed as change authorizations.
2. Either if discrepancies are discovered between the materials or equipment submitted, and the Contract Documents, prior to or after the data is processed, the Contract Documents govern.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Products and equipment comply with Oregon Revised Statute (ORS) 453.005(7)(e) prohibiting pentabrominated, octabrominated, and decabrominated diphenyl ethers. Where products or equipment within this specification contains these banned substances, provide complying products and equipment from approved manufacturers with equal performance characteristics.
2. Provide work and materials conforming to:
    a. Local and State codes.

b. Federal and State laws and regulations.
c. Other applicable laws and regulations.

3. Obtain and pay for all permits, licenses, and inspection certificates required by authorities having jurisdiction.
4. Pay any other fees required by governing authorities for work of this Division.

B. Install only electrical products listed by a recognized testing laboratory, or approved in writing by the local inspection authority as required by governing codes and ordinances.

1.7 SITE VISITATION

A. Visit the site prior to bidding and become familiar with existing conditions and other factors which may affect the execution of the work. Complete coordination of installation of equipment with prior bid packages previously issued. Include related costs in the initial bid proposal.

1.8 COORDINATION

A. Coordinate Work of This Division with all other trades to ensure proper installation of electrical equipment.
1. Review Drawings of other trades or crafts to avoid conflicts with cabinets, counters, equipment, structural members, and other possible impediments to electrical work.
2. Report potential conflicts to the Architect prior to rough-in.
3. Proceed with rough-in following Architect's directives to resolve conflicts.
4. Architectural Drawings govern.

B. Verify the physical dimension of each item of electrical equipment to fit the available space. Contractor's responsibility includes:
1. Coordination of the equipment to fit into the available space.
2. Access routes through the construction.

C. Layout Drawings:
1. Equipment arrangement shown on Drawings is diagrammatic to indicate general equipment sizing and spatial relationship. Include, as part of distribution equipment submittal, a scaled floor plan, which includes equipment shown with their submitted sizes. Include all feeder conduit routing, both aboveground and underground, including termination points at equipment. Submit for Engineer's review prior to commencing work.
2. Provide additional wiring details at switchboards, motor control centers, and other areas where work is of sufficient complexity to warrant additional detailing for coordination.
3. Submit layout drawings for approval prior to commencing field installation.

D. Where electrical connections are required for equipment provided as Work of other Divisions, coordinate rough in and wiring requirements for that equipment with its supplier and installer prior to commencing work. Notify Architect and Engineer of any discrepancies between the actual rough in and wiring requirements, and those identified on Drawings for resolution prior to installation.

E. Arrange raceways, wiring, and equipment to permit ready access to switches, motors, and control components.
1. Keep doors and access panels clear.

F. Coordinate electrical, telephone, and other utility services with the appropriate serving utility.
1. No additional compensation will be allowed the Contractor for connection fees or additional work or equipment required by the serving utility, but not covered in the Drawings or Specifications.

G. Coordinate underground work with other contractors working on the site.
1. Coordinate particularly with contractors installing storm sewer, sanitary sewer, water, and irrigation lines to avoid conflicts.
2. Common trenches may be used with other trades, providing clearances required by codes and ordinances are maintained.

H. Coordinated Shop Drawings.
1. Prepare in two-dimensional format.
2. Include but are not limited to:
a. Superplot plans of above ground work with a colored overlay of all trades including, but not limited to, HVAC piping, plumbing piping and equipment, fire alarm devices, electrical power conduit, and ceiling system to a minimum of 1/2-inch equals 1-foot scale.
b. Superplot plans of below ground work with a colored overlay of all trades including, but not limited to, structural footings and foundation, HVAC piping, civil piping, plumbing piping, and power conduit to a minimum of 1/2-inch equals 1-foot scale.

1.9 CHANGE ORDERS

A. Supplemental cost proposals by the Contractor accompanied with a complete itemized breakdown of labor and materials. At the Architect's request, make available estimating sheets for the supplemental cost proposals. Separate and allocate labor for each item of work.

1.10 WARRANTY

A. Provide a written warranty covering the work of this Division as required by the General Conditions.
1. Incandescent Lamps: Excluded from this warranty.
B. Apparatus:
1. Free of defects of material and workmanship and in accord with the Contract Documents.
2. Built and installed to deliver its full rated capacity at the efficiency for which it was designed.
3. Operate at full capacity without objectionable noise or vibration.
C. Include in Contractor's warranty for Work of Division 26, Electrical system damage caused by failures of any system component.

PART 2 – PRODUCTS

2.1 GENERAL

A. Where specified materials or methods conflict with applicable codes, the more stringent requirement applies.
B. Provide apparatus built and installed to deliver its full rated capacity at the efficiency for which it was designed.
C. Ensure that entire electrical system operates at full capacity without objectionable noise or vibration.
D. Materials and Equipment:
1. Use materials and equipment that are:
a. New
b. Quality meeting or exceeding specified standards.
c. Free of faults and defects.
d. Conforming to Contract Documents.
e. Of size, make, type, and quality specified.
f. Suitable for the installation indicated.
g. Manufactured in accordance with NEMA, ANSI, UL, or other applicable standards.
h. Otherwise as specified in Division 01, General Requirements.
2. Equipment not meeting all requirements will not be acceptable, even though specified by name.

3. Where two or more units of the same class of equipment are furnished, use products of the same manufacturer.
    a. Component parts of the entire system need not be products of same manufacturer.
4. Basis of Design:
    a. Consider the Basis of Design equipment scheduled or specified by performance or model number.
    b. If other equipment is provided in lieu of the Basis of Design equipment, assume responsibility for all changes and costs which may be necessary to accommodate this equipment, including, but not limited to:
        1) Different sizes and locations for connections.
        2) Different dimensions.
        3) Different access requirements.
        4) Other differences.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General:
1. Provide a complete properly operating system for each item of equipment specified.
2. Install materials in a neat and professional manner.
3. Comply with equipment manufacturer's written instructions, the best industry practices, and the Contract Documents.
4. Comply with latest published NECA Standard of Installation, and provide competent supervision.

B. Clarification:
1. Where there is a conflict among manufacturer's instruction, best practice, and the Documents, request clarification from the Architect prior to rough-in.
2. Architect's decision will be final.
3. Remove and correct work installed without clarification at no cost to the Owner.

C. Existing concrete, block, or brick walls are considered not accessible and may require use of Surface Mounted Raceway (SMR) if existing concealed raceway and device boxes are not available for reuse or do not meet the intent of the design (i.e., proximity to egress path, point of use, etc.). Coordinate route and installation where SMR is required with the Architect/Engineer prior to rough-in. Responsible for reinstalling SMR routed without such prior approval to the Architect's satisfaction.

D. Existing stud walls (wood or metal) with or without blocking with plaster, plasterboard, or paneling finish are considered accessible with accessible ceiling, attic, tunnel, or crawl space above, below, or adjacent. Remove, patch, and repair finished surface as required to conceal rough in for new device locations. If it is determined that a specific instance will not permit concealment of rough-in due to obstructions such as beams, headers, and other structural elements, prior approval before rough-in from the Architect is required.

3.2 INSTALLATION IN RATED CONSTRUCTION

A. Install intumescent material around ducts, conduits, and other electrical elements penetrating rated construction.

B. Comply with firestop materials manufacturer written instructions to prevent spread of smoke or fire through sleeves or block-outs penetrating rated fire barriers.

C. Provide firestop materials specified in Division 07, and as follows:
1. Capable of passing a 3-hour test per ASTM E-814 (UL 1479).
2. Consisting of material capable of expanding nominally eight times when exposed to temperatures of 250 degrees F-350 degrees F.
3. An alternate method utilizing intumescent materials in caulk or putty complying with Division 07, Thermal and Moisture Protection Section, "Through-Penetration Firestop Systems" may be used.

3.3 EXCAVATION AND BACKFILL

A. Perform all necessary excavation and backfill for the installation of electrical work in compliance with Division 31, Earthwork.

B. Direct Burial Cable or Non-Metallic Conduit:
   1. Minimum 3-inch cover of sand or clean earth fill placed around the cable or conduit on a leveled trench bottom.
   2. Lay steel conduit on a smooth level trench bottom, so that contact is made for its entire length.
   3. Where the electrical conduit is being laid, remove water from trench.

C. Place backfill in layers not exceeding 8-inches deep and compact to 95 percent of maximum density at optimum moisture to preclude settlement.
   1. Interior: Bank sand or pea gravel.
   2. Exterior: Excavated material with final 8-inches clean soil.

D. Following backfilling, grade all trenches to the level of surrounding soil. Dispose excess soil at the site as directed.

E. Provide 6-inches wide vinyl tape marked ELECTRICAL in backfill, 12-inches below finished grade, above all high voltage cable or conduit runs.

F. Coordinate patching of all asphalt or concrete surfaces disturbed by this work with General Contractor.

3.4 NOISE CONTROL

A. Minimize transmission of noise between occupied spaces.

B. Outlet Boxes:
   1. Do not install outlet boxes on opposite sides of partitions back to back.
   2. Do not use straight through outlet boxes, except where indicated.

C. Conduit:
   1. Route conduit along corridors or other “noncritical” space to minimize penetrations through sound rated walls, or through non-sound-rated partitions between occupied spaces.
   2. Grout solid and airtight all penetrations through sound rated partitions.
   3. Use flexible connections or attachments between independent wall structures.
      a. Do not rigidly connect (i.e., bridge) independent wall structures.

D. Do not install contactors, transformers, starters, and similar noise-producing devices on walls that are common to occupied spaces, unless otherwise indicated.
   1. Where such devices are indicated to be mounted on walls common to occupied spaces, use shock mounts, or otherwise isolate them to prevent the transmission of noise to the occupied spaces.

E. Ballasts, contactors, starters, transformers, and like equipment which are found to be noticeably noisier than other similar equipment on the project will be deemed defective and shall be replaced.

3.5 EQUIPMENT CONNECTIONS

A. General:
   1. Provide complete electrical connections for all items of equipment requiring such connections, including incidental wiring, materials, devices, and labor necessary for a finished working installation.
   2. Verify the location and method for connecting to each item of equipment prior to roughing-in.
   3. Check the amperage, maximum overcurrent protection, voltage, phase, and similar attributes of each item of equipment before rough in and connection.

B. Motor Connections:
   1. Make motor connections for the proper direction of rotation.
   2. Minimum Size Flex for Mechanical Equipment: 1/2-inch; except at small control devices where 3/8-inch flex may be used.

3. Exposed Motor Wiring: Jacketed metallic flex with minimum 6-inches slack loop.
4. Do not test run pump motors until liquid is in the system.

C. Control devices and wiring relating to the HVAC systems are furnished and installed under Division 23, HVAC; except for provisions or items indicated in Division 26, Electrical Drawings and Specifications.

3.6 EQUIPMENT SUPPORT

A. Minimum Support Capacity:
1. Provide fastening devices and supports for electrical equipment, luminaires, panels, outlets, and cabinets capable of supporting not less than four times the ultimate weight of the object or objects fastened to or suspended from the building structure.

B. Luminaire Supports:
1. Support luminaires from the building structure.
2. Use supports that provide proper alignment and leveling of luminaires.
3. Where permitted at exposed luminaires, install flexible connections neat and straight, without excess slack, and attached to the support device.

C. Support all junction boxes, pull boxes, or other conduit terminating housings located above the suspended ceiling from the floor above, roof, or penthouse floor structure to prevent sagging or swaying.

D. Conduits:
1. Support suspended conduits 1-inch and larger from the overhead structural system with metal ring or trapeze hangers and threaded steel rod having a safety factor of four.
2. Conduits smaller than 1-inch installed in ceiling cavities, may be supported on the mechanical system supports when available space and support capacity has been coordinated with the subcontractor installing the supports.
3. Anchor conduit installed in poured concrete to the steel reinforcing with No. 14 black iron wire.

E. Powder actuated or similar shot-in fastening devices will not be permitted for any electrical work except by special permission from the Architect.

3.7 ACCESS DOORS

A. Location and size of access doors is Work of Division 26, Electrical.

B. Furnishing and installation of access doors is work of Division 08, Openings.

3.8 ALIGNMENT

A. Install panels, cabinets, and equipment level and plumb, parallel with structural building lines.

B. Install distribution equipment and electrical enclosures fitted neatly, without gaps, openings, or distortion.

C. Properly and neatly, close unused openings with approved devices.

D. Fit surface panels, devices, and outlets with neat, appropriate, trims, plates, or covers without overhanging edges, protruding corners, or raw edges.

3.9 CUTTING AND PATCHING

A. General:
1. Comply with Division 01, General Requirements.
2. Restore to original condition new or existing work cut or damaged by installation, testing, and removal of electrical Work.
3. Patch and finish spaces around conduits passing through floors and walls to match the adjacent construction, including painting or other finishes.
4. Clean up and remove all dirt and debris.

B. Make additional required openings by drilling or cutting. Use of jackhammer is prohibited.

C. Cut oversize fill holes so that a tight fit is obtained around the objects passing through.
1. In rated construction, comply with Division 07, Thermal and Moisture Protection.

D. Obtain Architect's permission and direction prior to piercing beams or columns.

E. Where alterations disturb lawns, paving, walks, and other permanent site improvements, repair and refinish surfaces to condition existing prior to commencement of work.

3.10 PROTECTION OF WORK

A. Protect electrical work and equipment installed under this Division against damage by other trades, weather conditions, or any other causes.
   1. Equipment found damaged or in other than new condition will be rejected as defective.

B. Keep switchgear, transformers, panels, luminaires, and electrical equipment covered or closed to exclude dust, dirt, and splashes of plaster, cement, paint, or other construction material spray.
   1. Equipment not free of contamination is not acceptable.

C. Provide enclosures and trims in new condition, free of rust, scratches, and other finish defects.
   1. If damaged, properly refinish in a manner acceptable to the Architect.

3.11 UNINTERRUPTED SERVICE

A. Maintain electrical service to all functioning portions of the building throughout construction.

B. Pre-arrange with Owner outages necessary for new construction.
   1. Comply with Division 01, General Requirements.
   2. Apply for scheduled shutdowns minimum 4 weeks prior to time needed and reconfirm a minimum of 72 hours prior to time needed.
   3. Contractor is liable for any damages resulting from unscheduled outages or for those not confined to the pre-arranged times. Damages include costs incurred by the Owner and by the Owner's tenants.

C. Maintain signal and communication systems and equipment in operation at all times.
   1. Outages of these systems shall be treated the same as electrical power outages.

D. Maintain telephone services in accordance with Division 01, General Requirements.

3.12 WIRING IN PRECAST CONSTRUCTION

A. Coordinate installation of electrical conduit, boxes, fittings, anchors, and miscellaneous items concealed in precast concrete assemblies with the General Contractor.

B. Where electrical items are required to be installed in concrete assemblies precast off-site, it will be the Electrical Contractor's responsibility to place the electrical items necessary in the concrete at the off-site locations or pay for the General Contractor to make arrangements for the installation of these items in the precast assemblies. Electrical Contractor held responsible for the proper placement and locations of electrical items at the off-site location.

3.13 COMPLETION AND TESTING

A. General:
   1. Comply with Division 01, General Requirements.

B. Upon completion, test systems to show that installed equipment operates as designed and specified, free of faults and unintentional grounds.
   1. Schedule system tests so that several occur on the same day.
   2. Coordinate testing schedule with construction phasing.
   3. Conduct tests in the presence of the Architect or its representative.
   4. Notify Architect of tests 48 hours in advance.

C. Engage a journeyman electrician with required tools to conduct equipment tests. Arrange to have the equipment factory representative present for those tests where the manufacturer's warranty could be impacted by the absence of a factory representative.

D. Perform tests per the requirements of each of the following systems:
   1. Low Voltage Distribution System
   2. Fire Alarm System
   3. Security System

E. Provide a written record of performance tests and submit with operation and maintenance data.

3.14 COMMISSIONING

A. Complete phases of work so the system, equipment, and components can be checked out, started, calibrated, operationally tested, adjusted, balanced, functionally tested, and otherwise commissioned. Complete systems, including subsystems, so they are fully functional.

B. Perform commissioning as specified in Section 01 91 00, General Commissioning Requirements, the technical sections, and Section 26 08 00, Commissioning of Electrical Systems.

1. Unless specified otherwise in the technical sections, provide factory startup services for the following items of equipment:
   a. Electrical Distribution Systems

C. Participation in Commissioning:

1. Provide skilled technicians to checkout, startup, calibrate, and test systems, equipment, and components.
2. The Engineer reserves the right to judge the appropriateness and qualifications of the technicians relative to each item of equipment or system.

D. Resolution of Deficiencies:

1. Complete corrective work in a timely fashion to permit timely completion of the commissioning process. Experimentation to render system performance permitted.

E. Verification and Documentation:

1. Once each test is performed, have the commissioning manager observe the physical responses of the system and compare them to the specified requirements to verify the test results.
2. Submit site observation reports for deficiencies in the system.
3. Record the result of individual checks or tests on the pre-approved checklist, test, and report form from the commissioning plan and submit results for review.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Conductors - 600V
   2. Power Limited Wiring
   3. Connectors - 600V and Below

1.2 RELATED SECTIONS

A. Division 01, General Requirements
B. Division 26, Electrical
C. Section 26 05 26, Grounding and Bonding for Electrical Systems
D. Section 26 05 33, Raceways and Boxes for Electrical Systems
E. Section 26 05 53, Identification for Electrical Systems
F. Section 26 05 80, Electrical Testing

1.3 REFERENCED STANDARDS

A. ASTM: American Society For Testing and Materials:
   1. ASTM B 3 Soft or Annealed Copper Wire
   2. ASTM B 8 Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
   3. ASTM B 33 Tinned Soft or Annealed Copper Wire for Electrical Purposes
B. ICEA: Insulated Cable Engineers Association:
   1. S-95-658 Non-shielded 0-2 kV Cables
C. IEEE: Institute of Electrical and Electronic Engineers:
   1. IEEE 383 Type Test of Class IE Electric Cables, Field Splices, and Connections
D. UL: Underwriters Laboratories:
   1. UL 44 Rubber-Insulated Wires and Cables
   2. UL 83 Thermoplastic-Insulated Wires and Cables
   3. UL 1277 T ype TC Power and Control Tray Cable

1.4 SUBMITTALS

A. Submit product data for the following materials:
   1. Single conductor 600V power and control conductors.
B. Submittals of the following materials consist only of a listing of the manufacturer's name and the applicable catalog numbers of the items to be utilized:
   1. Connectors
   2. Branch Circuit Conductor Splices
   3. Splices with Compression Fitting and Heat-Shrinkable Insulator
C. Submit cable test data per testing requirements of PART 3.

1.5 QUALITY ASSURANCE

A. Copper Conductors: Indicated sizes considered minimum for ampacities and voltage drop requirements.
B. Conductors for special systems as recommended by the equipment manufacturer except as noted.
C. Deliver conductors to the job site in cartons, protective covers, or on reels.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Conductors - 600V:
   1. General
   2. Essex
   3. Southwire
   4. Or approved equal.

B. Connectors - 600V and Below:
   1. Burndy
   2. Anderson
   3. Or approved equal

2.2 CONDUCTORS – 600V

A. Type:
   1. Copper: 12 AWG minimum size unless noted otherwise. 12 AWG and 10 AWG, solid or stranded, 8 AWG or larger, Class B concentric or compressed stranded.
   2. Aluminum: 1/0 AWG minimum size unless noted otherwise. Compact stranded conductors, AA-8000 series electrical grade aluminum alloy.
   3. Conductors with continuous colored jackets are acceptable; refer to color-coding in PART 3.
   4. Conductors with manufacturers no lube continuous jacket coatings are acceptable.

B. Insulation:
   1. THHN/THWN-2 for conductors 6 AWG and smaller.
   2. XHHW-2 for conductors 4 AWG and larger.

2.3 POWER LIMITED WIRING

A. Copper, stranded or solid as recommended by the system manufacturer.
B. Insulation appropriate for the system and location used.

2.4 CONNECTORS – 600V AND BELOW

A. Branch Circuit Conductor Splices:
   1. Twist-on wire connectors: 3M Insulated Electrical Spring Connector (312/512), Ideal Industries Wing-Nut, or Buchanan B-Cap.

B. Cable Splices:
   1. Compression tool applied sleeves, Kearney, Burndy, or equivalent with 600V heat shrink insulation.
   2. Submit proposed splice location to the Engineer for review, except where indicated on the plans

C. Terminator Lugs for Stranded Wire:
   1. 10 AWG Wire and Smaller: Spade flared, tool applied.
   2. 8 AWG Wire and Larger: Compression tool applied.
   3. Setscrew type terminator lugs furnished as an integral part of distribution equipment, switches and circuit breakers will be acceptable.

PART 3 – EXECUTION

3.1 CONDUCTORS

A. Pulling compounds may be used for pulling conductors. Clean residue from the conductors and raceway entrances after the pull is made.
B. Pulleys or Blocks:
   1. Use for alignment of the conductors when pulling.
   2. Pulling in accordance with manufacturer's specifications regarding pulling tensions, bending radii of the cable, and compounds.
C. Make up and insulate wiring promptly after installation of conductors. Do not pull wire in until bushings are installed and raceways terminations are completed. Do not pull wire into conduit embedded in concrete until after the concrete poured and forms stripped.
D. Provide a dedicated neutral conductor with each branch circuit, do not use a shared neutral conductor between phases unless specifically requested or directed.
E. For remodel work or where shared neutrals are used by equipment such as systems furniture, provide a breaker handle tie as required for the phases sharing the neutral conductor.

3.2 CONNECTORS

A. Terminate control and special systems with a tool applied spade flared lug when terminating at a screw connection.

B. Screw and bolt type connectors made up tight and retightened after an 8-hour period.

C. Apply tool applied compression connectors per manufacturer's recommendations and physically checked for tightness.

3.3 COLOR CODING

A. Color code secondary service, feeders, and branch circuit conductors. Phase color code to be consistent at feeder terminations, A-B-C left-to-right, A-B-C top-to-bottom, or A-B-C front-to-back. Color code is as follows:

120/240V 208Y/120V	Phase	480V 480Y/277V
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray*
Green	Ground**	Green
* or white with colored (other than green) tracer		
**Ground for isolated ground receptacles green with yellow tracer.		

B. Use solid color compound or solid color coating for 12 AWG and 10 AWG branch circuit conductors and neutral sizes.

C. Phase conductors 8 AWG and larger color code using one of the following:

1. Solid color compound or solid color coating.
2. Stripes, bands, or hash marks of color specified above.
3. Colored as specified using 3/4-inch wide tape. Apply tape in half overlapping turns for a minimum of three inches for terminal points and in junction boxes, pull boxes, troughs, manholes, and handholes. Apply the last two laps of tape with no tension to prevent possible unwinding. Apply tags to cable stating size and insulation type where cable markings are tape covered.

D. Switch legs, travelers, etc., consistent with the phases to which, connected or a color distinctive from that listed.

E. Color-coding of the flexible wiring system conductors and connectors.

F. For modifications and additions to existing wiring systems, conform color-coding to the existing wiring system.

3.4 FIELD TESTING

A. 600V Rated Conductors: Test for continuity. Conductors 100A and over in meggered after installation and prior to termination. Provide the megger, rated 1,000V DC, and record and maintain the results, in tabular form, clearly identifying each conductor tested.

1. Replace cables when test value is less than 1 megohms.
2. Cable test submittal include results, equipment used, and date.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Ground Conductors
   2. Connectors
   3. Ground Rods

1.2 RELATED SECTIONS

A. Division 01, General Requirements
B. Division 26, Electrical
C. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables
D. Section 26 05 33, Raceways and Boxes for Electrical Systems
E. Section 26 05 80, Electrical Testing

1.3 QUALITY ASSURANCE

A. Provide complete ground systems as indicated. Include conduit system, transformer housings, switchboard frame and neutral bus, motors, and miscellaneous grounds required.
B. Provide 600V insulated main bonding jumper for utility company connection between ground bus in switchgear lineup and ground termination point or service ground in transformer vault as directed by the utility.
C. Provide an insulated ground conductor in every conduit or raceway containing power conductors.
D. Continue existing system as specified herein and shown on the Drawings.

PART 2 – PRODUCTS

2.1 GROUND CONDUCTORS

A. Green insulated copper for use in conduits, raceways, and enclosures.
B. Bare copper for ground grids and grounding electrode systems.

2.2 CONNECTORS

A. Cast, set screw, or bolted type.
B. Form poured, exothermic welds.
C. Grounding lugs where provided as standard manufacturer's items on equipment.

2.3 GROUND RODS

A. Copper-Bonded steel, 5/8-inch by 10-feet long ground rods. Where ground wells are indicated, provide a 12-inch deep, 8-inch diameter precast concrete well with flush lid for accessibility and inspection of welded connections, RCP Vaults 12R12A with 12R12-t cover.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Grounding Conductors: Sized in accordance with Article 250, Tables 250.66 and 250.122 of the National Electrical Code.
B. Grounding Conductor Connectors: Make up tight, located for future servicing, and ensure low impedance.
C. Ground the electrical system, the cold-water service, structural steel, and transformers to the building ground grid.

3.2 EQUIPMENT

A. Provide separate green insulated equipment ground conductor in non-metallic and flexible electrical raceways.
B. Ground luminaires, panels, controls, motors, disconnect switches, exterior lighting standards, and noncurrent carrying metallic enclosures. Use bonding jumpers, grounding bushings, lugs, buses, etc., for this purpose.

C. Provide grounding bushings on feeder conduit entrances to panels and equipment enclosures and bond bushings to enclosures with minimum 10 AWG conductor. Connect the equipment ground to the building system ground. Use the same size equipment ground conductors as phase conductors, up through 10 AWG.

3.3 GROUND RESISTANCE TEST

A. Accomplish with a ground resistance direct-reading single test meter utilizing the Fall-of-Potential method and two reference electrodes. Perform test prior to interconnection to other grounding systems. Orient the concrete-encased ground electrode to be tested and the two reference electrodes in straight-line spaced 50-feet apart. Drive the two reference electrodes 5-feet deep.

B. Provide test results writing.

1. Show temperature, humidity, and condition of the soil at the time of the tests.
2. Where the ground resistance exceeds 5 Ohms, the Engineer will issue additional instructions.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Hangers
   2. Pipe Straps
   3. Support of Open Cabling
   4. Rooftop Conduit Supports

1.2 RELATED SECTIONS

A. Division 01, General Requirements
B. Division 26, Electrical
C. Section 26 05 33, Raceways and Boxes for Electrical Systems
D. Section 26 05 36, Cable Trays for Electrical Systems

1.3 REFERENCED STANDARDS

A. International Building Code (IBC)
B. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

PART 2 – PRODUCTS

2.1 HANGERS

A. Kindorf B-905-2A Channel, H-119-D washer, C105 strap, minimum 1/2-inch rod with ceiling flange, or approved equal.

2.2 PIPE STRAPS

A. Two-hole galvanized or malleable iron.

2.3 SUPPORT OF OPEN CABLING

A. Support of Open Cabling: Label NRTL for support of Category 16 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
   1. Support brackets with cable tie slots for fastening cable ties to brackets.
   2. Lacing bars, spools, J-hooks, and D-rings.
   3. Straps and other devices.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Provide electrical equipment supports.
B. Install vertical support members for equipment, straight and parallel to building walls.
C. Provide independent supports to structural member for electrical fixtures, materials, or equipment installed in or on ceiling, walls, or in void spaces and/or over furred or suspended ceilings.
D. Do not use other trades' fastening devices to support electrical equipment materials or fixtures.
E. Do not use supports and/or fastening devices to support other than one particular item.
F. Support conduits within 18-inches of outlets, boxes, panels, cabinets, and deflections.
G. Provide complete seismic anchorage and bracing for the vertical and lateral restraint of conduit, cable trays, bus ducts, and electrical equipment as required by IBC Chapter 6 and the most recent version of the SMACNA Seismic Restraint Manual for Seismic Hazard Level (SHL) A.
H. Submit shop drawings of bracing systems to the Architect for review and bear the seal of a professional engineer registered in the State the project is located.

3.2 PULL AND JUNCTION BOXES

A. Pull and junction boxes installed within the cavity of a suspended ceiling that is not a fire rated assembly may be attached to the suspended ceiling framing members, provided the following criteria are met:
   1. Installation complies with the ceiling system manufacturer's instructions.
   2. Pull or junction box is not larger than 100 cubic inches.

3. Support to the main runner with two fastening devices designed for framing member application and positively attach or lock to the member.
4. Serves branch circuits and associated equipment in the area.
5. Pull or junction box is within 6-feet of the luminaires supplied.
6. Framing members are not rotated more than 2 degrees after installation.
7. Install within the cavity of a suspended ceiling may be attached to independent support wires, provided the following criteria are met:
    a. Independent support wires are taut and connected at both ends, one end to the ceiling framing member and the other to the structure above.
    b. Not larger than 100 cubic inches.
    c. Secure to the independent support wires by two fastening devices designed for the application.
    d. Independent support wires in a fire-rated ceiling are distinguishable by color, tagging, or other effective means.

3.3 CABLES AND RACEWAY

A. Cables and raceway installed within the cavity of a suspended ceiling may be attached to independent support wires provided the following criteria are met:
    1. Independent support wires are taut and connected at both ends, one end to the ceiling framing member and the other to the structure above.
    2. Raceways no larger than 1-inch trade size and cables and bundled cables are not larger than 1-inch diameter including insulation.
    3. Not more than three raceways or cables supported by independent support wire and supported within the top or bottom 12-inches.
    4. Cables for telecommunications, data processing, Class 2 power-limited signaling systems, fiber optics, and other power limited systems are securely fastened within 2 feet of each termination and at intervals not to exceed 5-feet or per the manufacturer's installation instructions.
    5. Secure raceways at intervals required for the type of raceway installed.
    6. Secure cables and raceway to independent support wires by fastening devices and clips designed for the purpose.
    7. Independent support wires are distinguishable by color, tagging, or other effective means.

B. Cables and raceway installed within the cavity of a suspended ceiling may be supported with trapezes constructed of steel rods and channels provided the following criteria are met:
    1. The size of the rods, channel, and fastening devices are suitable for the anticipated weight.
    2. The spacing of the trapezes meets that required for the type of raceway installed.
    3. Secure to a trapeze by straps designed for the purpose.
    4. Cables and raceway do not support other raceway or cables.
    5. An appropriately sized seismic bracing system is installed.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Metallic Conduits
   2. Non-Metallic Conduits
   3. Wireways
   4. Fittings
   5. Metallic Boxes
   6. Non-Metallic Boxes

1.2 RELATED SECTIONS

A. Division 01, General Requirements
B. Division 26, Electrical
C. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables
D. Section 26 05 26, Grounding and Bonding for Electrical Systems
E. Section 26 05 29, Hangers and Supports for Electrical Systems
F. Section 26 05 53, Identification for Electrical Systems

PART 2 – PRODUCTS

2.1 GENERAL

A. Raceways and conduits of specified types for electrical system wiring, except where clearly indicated otherwise.
B. Fittings, boxes, hangers, and appurtenances required for the conduits and raceways.
C. Size raceways and conduits as indicated. Where no size indicated, conduit may be the minimum code permitted size for the quantity of conductors installed, based upon NEC tables for conductors with type THW insulation.

2.2 METALLIC CONDUITS

A. Rigid Metal Conduit (RMC):
   1. Smooth surfaced, heavy wall mild steel tube of uniform thickness and temper, reamed and threaded at each end and protected inside and out with galvanizing, sherardizing, or equivalent process.
   2. Comply with NEC Article 344.
B. Intermediate Metallic Conduit (IMC):
   1. Smooth surface, intermediate wall mild steel tube of uniform thickness and temper, reamed and threaded at each end, and protected inside and out with galvanizing, sherardizing, or equivalent process.
   2. Comply with NEC Article 342.
C. Electrical Metallic Tubing (EMT):
   1. Smooth surface, thin wall mild steel tube of uniform thickness and temper, galvanized or sherardized on the outside, and enameled on the interior.
   2. Comply with NEC Article 358.
D. Flexible Conduits (Flex):
   1. Flexible Metallic Conduit:
      a. Interlocking single strip steel construction, galvanized inside and out after fabrication.
      b. Comply with NEC Article 348.
   2. Liquid Tight:
      a. Similar to flexible metallic conduit, except encased in a liquid tight polyvinylchloride or equivalent outer jacket over the flexible steel core.
      b. Comply with NEC Article 350.

2.3 NON-METALLIC CONDUITS

A. Rigid Non-Metallic Conduit:
   1. Type II PVC Schedule 40 or 80, suitable for use with 90 degree C rated wire.
   2. Conform to UL Standard 65l and carry appropriate UL listing for above and below ground use.
   3. Comply with NEC Article 352.

2.4 WIREWAYS

A. Troughs: Steel, painted, square in cross section, preformed knockouts on standard spacing, screw cover.
B. Fittings: Tees, elbows, couplings as required for configuration shown on the Drawings.

2.5 FITTINGS

A. RMC and IMC:
   1. Threaded Locknuts: Sealing type where used with NEMA 2, 3, 3R, 4, and 12 enclosures.
   2. Threaded Bushings: 1-1/4-inch and larger, insulated, grounding type as required under Section 26 05 26, Grounding and Bonding for Electrical Systems.
   3. Threaded Couplings:
      a. Standard threaded of the same material and as furnished with conduit supplied.
      b. Erickson type couplings may be used where required to complete conduit runs larger than 1-inch.
B. EMT:
   1. Connectors:
      a. Steel compression ring or steel set screw type for conduit termination, with insulated throat, suitable for conditions used.
      b. Use lay-in grounding type bushings where terminating grounding conductors.
   2. Couplings: Steel compression ring or steel set screw type, concrete tight.
C. Threadless: RMC and IMC couplings and box connectors may be steel threadless, compression ring or set screw type for use with conduits 1-inch and smaller where installed in poured concrete locations or where limited working space makes threaded fittings impractical.
D. Weatherproof Connectors: Threaded
E. Expansion Couplings: Equivalent to O.Z. type EX with jumper.
F. Seal-Offs: With filler fiber, compound, and removable cover.

2.6 METALLIC BOXES

A. Flush and Concealed Outlet Boxes: Galvanized stamped steel with screw ears for device ring mounting, knock-out plugs, mounting holes, fixture studs if required, RACO or equivalent.
B. Surface Outlet Boxes: Galvanized stamped steel same as above for use on ceilings; cast steel or aluminum with threaded hubs or bosses for use on walls.
C. Large Boxes:
   1. Boxes exceeding 4-11/16-inches when required welded steel construction with screw cover and painted, steel gauge as required by physical size.
   2. Manufacturers:
      a. Hoffman
      b. Circle AW
      c. Or equivalent.
D. Systems:
   1. Boxes for systems devices as recommended by the systems manufacturer, suitable for the equipment installed.
   2. Equip with grounding lugs, brackets, device rings, etc., as required.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Conceal conduits in finished spaces. Concealed conduits run in a direct line with long sweep bends and offsets. Where RMC and IMC embedded is in concrete below grade or in damp locations make watertight by painting the entire male thread with Rustoleum metal primer or equivalent before assembly.

B. Route exposed conduit parallel or at right angles to structural building lines and neatly offset into boxes. Conduits attached directly to building surfaces closely follow the surfaces. Conduit fittings used to saddle under beams. Coordinate drilling or notching of existing beams, trusses on structural members with Architect prior to commencing.

C. Rigidly secure RMC and IMC terminations at boxes, cabinets, and general wiring enclosures with double locknuts and bushings or approved fittings. Screw in conduit and engage at least five threads in hub where conduit boxes with threaded hubs or bosses are used. Use insulating bushings for conduits 1-1/4-inches or larger.

D. Keep conduit and raceways closed with suitable plugs or caps during construction to prevent entrance of dirt, moisture, concrete, or foreign objects. Clean and dry raceways before installation of wire and at the time of acceptance.

E. Pack spaces around conduits with polyethylene backing rods and seal with polyurethane caulking to prevent entrance of moisture where conduits are installed in sleeves or block-outs penetrating moisture barriers.

3.2 CONDUIT

A. RMC:
   1. Use in areas for wiring systems.
   2. Install for exposed runs of medium voltage circuits outside of the electrical rooms.
   3. Install where subject to mechanical injury.
   4. Install with threaded fittings made up tight.

B. IMC:
   1. Use for medium voltage circuits where concealed or where exposed in the electrical rooms.
   2. Use for circuits rated 600V and less where not in contact with earth or fill.
   3. Install with threaded fittings made up tight.

C. EMT:
   1. Securely support and fasten whether exposed or concealed at intervals of nominally every 8-feet and within 24-inches of each outlet, ell, fitting, panel, etc.
   2. Use in other dry protected locations for circuits rated 600V and less.
      a. Exceptions:
         1) Acceptable for outdoor use in photovoltaic roof applications, and within PV racking areas where not subject to damage.
         2) Acceptable for use in covered parking garages and other covered, protected areas, where periodically indirectly exposed to exterior weather conditions.
         3) Use raintight compression fittings where exposed to outdoor conditions.
   3. Do not install in areas where exposed to damage, such as vehicular or pedestrian.

D. Flex:
   1. Use for connections to vibration producing equipment and where installation flexibility is required with a minimum 12-inches slack connection.
   2. Limit flex length to 36-inches for exposed equipment connections and 72-inches in concealed ceiling and wall cavities.
   3. Use PVC jacketed flex in wet locations, areas subject to washdown, and exterior locations.

E. PVC:
1. Type II Schedule 40 and 80 PVC may be used underground and in and under interior slabs, poured concrete walls, and where scheduled or noted on the Drawings.
2. Make connections with waterproof solvent cement.
3. Provide RMC at 60 degree and larger bends and where penetrating slabs.

3.3 RACEWAYS

A. Surface metal wireways may be installed at locations to serve motor starters or other control devices where required by a multitude of wiring interconnections or physical layout.

3.4 FITTINGS

A. Assemble continuous and secured metallic raceways and conduits to boxes, panels, etc., with appropriate fittings to maintain electrical continuity. Cut square and reamed smooth conduit joints with fittings drawn up tight.
B. Do not use Crimp-on, tap-on, indenter type, malleable iron, or cast set screw fittings.

3.5 BOXES

A. General:
1. Provide multi-gang boxes as required to accept devices installed with no more than one device per gang.
2. Equip metallic boxes with grounding provisions.
B. Size and Type:
1. Flush wall switch and receptacle outlets used with conduit systems 4-inches square, 1-1/2-inches or deeper, with one or two-gang plaster ring, mounted vertically. Where three or more devices are at one location, use one piece multiple gang tile box or gang box with suitable device ring.
2. Wall bracket and ceiling surface mounted luminaire outlets 4-inch octagon 1-1/2-inches deep with 3/8-inch fixture stud where required. Wall bracket outlets have single gang opening where required to accommodate luminaire canopy. Provide larger boxes or extension rings where quantity of wires installed requires more cubic capacity.
3. Junction boxes installed in accessible ceiling or wall cavities or exposed in utility areas minimum of 4-inches square, 1-1/2 inches deep with appropriately marked blank cover.
4. Boxes for the special systems suitable for the equipment installed. Coordinate size and type with the system supplier.
C. Pull Boxes:
1. Provide pull boxes where shown for installation of cable supports or where required to limit the number of bends in conduits to not more than three 90-degree bends.
2. Use galvanized boxes of code-required size with removable covers installed so that covers will be accessible after work is completed.
D. Installation:
1. Mount boxes and outlets at nominal centerline heights shown on the drawings.
2. Adjust heights in concrete masonry unit (CMU) walls to prevent devices or finish plates from spanning masonry joints.
3. Recessed Boxes:
a. Flush with finished surfaces or not more than 1/8-inch back, level and plumb.
b. Long screws with spacers or shims for mounting devices will not be acceptable.
c. No combustible material exposed to wiring at outlets.
4. Covers for flush mounted boxes in finished spaces extend a minimum of 1/4-inch beyond the box edge to provide a finished appearance. Finish edge of cover to match cover face.
5. Boxes installed attached to a stud in sheet rock walls equipped with opposite side box supports equivalent to Caddy 760. Install drywall screw prior to finish taping. Methods used to attach boxes to studs not to cause projections on the face of the stud to prevent full-length contact of sheet rock to the stud face.

3.6 PULL WIRES

A. Install nylon pull lines in empty conduits larger than 1-inch where routing includes 25-feet or more in length or includes 180 degrees or more in bends.

B. Where conduits requiring pull lines are stubbed out and capped, coil a minimum of 36-inches of pull line and tape at termination of conduit for easy future access. Label pull lines as to conduit starting or terminations point and intended future use.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

A. The Sections includes:
1. Precast Concrete Handholes and Boxes
2. Precast Concrete Manholes
3. Duct Lines
4. Spacers
5. Ground Rods
6. Ground Wire
7. Conduit Expansion/Deflection Fittings

1.2 RELATED SECTIONS

A. Division 01, General Requirements
B. Division 03, Concrete
C. Division 26, Electrical
D. Division 31, Earthwork

1.3 REFERENCED STANDARDS

A. References listed below:

1.	AASHTO	American Association of State Highway and Transportation Officials
2.	ACI	American Concrete Institute
3.	ANSI	American National Standards Institute
4.	ASTM	American Society for Testing and Materials
5.	NEC	National Electrical Code
6.	NEMA	National Electrical Manufacturers Association
7.	UL	Underwriters Laboratories

1.4 SUBMITTALS

A. Shop Drawings:
1. Submit descriptive details of the manufacturers' proposed standard product listings, including:
a. Precast manholes and handholes.
b. Precast manhole and handhole accessories, including covers and frames.
c. Precast concrete 28-day compressive strength data.
d. Manhole and handhole cement certification.
e. Duct bank cement certification.
f. Duct spacers.
g. Ducts and raceways.
h. Conduit expansion/deflection fittings.

B. Show drawings for manholes and handholes, including:
1. Design criteria signed by professional structural engineer licensed by the State of Oregon.
2. Reinforcing steel locations and concrete covers.
3. Layout of inserts, attachments, and openings.
4. Locations and types of joints.
5. Accessories, including covers, frames, and diamond plate doors where applicable.

C. Duct-Bank Coordination Drawings: show duct profiles and coordination with other utilities and underground structures.
1. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.
2. Sign and seal drawings by a qualified professional engineer licensed by the State of Oregon.

PART 2 – PRODUCTS

2.1 PRECAST CONCRETE HANDHOLES AND BOXES

A. Handholes and Boxes:
   1. Precast concrete, 4,000 psi strength at 28 days, with reinforcing and galvanized checker plate traffic covers designed for AASHTO loading of H-20.
   2. Wall thickness 3-inches minimum.

B. Precast Units:
   1. Conform to ASTM C 478.
   2. Size, plan area and clear height not less than shown on the drawings and have concrete slab bottoms with sumps.

C. Pulling Irons: 7/8-inch diameter hot-dip galvanized steel bar with exposed triangular opening.

D. Design:
   1. Precast structures shall be designed in accordance with AASHTO Specification for Highway Bridges. Concrete and reinforcing shall be designed in accordance with ACI 318.
   2. Tops and walls of structures designed for AASHTO H-20 highway loading, with 30 percent loading added for impact.
   3. Design walls to withstand soil pressures, taking into consideration the soil to be encountered and ground water level present at the site.
   4. Assume ground water level is at ground surface unless a lower water table is indicated in the boring logs. Design and construct precast handhole pull boxes not to float.

E. Identify structures with manufacturer's name embedded in, or otherwise permanently attached to, an interior wall face.

F. Covers for handholes and boxes spring-assisted galvanized diamond plate door with locking latch, 3-inch high markings in weld bead, inscribed before galvanizing with the word, ELECTRICAL, COMMUNICATION, or DATA. Identify the covers.

G. Acceptable Manufacturers:
   1. Utility Vault Company
   2. Hanson
   3. Renton Concrete Products
   4. Or equal.

2.2 PRECAST CONCRETE MANHOLES

A. Manholes:
   1. Precast concrete, minimum 4,000 psi strength at 28 days, with reinforcing and cover designed for AASHTO loading of H-20.
   2. Wall thickness 3-inches minimum. Necking and shaft shall have 36-inch minimum clear opening.

B. Precast Units:
   1. Conform to ASTM C 478.
   2. Size, plan area and clear height not less than shown on the drawings with concrete slab bottoms with sumps.

C. Pulling Irons: 7/8-inch diameter, hot-dip galvanized steel bar with exposed triangular opening.

D. Design:
   1. Precast structures designed in accordance with AASHTO Specification for Highway Bridges. Concrete and reinforcing shall be designed in accordance with ACI 318.
   2. Tops and walls of structures shall be designed for AASHTO H-20 highway loading, with 30 percent loading added for impact.
   3. Design walls to withstand soil pressures, taking into consideration the soil to be encountered and groundwater level present at the site.
   4. Assume ground water level is at ground surface unless a lower water table is indicated in the boring logs. Precast manholes shall be designed and constructed not to float.

E. Identify structures with manufacturer's name embedded in, or otherwise permanently attached to, an interior wall face.
F. Manhole Cover and Frame: Class 30B grey cast iron per ASTM A 48 with machine-finished, flat, bearing surfaces.
G. Frame: Solid cast ductile iron with a 6-inch round opening. The cover shall have holes for lifting and shall have minimum 2-inch high factory label TELEPHONE, ELECTRIC, or ELECTRIC HV, as appropriate or as noted on the drawings.
H. Manufacturers:
1. Utility Vault Company
2. Hanson
3. Renton Concrete Products
4. Or equal.

2.3 DUCT LINES

A. Size: Except where otherwise shown on the drawings, ducts and conduits shall not be less than 4-inch trade size.
B. Ducts (Concrete-Encased):
1. Type II PVC Schedule 40, suitable for use with 194 degree F rated wire.
2. Conduit conforms to UL Standard 651 and carry appropriate UL listing for below-ground use.
C. Ducts (Direct-Buried):
1. Rigid Non-Metallic Conduit:
a. Type II PVC Schedule 40, suitable for use with 90°C rated wire.
b. Conduit conforms to UL Standard 651 and carry appropriate UL listing for above- and below-ground use.
2. Rigid Metal Conduit:
a. UL 6 galvanized rigid steel.
b. Where metal conduit is shown on the drawings or specified below, conduit has a coating of 20 mil bonded PVC, or coated with bituminous asphaltic compound.
D. Ducts for Fiber Optic Trunk Lines (Non-Metallic):
1. PVC Schedule 40, UL listed for underground use with optical fiber or communications cables.
2. Provide 4-inch by 1-inch nominal innerducts.
3. Prelubricate innerducts to meet Bellcore GR356-CORE coefficient of friction requirements.
4. Four-cell color scheme shall be white-orange-green-gray.
5. Coupling: O-ring gasket to allow for easy joining yet provide resistance to pull out and to provide a watertight seal.
6. Ducts available in 20-foot sections.
7. Manufacturers:
a. Carlon
b. Or equal.
E. Ducts for Fiber Optic Trunk Lines (Metallic):
1. Galvanized steel, with factory-installed reverse spin coupling for easy assembly without turning outer shell.
2. Provide 4-inch by 1-inch nominal innerducts.
3. Prelubricate innerducts to meet Bellcore GR356-CORE coefficient of friction requirements.
4. Four-Cell Color Scheme: White-orange-green-gray.
5. Coupling: O-ring gasket to allow for easy joining yet provide resistance to pull out and to provide a watertight seal.
6. Ducts available in 10-foot sections.

7. Manufacturers:
   a. Carlon
   b. Or equal.

F. Manufactured bends shall be not less than 36-inches in radius for conduits 4-inches in diameter or larger.

2.4 SPACERS

A. Factory-fabricated rigid PVC vertical and horizontal interlocking spacers, sized for type and sizes of ducts with which used, and selected to provide minimum of 3-inches separation between ducts while supporting ducts during concreting or backfilling.

B. Manufacturers:
   1. Carlon
   2. Orangeburg
   3. Or equal.

2.5 GROUND RODS

A. Copper-clad steel, 3/4-inch diameter and 10-feet long.

2.6 GROUND WIRE

A. Ground wire shall be stranded bare copper 6 AWG minimum.

2.7 CONDUIT EXPANSION/DEFLECTION FITTINGS

A. Conduit expansion/deflection fittings in embedded runs rated for indoor use, outdoor use, buried underground, or embedded in concrete in non-hazardous areas.

B. Allow axial expansion or contraction up to 3/4-inch and angular misalignment of the axes of the coupled runs in any direction to 30 degrees. Inner sleeves maintain constant inside diameter in any position and provide smooth insulated wireway for protection of wire insulation.

C. Watertight flexible neoprene outer jacket and tinned copper flexible braid grounding strap.

D. Use with galvanized rigid steel conduit or PVC Schedule 40 conduit utilizing rigid metal conduit nipples and rigid metal to PVC adapters.

E. Manufacturers:
   1. Crouse-Hinds
   2. O-Z/Gedney
   3. Or equal.

PART 3 – EXECUTION

3.1 CONDUIT ENCASEMENT OR EMBEDMENT (STRUCTURES AND DUCT BANKS)

A. Concrete class 3500-3/4 with red dye.

B. Concrete-embedded conduit shall be separated from the earth by at least 3-inches of concrete. Clearances shall be equal to the conduit diameter, but not less than 1-1/2-inches. Clearances shall also be maintained between conduits encased in slabs. Clearances of less than 1-1/2-inches at conduit crossing and terminating locations are acceptable.

C. Provide conduit expansion/deflection fittings where embedded conduit crosses building expansion joints, passes between two adjacent structures, or passes between a duct bank and structure. Locate conduit expansion/deflection fittings between duct bank and manholes or pull boxes where noted on the drawings.

D. Place duct banks on an undisturbed soil base wherever possible. Where duct banks pass through backfilled areas, the soil base shall be as specified elsewhere in the project manual. Duct banks that run under traffic areas shall be steel reinforced.

E. Locate plastic spacers 5-feet to 8-feet on center as recommended by the manufacturer. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups. Secure spacers to earth and to ducts to prevent conduit flotation during concreting. Conduit runs shall be watertight.

F. Protect conduit ends from damage during construction. When using plugs for protection, a 1/4-inch hole shall be drilled in the lower portion of the plug to provide drainage.

G. Where a conduit is specified spare or for future use, install a nylon cord in conduit and fasten at each end.

H. Pull leather-washer-type duct cleaner, with graduated washer sizes through full lengths of ducts immediately after concrete is poured. After the concrete has set but before backfilling, pull a 4-inch-long mandrel having a diameter equal to the conduits inside diameter minus 1/2-inch through each conduit. The mandrel shall be lead-covered or painted white so that it will indicate any protrusion on the inside of the conduit.

3.2 PRECAST MANHOLES AND HANDHOLE PULL BOXES

A. Construction
   1. Units may be precast monolithically or may consist of assembled sections.
   2. Assembled sections shall have mating edges with tongue-and-groove joints. Joints shall be designed to firmly interlock adjoining components, and provide waterproof junctions. Joints shall be sealed watertight using preformed plastic strips installed in accordance with the manufacturer's instructions.
   3. Furnish lifting devices for proper handling of units.
   4. Provide ground rod and sleeve in manhole floors.
   5. Install sump with grate.

B. Duct entries shall be a minimum of 14-inches above floor and below ceiling.

C. Provide cable supports, clamps, or racks.

D. Floor slope 2 percent in all directions to a sump.

E. Sump a minimum of 8-inches in diameter.

F. Install pulling irons or inserts for pulling eyes, inserts for cable racks, and openings for conduit entry as required. Steel components other than reinforced steel shall be hot-dip galvanized after fabrication. Manholes and handhole pull boxes shall have concrete bottoms.

G. Manholes and handhole pull boxes shall be drained into the storm water system. Seal vault watertight and drain coordinated with raceway entries.

3.3 INSTALLATION

A. Install on a level bed of well-tamped gravel or crushed stone, well-graded from the 1-inch to 2-inch sieve.
   1. The top of frame and covers shall be flush with the finished surface of pavements, and flush with finished grade in unpaved areas.
   2. Set manholes and handholes plumb to limit the depth of standing water to a maximum of 2-inches. Unless otherwise specified, manhole covers shall be set at grade.
   3. Construct a sufficient number of precast concrete and mortar courses between top of manhole and manhole frame to reach the required level. Grout the manhole frame to the chimney.

B. Locate underground duct lines and manholes and handholes at the approximate locations shown on the drawings with due consideration given to the location of other utilities, grades, and paving.

C. Provide windows for duct bank terminations and fill with concrete or non-shrink grout after duct placement.

D. Provide pulling irons opposite each duct and conduit entrance. Pulling irons shall be cast in the walls opposite all duct windows approximately 6-inches above the top of the window.

E. Ground Rods and Grounding:
   1. Rods protrude approximately 4-inches above the manhole floor.
   2. In precast manholes, drive a ground rod into the earth through the floor sleeve. After the manhole is set in place, fill the sleeve with sealant to make a watertight seal.

F. Ground Wires:
   1. Install ground wires around the inside perimeter of the manhole and anchor them to the walls.
   2. Connect the wires to the ground rods by exothermic welding or approved compression process to form solid metal joints.

3. Bond the ground wires to the exposed non-current-carrying metal parts of racks, etc., in the manholes. Also bond the wires to duct bank bare equipment grounding conductors.

3.4 TRENCHING

A. Excavate trenches in accordance with Division 31, Earthwork.

B. Work with extreme care near existing utilities to avoid damaging them. Cut the trenches neatly and uniformly.

C. For Concrete-Encased Ducts:

1. After excavation of the trench, drive stakes in the bottom of the trench at 4-foot intervals to establish the grade and route of the duct bank.
2. Pitch the trenches uniformly toward manholes or both ways from high points between manholes for the required duct line drainage. Avoid pitching the ducts towards buildings.
3. The walls of the trench may be used to form the side walls of the duct bank provided that the soil is self-supporting and that the concrete envelope can be poured without soil inclusions. Use forms where the soil is not self-supporting.
4. After the concrete-encased duct has sufficiently cured, backfill the trench in accordance with Division 31, Earthwork.

3.5 DUCT LINE INSTALLATIONS

A. General:

1. Duct line in accordance with the NEC, as shown on the drawings, and as specified.
2. Slope duct to drain toward manholes and away from building and equipment entrances. Pitch not less than 4-inches in 100-feet. Curved sections in duct lines consist of long sweep bends with a minimum radius of 5-feet in the horizontal and vertical directions unless noted otherwise. Use of manufactured bends is limited to building entrances and stub-ups to equipment.
3. Underground conduit stub-ups to equipment inside buildings shall be galvanized rigid steel and shall extend at least 10-feet outside the building foundation. Stub-ups to equipment, mounted on outdoor concrete slabs, shall be galvanized rigid steel and shall extend at least 5-feet from edge of slab. Install insulated grounding bushings on the terminations. Couple the steel conduits to the ducts with suitable adapters, and encase with 3-inches of concrete.
4. Upon completion of the duct bank installation, pull a standard flexible mandrel through each duct. The mandrel shall be at least 12-inches long, and shall have a diameter 1/2-inch less than the inside diameter of the duct. After mandrelling, pull a brush with stiff bristles through each duct to remove the loosened particles. Diameter of the brush equal to or slightly larger than the diameter of the duct.
5. Seal the ducts and conduits at building entrances and at outdoor equipment terminations with a suitable non-hardening compound.

B. Fiber Optic Trunk Conduits:

1. Conduits: Join, terminate, and seal with fittings, materials and methods recommended by the manufacturer. Supply necessary fittings and materials for a complete fiber optic conduit/duct system.
2. Submit a complete material list for approval prior to purchasing materials and indicate locations of material usage.

C. Concrete-Encased Ducts:

1. Duct lines shall consist of single or multiple duct assemblies encased in concrete, and installed with top of duct bank not less than 36-inches below established grade unless otherwise indicated. Ducts shall be uniform in size and material throughout the installation.

2. Rigid base and intermediate spacers shall securely support and maintain uniform spacing of the duct assembly at least 3-inches above the trench bottom during pouring of concrete. Spacer spacing not to exceed 8-feet. Use a minimum of 3 spacers for each 20-foot length of duct.
3. Clearances between individual ducts:
   a. For like service, clearance not less than 3-inches.
   b. For high voltage power and telephone services, clearance not less than 6-inches.
   c. For high voltage and 600V services, clearance not less than 3-inches.
   d. Provide tie wires to prevent displacement of the ducts during pouring of concrete. Tie wires not to act as substitutes for spacers.
4. Terminate duct lines at window openings in manhole walls as shown on the drawings. Adjust window openings to correspond with duct line inverts. Fit ducts with end bells.
5. Couple the ducts in staggered rows and layers to ensure maximum strength and rigidity of the duct bank.
6. Extend the concrete envelope encasing the ducts at least 3-inches beyond the outside walls of the outer ducts and conduits.
7. Install reinforcing steel bars within the top and bottom of each concrete envelope within 5-feet of the building, at manhole wall penetrations, under roadways, and between concrete pours. Where shown on the drawings, incorporate additional steel reinforcing in the duct envelopes.
8. Keep ducts clean of earth, sand, or gravel during construction, and seal with tapered plugs upon completion of each portion of the work.
9. Where new ducts, conduits, and concrete envelopes are to be joined to existing manholes, make the joints with the proper fittings and fabricate the concrete envelopes to ensure smooth, durable transitions.
10. Place a continuous strip of utility warning tape approximately 12-inches above ducts before backfilling trenches. Refer to Division 31, Earthwork, for tape description and installation requirements.

D. Direct Burial Duct and Conduits:
1. Install direct burial ducts and conduits only where shown on the drawings.
2. Join and terminate ducts and conduits with fittings recommended by the conduit manufacturer.
3. Tops of ducts and conduits not less than 24-inches below grade.
4. Do not kink the ducts or conduits.
5. Place a continuous strip of utility warning tape approximately 12-inches above ducts or conduits before backfilling trenches. Refer to Division 31, Earthwork, for tape description and installation requirements.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Seismic Bracing
   2. Channel Type Elements
   3. Bolting Accessories

1.2 RELATED SECTIONS

A. Division 01, General Requirements
B. Division 26, Electrical
C. Section 26 05 29, Hangers and Supports for Electrical Systems

1.3 REFERENCED STANDARDS

A. The following are the referenced standards:

1.	SMACNA	Sheet Metal and Air Conditioning Contractor's National Association
2.	AISC	American Institute of Steel Construction
3.	ASTM	American Society for Testing and Materials
4.	AWS	American Welding Society
5.	IBC	International Building Code
6.	ICC	International Code Council
7.	OSHPD	Office of Statewide Health Planning and Development
8.	ASCE 7-16	Minimum Design Loads and Associated Criteria for Buildings and Other Structures

1.4 QUALITY ASSURANCE

A. General Requirements:
   1. Provide seismic restraints for equipment, both supported and suspended, conduits, and cable tray systems.
   2. Bracing of conduits and cable trays in accordance with the provisions set forth in the SMACNA seismic restraint manual and the requirements set in ASCE 7 Section 13.2.
   3. Review and approve structural requirements for restraints, including their attachment to the building structure by a registered structural engineer in the same state as the project.
   4. Attachments to supported or suspended equipment must be coordinated with the equipment manufacturer.

B. Bracing of Conduits:
   1. Provide seismic bracing of conduit as detailed below:
      a. Brace electrical conduits 2-1/2 inch nominal diameter or larger.
      b. Brace conduits located in electrical rooms, boiler rooms, mechanical equipment rooms, and refrigeration mechanical rooms that are 1-1/4-inch nominal diameter and larger.
      c. Exception: Conduits suspended by individual hangers 12-inches or less in length, as measured from the top of the conduit to the bottom of the support where the hanger is attached, need not be braced.

C. Suspended Equipment and Raceways:
   1. Cable Method: The seismic restraint shall consist of a combination of stranded steel aircraft cable with an added nut and neoprene and steel washer.
   2. Cable attachment details, cable size, and the neoprene and steel washers shall be sized by the manufacturer and are to be indicated in the shop drawings.
   3. Provide detailed shop drawings for approval in sufficient time to allow structural attachment work to be incorporated into the normal work sequence.

D. Seismic restraints, including anchors to building structure, designed by a registered professional structural engineer licensed in the state of Oregon. Design includes:
   1. Number, size, capacity, and location of anchors for floor- or roof-mounted equipment. For curb-mounted equipment, provide design of attachment of both the unit to the curb and the curb to the structure. For units weighing greater than 2500 pounds, or curbs more than 10 feet long, provide substantiating calculations the curb can accept the prescribed seismic forces.
   2. Number, size, capacity, and location of seismic restraint devices and anchors for vibration-isolation and suspended equipment. Provide calculations, test data, or California OSHPD approval number verifying the horizontal and vertical ratings of the seismic restraint devices.
   3. Number, size, capacity, and location of braces and anchors for suspended raceways, bus ducts, and cable trays on as-built plan drawings.
      a. Select a single seismic restraint system pre-designed to meet the requirements of the latest edition of the IBC such as the 1999 Mason Industries Seismic Restraint Guidelines for Suspended Piping, Ductwork, and Electrical Systems.
      b. Details or designs from separate seismic restraint guidelines are not acceptable. Installation not addressed by the selected system shall be designed, detailed, and submitted alone with the as-built plan drawings.
      c. Maximum seismic loads shall be indicated on drawings at each brace location. Drawings shall bear the stamp and signature of the registered professional structural engineer licensed in the state of Oregon who designed the layout of the braces.

E. Supports, Hangers, and Anchors: Comply with the requirements of Section 26 05 29, Hangers and Supports for Electrical Systems meet the requirements of ASCE 7 Section 13.2 based on the Seismic Design Criteria located on the structural drawings.

1.5 SUBMITTALS

A. Product Data: Submit product data for products specified herein.

B. Shop Drawings:
   1. Submit shop drawings complying with the requirements of the Quality Assurance article of this Section.
   2. Stamp shop drawings by a professional structural engineer licensed in the state of Oregon.
   3. Approve submittals prior to rack fabrication and installation.

C. Calculations:
   1. Submit seismic calculations indicating restraint loadings resulting from the design seismic forces presented in the Quality Assurance article of this Section.
   2. Include anchorage details that include the diameter, embedment, and material grade of the material in which the anchor is placed.
   3. Stamped by a professional structural engineer licensed in the state of Oregon .

D. Certifications:
   1. Submit certification of seismic restraint's and building structural member's capability to safely accept loads resulting from seismic forces calculated in the previous paragraph.
   2. Tests in three planes clearly showing ultimate strength and appropriate safety factors performed by independent laboratories and certified by a professional structural engineer licensed in the state of Oregon or calculations by a professional structural engineer licensed in the state of Oregon are acceptable.

PART 2 – PRODUCTS

2.1 SEISMIC BRACING:

A. Steel fabrication, in accordance with AISC Steel Manual, with structural steel shapes of ASTM A 36 steel.

B. Welding in accordance with AWS D1.1.

C. Design and sizes as required.
D. Fastenings, bracing, and assembly selected by a professional structural engineer licensed in the state of Oregon.
E. Show that the maximum stress in any structural steel member will not exceed 18,000 psi.

2.2 CHANNEL TYPE ELEMENTS

A. 12 gauge formed steel, 1-5/8-inch square prime painted or chromate dip finish. Use spring-in nuts with grooves.

2.3 BOLTING ACCESSORIES

A. Machine bolts with semi-finished nuts.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Provide support assemblies to meet the seismic zone indicated. Equipment shall be braced and anchored to conform to the requirements listed under the Quality Assurance article of this Section.
B. Seismically brace raceways, cable trays, and suspended bus duct to conform to the requirements listed under the Quality Assurance article of this Section.
C. Provide pipeline seismic flexible connectors where piping crosses building earthquake joints. Arrange raceways and connectors for the amount of motion required. Maintain continuity of the grounding system for each of the joints.
D. Do not use powder-actuated inserts.
E. Seismic Restraints:
    1. Attach to structural members of the building, which are capable of withstanding the design load of the seismic restraint.
    2. Ensure load capacity of the structural members is greater than or equal to the capacity of the seismic restraint.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Labels

1.2 RELATED SECTIONS

A. Division 01, General Requirements
B. Division 26, Electrical
C. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables
D. Section 26 05 33, Raceways and Boxes for Electrical Systems
E. Section 28 30 00, Fire Detection and Alarm

PART 2 – PRODUCTS

2.1 LABELS

A. Pre-printed:
   1. Permanent material pre-printed with black on white, with adhesive backing.
   2. Manufacturer:
      a. Brady
      b. 3M
      c. Or equal.

B. Engraved Laminated Plastic:
   1. 3-ply laminated plastic, colors indicated herein, with beveled edges, engraved letters, and stainless steel screw attachment.
   2. Nameplate length to suit engraving.
   3. Adhesive attachment is not acceptable.

C. Clear Plastic Tape:
   1. Black (normal) or red (emergency or standby) 12 point Helvetica medium text, clear adhesive backing, field printed with proper equipment for device labeling.
   2. Manufacturers:
      a. Brother P-Touch
      b. Dyno-tape
      c. Kroy
      d. Or equal.

D. Wire Markers:
   1. White with black numbers, adhesive-backed tape on dispenser roll.
   2. Manufacturers:
      a. Brady
      b. 3M
      c. Or equal.

E. Feeder Conduit Marking:
   1. Provide one-piece snap-around vinyl feeder conduit markers for feeder conduits.
   2. Provide custom label, black letters on orange background indicating destination equipment, 1-1/4-inch high letters (minimum) – Seton Setmark Pipe Marker Series.
   3. Provide additional one-piece snap-around vinyl label, black letters on orange background for voltage designation (i.e., 277/480V, 120/208V).
   4. Secure labels to conduits using plastic tie wrap, two per label.

F. Marker Pen: Black permanent marker suitable for writing on metallic surfaces.

PART 3 – EXECUTION

3.1 GENERAL

A. Nameplate and text coloring:
   1. Normal Black nameplate with white lettering.

3.2 FEEDER CONDUIT

A. Provide feeder conduit marker for electrical feeders.

B. Provide markers when exiting source equipment and located along the entire conduit length 20-feet on centers in exposed areas, above ceilings, and upon entering or leaving an area or room.

3.3 RACEWAYS AND BOXES

A. Label pull boxes and junction boxes for systems with paint or marker pen on box cover identifying system. Where box covers are exposed in finished areas, label inside of cover.

B. Color label covers as follows:

1.	480Y/277V wiring	Orange
2.	208Y/120V wiring	Black
3.	Fire Alarm	Red
4.	Communications	Green
5.	Security	Blue

C. Label each end of pull wires left in empty conduits with tags or tape indicating location of other end of wire.

3.4 SYSTEMS

A. Complex control circuits may utilize combination of colors with each conductor identified throughout using wraparound numbers or letters. Use the number or letters shown where the Drawings or operation and maintenance data indicate wiring identification.

B. Label the fire alarm and communication equipment zones, controls, indicators, etc., with machine-printed labels or indicators appropriate for the equipment installed as supplied or recommended by the equipment manufacturer.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Testing Equipment

1.2 RELATED SECTIONS

A. Division 01, General Requirements
B. Division 26, Electrical
C. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables
D. Section 26 05 26, Grounding and Bonding for Electrical Systems

1.3 TESTING CRITERIA

A. General:
   1. Perform field tests and operational checks to assure that all electrical equipment, both contractor and Owner supplied, is operational within industry and manufacturer's tolerances, and is installed in accordance with design specifications.
   2. The tests and operational check shall determine the suitability for energization.
   3. Schedule tests and give a minimum of one week's advance notice of time and date to the Architect and Owner for any major systems tests specified in this Section.
   4. The testing company shall provide the equipment and technical personnel to perform all tests and inspections. At Contractors expense, furnish any personnel necessary to assist in the testing and inspection.
   5. When tests and inspections are complete, attach a label to the devices tested. Provide on the label, the name of the testing company, date of tests, and initials of the Engineer who performed the tests.

B. Responsibilities:
   1. Clean the equipment, torque down accessible bolts according to the equipment manufacturer's instructions; perform routine insulation resistance tests on branch and feeder circuits, continuity checks on branch and control wiring, and rotation tests for distribution and utilization equipment.
   2. Furnish a complete set of current plans and specifications to the testing company prior to commencement of testing. At each test site, provide test control power necessary to perform the tests specified. Consult the test organization as to the specific power requirements. Notify the testing organization when the equipment and systems are ready for their inspections and testing. After review by the testing engineer, correct deficiencies noted by the testing company.
   3. Responsible for having the manufacturer of each equipment and/or system provide factory trained representatives(s) that will perform required functional testing, checkout, and repairs in order to pronounce the equipment and/or systems meet the requirements of these specifications and Drawings and it is ready for startup testing and commissioning by the testing organization as specified hereafter.
   4. Furnish settings of protective devices by the Engineer, in conjunction with Utility.
   5. Testing organization to notify Engineer prior to the commencement of testing. The testing organization, set, and adjust the protective devices and associated auxiliary timing devices in accordance with the values furnished by the Engineer. The testing organization maintains a written record of tests and, upon completion of the test, include them in a final report. Detail deficiencies in the system material, workmanship, or design.

C. Implementation:
   1. Safety practices comply with applicable state and local safety orders, as well as with the Occupational Safety and Health Act (OSHA). Compliance with the National Fire Protection Association (NFPA) standard NFPA 70E, and the Accident Prevention Manual for Industrial Operations of the National Safety Council.

2. Tests, other than phase rotation and operational tests, only performed on apparatus that is deenergized. The testing company's lead test engineer for the project designated safety representative and supervise testing observations and safety requirements. Do not proceed with Word until determined that it is safe to do so.
3. Power Circuits: Conductors shorted to ground by a hotline grounding device approved for the purpose. Provide warning signs and protective barriers as necessary to conduct the tests safely.

D. Reports:
1. General: Provide full documentation of tests in the form of a report.
2. Test report includes the following sections:
   a. Scope of Testing
   b. Equipment Tested
   c. Description of Test
   d. Test Results
   e. Conclusions and Recommendations
   f. Appendix, including Test Forms
3. Record each piece of equipment on a data sheet listing the condition of the equipment as found and as left. Include recommendations for necessary repair and/or replacement parts. Indicate on data sheets the name of the engineer who tested the equipment and the date of the test completion.
4. Submit record copies of the completed test report no more than 30 days after completion of the testing and inspection.

1.4 REFERENCES

A. The testing and inspection comply with applicable sections of the applicable codes and standards listed in Section 26 05 00, Common Work Results of Electrical of the project specifications.

B. The inspection and testing comply with the project plans and specifications, as well as with the manufacturer's drawings, instruction manuals, and other applicable data that may be provided by the Engineer, for the apparatus tested.

1.5 QUALIFICATIONS

A. Testing Organization:
1. Independent division of the manufacturer of the assembled products being tested. If an outside testing organization is utilized, a representative of the manufacturer under contract by the testing company. Be present during testing to ensure the testing is performed properly and deficiencies discovered are promptly corrected.
2. Full Service Company that employs factory trained test engineers capable of troubleshooting, as well as identifying power equipment problems.
3. Perform Work outlined under the full time, onsite supervision of a graduate engineer with a minimum of 5 years of field testing experience.
4. Upon request, submit proof of its qualifications.

PART 2 – PRODUCTS

2.1 TESTING EQUIPMENT

A. Testing agency to have calibration program, which maintains applicable test instrumentation within rated accuracy. Traceable accuracy to the National Bureau of Standards in an unbroken chain. Calibrate instruments calibrated in accordance with the following frequency schedule:
1. Field Instruments: 6 months maximum.
2. Laboratory Instruments: 12 months.
3. Leased Specialty Equipment: 12 months (where accuracy is guaranteed by lessor). Dated calibration labels visible on test equipment.

PART 3 – EXECUTION

3.1 EQUIPMENT TO BE TESTED

A. Section 26 05 19, Low Voltage Electrical Power Conductors and Cables:
   1. For circuits rated 400A or higher perform tests listed in the NETA 2017 Acceptance Testing Specifications for Low-Voltage Cables, Section 7.3.2.

B. Section 26 05 26, Grounding and Bonding for Electrical Systems:
   1. Perform tests listed in the NETA 2017 Acceptance Testing Specifications for Grounding Systems, Section 7.13.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

A. The commissioning process is described in Section 01 91 00, Commissioning.

B. Provide all labor and materials required to complete the commissioning of those Division 26, Electrical, systems and equipment identified as Commissioned Systems and Equipment in Section 01 91 00, Commissioning.

1.2 RELATED SECTIONS INCLUDE:

A. Division 01, General Requirements

B. Division 26, Electrical

C. Section 01 91 00, Commissioning.

1.3 SUBMITTALS

A. Refer to Section 01 91 00, Commissioning.

1.4 COMMISSIONING SCOPE OF WORK - COMMISSIONING AGENT

A. Refer to Section 01 91 00, Commissioning.

1.5 COMMISSIONING SCOPE OF WORK - CONTRACTOR

A. Refer to Section 01 91 00, Commissioning.

PART 2 – PRODUCTS

2.1 TEST EQUIPMENT

A. Refer to Section 01 91 00, Commissioning.

PART 3 – EXECUTION

3.1 MEETINGS

A. Refer to Section 01 91 00, Commissioning.

3.2 INSTALLATION, CHECK-OUT, START-UP AND PREFUNCTIONAL CHECKS

A. Refer to Section 01 91 00, Commissioning.

3.3 FUNCTIONAL TESTING

A. Refer to Section 01 91 00, Commissioning.

3.4 TRAINING OF FACILITY OPERATING STAFF AND BUILDING OCCUPANTS

A. Refer to Section 01 91 00, Commissioning.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

A. Work included in Section 27 05 00 applies to Division 27, Communications work to provide materials, labor, tools, permits, incidentals, and other services to provide and make ready for Owner's use of communications systems for proposed project:

B. Contract Documents include, but are not limited to, Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Drawings, Addenda, Owner/Architect Agreement, and Owner/Contractor Agreement. Confirm requirements before commencement of work.

C. Additional conditions apply to this Division including, but not limited to:

1. Specifications including General and Supplementary Conditions and Division 01, General Requirements
2. Drawings
3. General provisions of the Contract
4. Addenda
5. Owner/Architect Agreement
6. Owner/Contractor Agreement
7. Codes, Standards, Public Ordinances and Permits

1.2 RELATED SECTIONS

A. Division 01, General Requirements
B. Division 27, Communications
C. Section 26 05 33, Raceways and Boxes for Electrical Systems
D. Section 26 05 43, Underground Ducts and Raceways for Electrical Systems
E. Section 28 05 13, Conductors and Cables for Electronic Safety and Security

1.3 REFERENCES

A. References, Codes and Standards per Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, individual Division 27 Sections and those listed in this section.

B. Supervisors and Lead Installers:

1. Working knowledge and understanding of the following documents and codes or their most recent updates and familiar with the requirements that pertain to this installation.
2. Installers familiar with and have practical working knowledge of the requirements that pertain to this installation.

C. Codes:

1. Comply with applicable sections of the most recent editions and addenda of following for interior and exterior installations.
2. Codes to include latest adopted editions, including current amendments, supplements and local jurisdiction requirements in effect as of the date of the Contract Documents, of/from:
   a. IBC International Building Code
   b. NEC/NFPA 70 National Electrical Code
   c. NEXC IEEE National Electrical Safety Code
3. State of Oregon:
   a. OAR Oregon Administrative Rules
   b. OESC Oregon Electrical Specialty Code
   c. OFC Oregon Fire Code
   d. OSSC Oregon Structural Specialty Code
   e. OEESC Oregon Energy Efficiency Specialty Code

D. Standards:

1. Comply with applicable sections of the most recent editions and addenda of the following for installations and testing of communications cabling, connectors, and related hardware.
2. Reference standards and guidelines include but are not limited to the latest adopted editions from the following:
   a. ANSI American National Standards Institute
   b. NEMA National Electrical Manufacturers Association
   c. TIA Telecommunications Industries Association

1)	TIA TSB-125	Guidelines for Maintaining Optical Fiber Polarity Through Reverse-Pair Positioning
2)	TIA TSB-140	Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems
3)	TIA-526-7	Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant – OFSTP-7
4)	T-526-14-A	Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant – SFSTP-14
5)	ANSI/TIA-568.0-D	Generic Telecommunications Cabling for Customer Premises
6)	ANSI/TIA-568.1-D	Commercial Building Telecommunications Cabling Standard Part 1: General Requirements
7)	ANSI/TIA-568-C.2	Commercial Building Telecommunications Cabling Standard—Part 2: Balanced Twisted Pair Cabling Components
8)	ANSI/TIA-568-3-D	Optical Fiber Cabling Components Standard
9)	ANSI/TIA-569-C	Commercial Building Standards for Telecommunications Pathways and Spaces
10)	ANSI/TIA-598-C	Optical Fiber Cable Color Coding
11)	ANSI/TIA-604.2-A	FOCIS 2—Fiber Optic Connector Intermateablility Standard
12)	ANSI/TIA-606	Administration Standard for Commercial Telecommunications Infrastructures
13)	ANSI/TIA/607-C	Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
14)	ANSI/TIA-758-A	Customer-owned Outside Plant Telecommunications Infrastructure Standard
15)	ANSI/TIA-854	A Full Duplex Ethernet Specification for 1000 Mb/s (1000BASE-TX) Operating over Category 6 Balanced Twisted-Pair Cabling
16)	ANSI/TIA-862-B	Structured Cabling Infrastructure Standard for Intelligent Building Systems
17)	ANSI/TIA-4994	Standard for Sustainable Information Communications Technology
18)	ANSI/NECA/BICSI 568-2006	Standard for Installing Telecommunications Systems

d. Other Reference Materials

1)	ANSI/NECA/GICSI-568-2006, Standard, Installing Commercial Building Telecommunications Cabling	
2)	COOSP	BICSI - Outside Plant Design Reference Manual
3)	ESSDRM	BICSI - Electronic Safety and Security Reference Manual
4)	ITSIM	BICSI - Information Transport Systems Installation Methods Manual
5)	NDRM	BICSI - Network Design Reference Manual
6)	TDDM	BICSI - Telecommunications Distribution Methods Manual
7)	WDRM	BICSI - Wireless Design Reference Manual
8)	IEEE	Institute of Electrical and Electronic Engineers
9)	NEMA	National Electrical Manufacturers Association
10)	UL	Underwriters Laboratories Cable Certification and Follow Up Program
11)	ASA	American Standards Association

1.4 QUALITY ASSURANCE

A. Perform work in accordance with contract documents and governing codes and standards.

B. Personnel performing the work of this Section thoroughly familiar with the cabling methods set forth in the latest release of the TDMM.

C. RCDD reviews required work prior to commencing. Oversee the installation and will have the end responsibility for the quality of the installation work performed. Submitted designs and or changes to the design must be approved and signed off by the RCDD.

D. Installed cabling systems not to generate nor be susceptible to harmful electromagnetic emission, radiation, or induction that degrades cabling systems.

E. Expansion Capability: Unless otherwise indicated, provide spare positions in wall fields, cross connects, and patch panels, as well as space in distribution and riser pathways to accommodate minimum 15 percent future growth.

F. Backward Compatibility: The provided solution backward compatible with lower category ratings such that if higher category components are used with lower category components, the permanent link and channel measures meet or exceed the lower channel's specified parameters.

G. Component Compliance: The provided solution's components each meet the minimum transmission specifications listed herein such that no individual component will be less than specifications for permanent and channel, regardless of the fact that tests for permanent and channel ultimately meet required specifications.

H. Visibly damaged goods are to be returned to the supplier and replaced at no additional cost to the Owner.

1.5 CONTRACTOR RESPONSIBILITY AND QUALIFICATIONS

A. Provide components, materials, services, and labor essential for a complete and functional structured cabling system.

B. Comply with local, state, and federal laws and regulations applicable to the work to be performed although said law, rule, or regulation is not identified herein.

C. Examination of building and site responsibility:

1. Examine site and building prior to installation to determine conditions affecting the scope of work.
2. Contact Owner representative for arrangements.
3. Systems and cabling are assumed working and in good condition unless Contractor documents exceptions.

D. Respect and protect the privacy and confidentiality of Owner, its employees, processes, products, and intellectual property to the extent necessary, consistent with the legal responsibilities of the State of Oregon and Owner policies.

E. Use of Sub-Contractors:
   1. Inform in writing to Owner's representative and General Contractor about the intention to use sub-contractors and the scope of work for which they are being hired.
   2. Owner's representative prior to the sub-contractor's hiring and start of work must approve the use of sub-contractors in writing.

F. Provide a sufficient number of technicians for this project to stay on schedule.

G. Contractor Qualifications:
   1. Fully conversant and capable in the cabling and equipment installation of communications systems including, but not limited to:
      a. Data/Voice Structured Cabling
      b. Audio and Video System Types
   2. Minimum of five years' experience in the design, installation, testing, and maintenance of communications systems.
   3. Must employ at least one full time BICSI certified RCDD who is involved in reviewing work performed by contractor on this project.
   4. Verification of current BICSI Certified Installer, or equivalent.
   5. Personnel trained in the installation of pathways and support for housing horizontal and backbone cabling.
   6. Installers: Only technicians certified by approved equipment manufacturer are approved.
   7. Maintain a local service facility which stocks spare devices and/or components for servicing systems.
   8. Have performed successful installation and maintenance of at least three projects similar in scope and size. Provide project references for these three projects, including scope of Work, project type, Owner/user contact name and telephone number.

1.6 MANUFACTURERS

A. Equipment in these Sections are the standard products of a manufacturer regularly engaged in the manufacture of such products unless specified otherwise. Components used in the system commercial products that comply with these Specifications.

B. Each component of equipment identifies the manufacturer's name, model, and applicable serial number. The Owner's authorized representative retains the right to reject products that reflect, in their opinion, sub-standard design practices, manufacturing procedures, support services, or warranty policies.

1.7 CHANGE ORDERS

A. Supplemental cost proposals by the Contractor accompanied with a complete itemized breakdown of labor and materials. At the Architect's request, Contractor's estimating sheets for the supplemental cost proposals made available to the Architect.

B. Separate and allocate labor for each item of work.

1.8 WARRANTY

A. The chosen Communications Contractor provide a minimum 1 year warranty on material, installation, and workmanship.

B. Provide a written warranty covering the work of this Division as required by the General Conditions.

C. Apparatus:
   1. Free of defects of material and workmanship and in accord with the Contract Documents.
   2. Built and installed to deliver its full rated capacity at the efficiency for which it was designed.

D. Include in Contractor's warranty for Work of Division 27, Communications system damage caused by failures of system component.

1.9 GENERAL

A. Meet or exceed applicable referenced standards, federal, state, and local requirements and conform to codes and ordinances of authorities having jurisdiction.

1.10 SUBMITTALS

A. General:
   1. Guidelines set forth in this Section pertain to Division 27, Communications specifications included in this project.
   2. Submit the following deliverables to the Owner and Design Team prior to ordering equipment or installation of equipment.
   3. Partial submittals will not be considered, reviewed, or stored, and such submittals will not be returned.
   4. Materials and equipment listed that are not in accordance with specification requirements and/or not prior approved may be rejected.
   5. The approval of material, equipment, systems, and shop drawings is a general approval subject to the Drawings, Specifications, and verification of measurements at the job. Approval does not relieve the Contractor from the responsibility of shop drawing errors. Carefully check and correct shop drawings prior to submission for approval.

B. Informational Submittals:
   1. Field Test Reports:
      a. Submit sample cable test reports showing report format and parameters tested.
      b. Submit minimum of 2 weeks prior to final punch walkthrough. Maintain test equipment on-site during punch for sample proof-of-performance tests.
   2. Proposed test forms for fiber backbone, copper backbone, and horizontal UTP cable.
   3. Certificates:
      a. Certify that field tests have been performed and that work meets or exceeds specified requirements.
      b. Certify that factory tests have been performed and that work meets or exceeds specified requirements. Certificates may be based on recent or previous test results, provided material or products tested are identical to those proposed for this Project.
      c. Optical loss budget calculations for each optical fiber run.
      d. Calibration report of test equipment for fiber and copper. Last calibration date should not be older than one year from the first day of testing.
      e. Name(s) and copy of installer's certificates as it pertains to the system design (e.g. RCDD, CTS, NICET, etc.).

C. Shop Drawings:
   1. Original bid contract documents are not to be used as shop drawings. Generate their original shop drawings utilizing CAD software (i.e. AutoCAD, Revit, etc.)
   2. Shop drawings that appear to be traces or overlays of original bid contract documents immediately rejected.
   3. Where scope is distributed among multiple sub-contractors, each sub-contractor's submittal makes reference the other submittal where connections to equipment provided by other sub-contractors is required.
      a. Example: Contractor A provides System X shop drawings. Contractor B provides System Y shop drawings. Both sets of shop drawings must make references to each other where systems X or Y are interdependent on each other to function.
   4. General Requirements:
      a. Clear and legible
      b. Utilize the same sheet size as the contract drawings.
      c. Use minimum of 1/8-inch text height for text, symbol text, and subscript text.

d. Plan drawings utilize the same scale as issued in the contract documents.
e. Plan drawings utilize the same sheet order as issued in the contract documents.
f. Plan drawings utilize the same grid-line locations relative to the sheet as issued in the contract document (this is to aid overlay and checking of shop drawings vs. contract documents and to aid the as-built documentation).
g. Sheets, including the cover sheet include a title block containing the following information:
    1) System specific sheet number
    2) Project name, specification section number, and Section title name
    3) Floor name, area, and/or floor description matching that of the contract drawings.
h. Include architectural information on the shop drawings including, but not limited to the following:
    1) Match Lines
    2) Grid Lines
    3) Grid Bubbles
    4) Key Plans
    5) Enlarged Floor Plan Callouts

5. Cover Sheet:
    a. The first page of shop drawings includes a coversheet containing the following information:
        1) Site Information:
            a) Name of Site
            b) Address
            c) City
            d) Zip Code
        2) Installing Contractor's Information:
            a) Business Name
            b) Local Office Address
            c) Phone Number
            d) Website
            e) Primary Contact Person:
                (1) Name
                (2) Phone Number
                (3) Email Address
    b. Provide sheet index on the coversheet.
6. Legends:
    a. Symbols:
        1) Shop drawings include an associated symbol for each device used on the symbol legend, including but not limited to the following:
            a) Symbol Name
            b) Device Description
            c) Rough-in Requirements
            d) Applicable Manufacturer
            e) Manufacturer's Model Number
    b. Wiring:
        1) Shop drawings include an associated symbol for each wire used on the symbol legend, including but not limited to the following:
            a) Cable Designator
            b) Cable Manufacturer
            c) Model Number
            d) Cable Rating (e.g. CMP, CMR, OSP, etc.)
            e) Size of Conductors

f) Quantity of Conductors
2) Each cable type has a different designation.

7. Plans and Elevations:
   a. Plan Views:
      1) Devices, cabinets, racks, and termination blocks.
      2) Raceways (conduits, cable trays, ladder racks, floor ducts, junction boxes, pull boxes, splice boxes, manholes, and associated supports).
      3) Field devices with their respective address number.
      4) IP addresses for TCP/IP devices included in the system.
      5) Equipment clearances for racks/cabinets.
   b. Elevation Views:
      1) Termination blocks, patch panels, wire managers, and other devices.
      2) Vertical and horizontal offsets and transitions.
      3) Vertical elevation of cable trays above the floor or bottom of ceiling structure.
      4) Clearances for access above and to side of cable trays.
      5) Rack Layouts
         a) Intended equipment layout within the racks.
         b) Blank filler plates in spaces where equipment is not installed.
         c) Areas within the rack for equipment furnished by or reserved by others.
         d) Indicate rack unit size of equipment, and total rack units available in the rack.
8. Details and Diagrams:
   a. Details:
      1) Mounting details for head-end equipment, racks, and field devices.
   b. Diagrams:
      1) Associated one-line or riser diagram showing connections between devices and connections to equipment provided in other systems.
      2) Indicate cable type, sizes, and quantities between each TR for backbone copper and fiber cabling.
      3) Show field devices with their respective room names/numbers and connections to their associated equipment.
      4) Show field devices with their respective address number.
      5) Show IP addresses for TCP/IP devices included in the system.
9. System Labeling Schedules:
   a. Electronic copy of labeling schedules, in software and format selected by Owner.
10. Deferred Submittals:
   a. Mounting Details:
      1) Provide engineering analysis, calculations, and drawing details of device restraints and supports for maximum loading in compliance with Code and coordinated with all trades.
      2) Details to show loads, connection type/materials, dimensions, etc., specific to each unique installation instance.
      3) Details to indicate both expected and maximum loads.
      4) Analysis to adhere to seismic bracing requirements in the jurisdiction specific to the project.
      5) Details to be stamped and signed by an Engineer licensed for the applicable work in the project's area of jurisdiction.
      6) Provide details for:
         a) Floor mounted equipment racks, including raised floor supports.

b) Cable tray, runway, and wire-basket tray.
c) Ceiling and Wall:
(1) Supported flat panel displays.
(2) Supported projectors and projection screens.
d) Roof-mount devices, braced to withstand maximum wind gusts and uplift pressures.
e) Conduit and junction boxes infrastructure systems.
f) Antennas and satellite dishes.
g) Other ceiling and wall supported devices weighing more than 20 pounds.

D. Equipment/Product Data Submittals:
1. Submit a single package of the related submittals for the products called out in Division 27, Communications Specifications.
2. Two indexed sets of manufacturer's technical data for each product including product description, specifications including labeling or listing by an agency acceptable to the Owner, and storage requirements.
3. Submitted digitally (e.g. in PDF) and have digital bookmarks for navigating the document set, organized as follows:
a. Primary division (e.g. 27)
1) Submittal section (e.g. 271500)
a) Product name (e.g. “PATCH PANELS”)
4. For each applicable section within the Division 27, Communications, organize as follows:
a. Cover sheet for each applicable section number.
1) Include the contractor’s contact information
b. Table of contents with the following information per line:
1) Equipment Type
2) Manufacturer
3) Model Number
4) Page Number (with hyperlink to product data sheet’s page)
c. Apply header to each page of each sections submittals including the following:
1) Title of division 27 section the products fall under (e.g. 271500 Communications Horizontal Cabling).
d. Apply footer to the bottom of each submittal package including the following:
1) Clearly labeled page numbers
2) Date of submittal (YYYY-MM-DD)
5. Where more than one product is called out on the same sheet, clearly highlight or mark which product is proposed for use.

E. Project Closeout:
1. Manufacturer's Installation, Start-Up, and Adjustment Instructions.
2. Operation and Maintenance Data.
a. Update to the Equipment/Product Data Submittals with identical document structure and digital document requirements.
b. Include digital copy in both of the following:
1) Archival quality DVD-R
2) USB flash drive
c. Include full manuals of equipment provided (data sheets alone not acceptable).
d. Include test data and reports.

e. Include original software configuration files and programming software for head-end equipment.
   1) Software files consist of both the original "un-compiled" file used for creating the system, as well as the compiled firmware/instructions that are loaded onto the head-end equipment/device. This includes, but is not limited to, the following typical systems:
      a) Access Control
      b) Intrusion Alarm
      c) Video Surveillance

3. Special Warranty:
   a. Do not offer a special warranty to Owner to supplement the standard warranty requirement covered in this Specification.
      1) With respect to the installation of Approved Manufacturer's Cabling System, furnish Approved Manufacturer's Cabling System application / system standard warranty.

1.11 PRODUCT ASSURANCE

A. UL and/or ETL approved and labeled in accordance with NEC for products where labeling service normally applies.

B. Label materials and equipment requiring UL 94, 149, or 1863. Modification of products that nullifies UL labels is not permitted.

C. Materials and equipment provided by standard Commercial-Off-The-Shelf (COTS) products of a manufacture engaged in the manufacture of such products.

D. Typical commercial designs that comply with the requirements specified. Materials and equipment readily available through manufacturers and/or distributors. Supply equipment complete with optional items required for proper installation.

E. Materials or Manufactures not listed in this Division 27, Communications but are required materials to provide a complete and functioning cable infrastructure system have cut sheets and product data included in the material and procedures submittal package.

F. Coordinate the features of materials and equipment so they form an integrated system. Match components and interconnections for optimum future performance and backward compatibility.

G. Test fiber cable while on the reel prior to installation of the cable. Assume liability for replacement of cable should it be found defective at this time or a later date prior to customer acceptance.

1.12 COORDINATION

A. Coordinate arrangement, mounting, and support of communications equipment with Architect, Communication Design Professional or Owner Information Technology Team:
   1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
   2. To provide the most efficient pathway for structured cabling endpoint devices such that the cabling never exceeds the 295-feet permanent link distance. Pathways must be shown on shop drawings for review prior to installation.
   3. To provide for ease of disconnecting the equipment with minimum interference to other installations.
   4. To allow right-of-way for piping and conduit installed at required slope.
      a. Racks and Communication Cabinets: 3-foot minimum.
      b. Open Pathways – Cable Tray, J-Hooks: 12-inch clear on working side; 3-inch clear from ceiling tiles.
      c. Closed Pathways – Conduit (Above and Below Grade):
         1) 3-inch clear from electrical pathways concrete encased.
         2) 12-inch clear in electrical pathways in dirt.
         3) 48-inch clear electrical Motors and transformers.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
C. Coordinate location of access panels and doors for communications items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08, Openings.
D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07, Thermal and Moisture Protection.
E. Responsible for coordination with all trades, to include required scheduling of materials and/or equipment with Owner and/or General Contractor for delivery, storage, and protection of equipment as required.
F. Finishes: Where specific device finishes have not been identified, selected by Owner or Architect, finish to match surrounding surfaces.

1.13 PRE-INSTALLATION CONFERENCE

A. Arrange and schedule pre-installation conference prior to beginning work of this Section Division 27, Communications.
B. Agenda: Clarify questions in writing related to work to be performed, scheduling, coordination, etc., with Consultant and/or Project Manager/Owner representative.
C. Individuals, who will be in an on-site supervisory capacity, are required to attend the pre-installation conference. This includes project managers, site supervisor, and lead installers. Individuals who do not attend the conference will not be permitted to supervise the personnel that install, terminate, or test communications cables on the project. Oversee the installation is required to attend the pre-installation conference.
D. The manufacturer that will be providing the extended warranty is required to have a representative attend the pre-installation conference.

1.14 FIELD QUALITY CONTROL

A. Perform the following field inspections during installation and commissioning:
   1. Visually inspect UTP and optical fiber jacket materials for NRTL certification markings.
   2. Visually inspect cabling placements, pathways, and terminations in communications equipment rooms, telecommunications rooms, and work areas for compliance with standards and codes.
   3. Visually inspect grounding and bonding for compliance with standards and codes.
   4. Visually inspect installed cable trays, cable pathways, and wall penetrations for compliance with standards and codes.
B. Responsible for field inspections and will submit a signed weekly inspection report to Owner.

1.15 ALTERNATES, SUBSTITUTIONS, AND CHANGE ORDERS

A. If a proposed alternate material submitted as an “or approved equal” to or exceeds specified requirements, provide manufacturer’s specifications in writing for written approval prior to purchase and installation of proposed materials. The proposed material substitution not void or change manufacturer’s warranty.
B. Provide a complete cabling infrastructure according to these written specifications and drawings. Changes from the Owner changes the scope of work to be performed by the Contractor, put in writing. Respond to changes with a complete material list, labor, and taxes in writing presented to the Owner for approval. Do not proceed with additional scope of work without a signed approval by the Owner.
C. Additional work performed by the Contractor will not be paid by Owner without signed approval of these changes prior to implementing changes. Submit a copy of signed change order upon billing.
D. Refer to Technology Drawings for detailed information relating to the appropriate alternates.

1.16 PROJECT MANAGEMENT

A. Designate a project manager to act as the single point of contact. Project manager to oversee work performed to ensure a quality installation compliant with specifications as outlined in documents (which includes specifications and drawings). Owner or Consulting Engineer will review a copy of the resume of the on-site project managers and each on-site team.

B. Contractor project manager/supervisor to attend meetings arranged by General Contractor, Architect, Owner's representatives, and/or other parties affected by work of this specification.

1.17 DELIVERY AND STORAGE

A. Assume custody and responsibility for the items upon delivery and determining that the contents are complete and in satisfactory condition for installation.

B. Delivery, loss, storage, and protection: Materials and equipment delivered and placed in storage stored with protection from the weather, humidity, and temperature variation, dirt, and dust or other contaminants.

C. Coordinate deliveries and submittals with the General Contractor/Owner to ensure a timely scheduled installation.

D. Responsible for handling and control of cabling equipment and liable for material loss due to delivery and storage problems.

E. No equipment or materials delivered to the job site more than three weeks prior to the commencement of its installation. Coordinate with General Contractor/Owner on location of storage materials.

1.18 AS-BUILTS

A. Record copy and as-built drawings.

1. Provide record copy drawings periodically throughout the project as requested by the General Contractor or Owner, and at end of the project on CD-ROM. Record copy drawings at the end of the project in AutoCAD format and include notations reflecting the as built conditions of additions to or variation from the drawings provided such as, but not limited to, cable paths and termination points. AutoCAD drawings are to incorporate test data imported from the test instruments.
2. As built drawings include, but are not limited to: block diagrams, frame and cable labeling, cable termination points, equipment room layouts, rack elevations, and frame installation details. The as-built drawings includes field changes made up to construction completion:
    a. Field directed changes to cross connect and patching schedule.
    b. Horizontal cable routing changes.
    c. Backbone cable routing or location changes, inclusive outside plant physical pathways (if within scope of this project).
    d. Associated detail drawings.

1.19 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, dust, and construction debris and repair damaged finish, including chips, scratches, and abrasions. This includes touching up paint removed for grounding.

B. Provide a clean work environment, free from trash/rubbish accumulated during and after cabling installation.

C. Maintain construction materials and refuse within the area of work. Clean the work area at the end of each day.

D. Keep liquids off finished floors, carpets, tiles, racks, and equipment. If liquid damages finishes or equipment, provide professional services to clean or repair scratched/soiled finishes or damaged equipment at the Contractors own expense.

1.20 PAINTING

A. Certain Division 27, Communications Sections contain the requirement of painting, it is the responsibility of the Contractor to coordinate the requirements and labor involved to complete this work with the General Contractor.

B. Touch up marred and bared surfaces of primed, galvanized, and finish painted equipment, materials, and accessories installed.

C. Restore patched surfaces as close to the original condition and finish as reasonably possible. Where patching occurs in smooth painted surface, extend final paint coat over entire unbroken surface containing patch, after patched area has received two coats of primer and two coats of finished paint.

PART 2 – PRODUCTS

2.1 GENERAL

A. Where specified materials or methods conflict with applicable codes, the more stringent requirement applies.

B. Provide apparatus built and installed to deliver its full rated capacity at the efficiency for which it was designed.

C. Materials and Equipment:

1. Use materials and equipment that are:
   a. New
   b. Of quality meeting or exceeding specified standards.
   c. Free of faults and defects.
   d. Conforming to Contract Documents.
   e. Of size, make, type, and quality specified.
   f. Suitable for the installation indicated.
   g. Manufactured in accordance with NEMA, ANSI, UL, or other applicable standards.
   h. Otherwise as specified in Division 01, General Requirements.
2. Where two or more units of the same class of equipment are furnished, use products of the same manufacturer.
   a. Component parts of the entire system need not be products of same manufacturer.

D. Basis of Design:

1. First listed manufacturer specified by performance or model number considered the Basis of Design.
2. If other equipment is provided in lieu of the Basis of Design equipment, assume responsibility for changes and costs which may be necessary to accommodate this equipment, including, but not limited to:
   a. Different sizes and locations for connections.
   b. Different dimensions.
   c. Different access requirements.
   d. Different configurations of connected equipment.
   e. Other differences.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General:

1. Full and complete compliance with standards and guidelines set forth in this and subsequent specifications.

2. Field verify existing conditions prior to installation and make note of conflicts and discrepancies between these specifications and construction drawings to the Owner immediately.
    a. Field discrepancies not noted to the Owner or Design Team prior to installation commencement the responsibility of the Contractor and repaired at no cost to the Owner.
3. Provide a complete and properly operating system for each item of equipment specified.
4. Install materials in a neat and professional manner.
5. Comply with equipment manufacturer's written instructions, the best industry practices, and the Contract Documents.

B. Clarification:
1. Where there is a conflict among manufacturer's instruction, best practice, and the Documents, request clarification from the Architect prior to rough-in.
2. Architect's decision will be final.
3. Remove and correct work installed without clarification by the Contractor at no cost to the Owner.

C. Existing concrete, block, or brick walls are considered not accessible and may require use of Surface Mounted Raceway (SMR) if existing concealed raceway and device boxes are not available for reuse or do not meet the intent of the design. Coordinate route and installation where SMR is required with the Architect/Engineer prior to rough-in. Responsible for reinstalling SMR routed without such prior approval to the Architect's satisfaction.

D. Existing stud walls (wood or metal) with or without blocking with plaster, plasterboard, or paneling finish are considered accessible with accessible ceiling, attic, tunnel, or crawl space above, below, or adjacent. Remove, patch, and repair finished surface as required to conceal rough-in for new device locations. If it is determined that a specific instance will not permit concealment of rough-in due to obstructions such as beams, headers, and other structural elements, prior approval before rough-in from the Architect is required.

3.2 INSTALLATION IN RATED CONSTRUCTION

A. Install intumescent material around ducts, conduits, and other telecommunications elements penetrating rated construction.

B. Comply with firestop materials manufacturer's written instructions to prevent spread of smoke or fire through sleeves or block-outs penetrating rated fire barriers.

C. Provide firestop materials specified in Division 07, Thermal and Moisture Protection, and as follows:
1. Capable of passing a 3-hour test per ASTM E-814 (UL 1479).
2. Consisting of material capable of expanding nominally eight times when exposed to temperatures of 250 degrees F – 350 degrees F.
3. An alternate method utilizing intumescent materials in caulk or putty complying with Division 07, Thermal and Moisture Protection may be used.

3.3 EQUIPMENT SUPPORT

A. Minimum Support Capacity:
1. Provide fastening devices and supports for equipment, panels, outlets, and cabinets capable of supporting not less than four times the ultimate weight of the object or objects fastened to or suspended from the building structure.

B. Support junction boxes, pull boxes, or other conduit terminating housings located above the suspended ceiling from the floor above, roof, or penthouse floor structure to prevent sagging or swaying.

C. Conduits:
1. Support suspended conduits 1-inch and larger from the overhead structural system with metal ring or trapeze hangers and threaded steel rod having a safety factor of four.

2. Conduits smaller than one 1-inch installed in ceiling cavities may be supported on the mechanical system supports when available space and support capacity has been coordinated with the sub-contractor installing the supports.
3. Anchor conduit installed in poured concrete to the steel reinforcing with 14 AWG black iron wire.

D. Powder actuated or similar shot-in fastening devices will not be permitted for technology work except by review from the project structural engineer.

3.4 ALIGNMENT

A. Install panels, cabinets, and equipment level and plumb, parallel with structural building lines.
B. Install equipment and enclosures fitted neatly, without gaps, openings, or distortion.
C. Properly and neatly close unused openings with approved devices.
D. Fit surface panels, devices, and outlets with neat, appropriate, trims, plates, or covers without overhanging edges, protruding corners, or raw edges.

3.5 CUTTING AND PATCHING

A. General:
   1. Comply with Division 01, General Requirements.
   2. Restore to original condition new or existing work cut or damaged by installation, testing, and removal of work.
   3. Patch and finish spaces around conduits passing through floors and walls to match the adjacent construction, including painting or other finishes.
   4. Clean up and remove dirt and debris.
B. Make additional required openings by drilling or cutting. Use of jackhammer is prohibited.
C. Fill holes that are cut oversize so that a tight fit is obtained around the objects passing through.
   1. In rated construction, comply with Division 07, Thermal and Moisture Protection.
D. Obtain Architect's permission and direction prior to piercing beams or columns.
E. Where alterations disturb lawns, paving, walks, and other permanent site improvements, repair and refinish surfaces to condition existing prior to commencement of work.

3.6 PROTECTION OF WORK

A. Protect telecommunication work and equipment installed under this Division against damage by other trades, weather conditions, or other causes.
   1. Equipment found damaged or in other than new condition will be rejected as defective.
B. Keep equipment, panels, outlets, and related telecommunication equipment covered or closed to exclude dust, dirt, and splashes of plaster, cement, paint, or other construction material spray.
   1. Equipment not free of contamination is not acceptable.
C. Provide enclosures and trims in new condition, free of rust, scratches, and other finish defects.
   1. If damaged, properly refinish in a manner acceptable to the Architect.

3.7 COMPLETION AND TESTING

A. General:
   1. Comply with Division 01, General Requirements.
B. Upon completion, test systems to show that installed equipment operates as designed and specified, free of faults.
   1. Schedule system tests so that several occur on the same day.
   2. Coordinate testing schedule with construction phasing.
   3. Submit systems test reports for Design Team review and feedback.
   4. Schedule proof-of-performance testing with Design Team representative and/or Owner's representative.
C. A qualified contractor with required tools to conduct cable and equipment tests. Arrange to have the equipment factory representative present for those tests where the manufacturer's warranty could be impacted by the absence of a factory representative.
D. Perform tests per the requirements of each of the following systems:
   1. Horizontal data/voice structured cabling system.

2. Backbone data/voice cabling system.
3. Audio/video systems.

E. Software and Programming
1. Software, firmware, web-based GUI, and other systems with username and login credentials given unique passwords from the factory defaults.
2. Maintaining factory default credentials is not acceptable.
3. Document username/passwords for equipment in the as-built/O&M manuals.

F. Provide a written record of final performance tests after final proof-of-performance review and acceptance, and submit with operation and maintenance data.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Conduit and other Closed Pathway System
   2. Pathway Bend Management
   3. Wide Base Cable Supports
   4. Cable Trays - General
   5. Cable Tray Accessories
   6. Enclosures and Pullboxes
   7. Fire Rated Pathways
   8. Acoustically Separated Pathways
   9. Cable Straps

B. Handholes and Boxes for Exterior Underground Cabling

C. Work covered by this Section consists of furnishing labor, equipment, supplies, materials, and testing unless otherwise specified for a complete pathways system for the communications systems.

1.2 RELATED SECTIONS

A. Division 01, General Requirements

B. Division 27, Communications

C. Section 26 05 33, Raceways and Boxes for Electrical Systems]

D. Section 26 05 43, Underground Ducts and Raceways for Electrical Systems

E. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, General Requirements Specification Sections, apply to this Section.

F. Provisions of Division 27, Communications Section 27 05 00, Common Work Results for Communications, apply to this Section.

1.3 REFERENCES

A. References, Codes and Standards as required by Section 27 05 00, Common Work Results for Communications and Division 01, General Requirements.

B. In addition, meet the following:
   1. Underwriters Laboratories, Inc.:
      a. UL 1-03 Flexible Metal Conduit
      b. UL 5-01 Surface Metal Raceway and Fittings
      c. UL 6-03 Rigid Metal Conduit
      d. UL 50-03 Enclosures for Electrical Equipment
      e. UL 360-03 Liquid-Tight Flexible Steel Conduit
      f. UL 467-01 Grounding and Bonding Equipment
      g. UL 514A-01 Metallic Outlet Boxes
      h. UL 514B-02 Fittings for Cable and Conduit
      i. UL 514C-05 Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers
      j. UL 651-02 Schedule 40 and 80 Rigid PVC Conduit
      k. UL 651A-03 Type EB and A Rigid PVC Conduit and HDPE Conduit
      l. UL 797-03 Electrical Metallic Tubing
      m. UL 1242-00 Intermediate Metal Conduit
      n. UL 1684 Fiberglass Conduit Above Ground
   2. National Electrical Manufacturers Association:
      a. NEMA TC-3-04 PVC Fittings for Use with Rigid PVC Conduit and Tubing
      b. NEMA FB1-03 Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable

1.4 QUALITY ASSURANCE

A. Conform to the quality assurance requirements of Section 27 05 00, Common Work Results for Communications and Division 01, General Requirements.3

B. Low voltage system cable supports and accessories listed to Underwriter's Laboratories or other national recognized testing laboratory.
C. Low voltage system cable supports and accessories have the manufacturers name and part number stamped on the part for identification.
D. Pre-Installation Meetings:
   1. Setup a pre-installation meeting to discuss low voltage cable support layout work and installation guidelines.
   2. Organize meeting a minimum of 30 days prior to initiating cable support installation work.
   3. Attendees include Contractor, appropriate subcontractors, low voltage system vendors, Architect, and Owner's Representative.
E. Purpose of meeting is to coordinate work between the parties to have a consistent layout for low voltage system cables, minimize interferences, and to make cable system accessibility for future owner modifications and maintenance high priority issue for installers.

1.5 SUBMITTALS

A. Including, but not limited to: Product Data Sheets, Shop Drawings, etc.
B. General:
   1. Submit in accordance with Section 27 05 00, Common Work Results for Communications submittal requirements.
C. Closeout Submittals:
   1. Submit in accordance with Section 27 05 00, Common Work Results for Communications submittal requirements.
D. Additional requirements specific to this Section:
   1. Firestop design basis documentation that includes each type of communication penetration, type of building construction being penetrated including the hourly resistance rating of floor, wall, or other partition of building construction into which firestop design will be installed, and firestop device or system proposed for use.

1.6 COORDINATION

A. Responsible for coordinating the arrangement, mounting and support for communications support equipment.
B. In accordance with the requirements set forth in Section 27 05 00, Common Work Results for Communications, provide the following:
   1. Plan view and elevations of raceways (conduits, cable trays, ladder racks, floor ducts, junction boxes, pull boxes, splice boxes, manholes, and associated supports).
      a. Vertical and horizontal offsets and transitions.
      b. Clearances for access above and to side of cable trays.
      c. Vertical elevation of cable trays above the floor or bottom of ceiling structure.
C. Coordinate layout and installation of low voltage cable bundle supports with other construction elements to ensure adequate headroom, working clearance and access. Revise locations and elevations for those indicated as required to suit field conditions and as approved by Owner's Representative.
D. Examine drawings and existing conditions above ceilings and include additional supports in bid price to avoid ducts, pipes, conduits, etc. Installation in existing ceilings can be very difficult. Include extra labor time involved in bid price.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Conduit and Other Closed Pathways Systems:
   1. Conduit:
      a. Allied
      b. Prime
      c. Wheatland

d. Or approved equal.

2. Conduit Supports:
   a. Allied
   b. Prime
   c. Wheatland
   d. Or approved equal.

B. Pathway Bend Management:
1. Panduit Conduit Waterfall
2. Bejed Cable Spillway
3. STI Radius Control Modules
4. Legrand
5. Or approved equal.

C. Wide Base Cable Supports:
1. ERICO Caddy CableCat Series
2. Garvin
3. ICC
4. Or approved equal.

D. Cable Tray, Robust with Side Rails:
1. Cooper B-Line
2. PW Industries
3. Or approved equal.

E. Cable Runways (Ladder-Type) Cable Trays:
1. Chatsworth Products (CPI).
2. B-Line Cooper, Inc.
3. Hoffman.
4. Cablofil/Legrand.
5. Or approved equal.

F. Wire Basket Cable Tray:
1. Cablofil/Legrand
2. Chatsworth Products (CPI)
3. B-Line Cooper, Inc.
4. Hoffman
5. WBT
6. Or approved equal.

G. Cable Tray Accessories:
1. Compatible w/ submitted tray manufacturer.

H. Enclosures and Pullboxes:
   a. Hoffman
   b. Cooper B-Line
   c. Or approved equal.

I. Fire Rated Pathways:
1. STI EZ-path
2. Hilti Speed Sleeve
3. 3M
4. Or approved equal.

J. Acoustically Separated Pathways:
1. STI Acoustical Pathway
2. Hilti Acoustic and Smoke Pathway
3. Or approved equal.

K. Cable Straps:
1. Panduit
2. Velcro
3. Or approved equal.

2.2 CONDUIT AND OTHER CLOSED PATHWAY SYSTEMS

A. Conduit Size: In accordance with the NEC, but not less than 1-inch unless otherwise shown in the Contract Drawings.

B. Install in accordance with the construction documents, national codes, and applicable publications designated herein.

C. Conduit:
   1. Following construction types:
   2. Fiberglass
   3. Electrical Metallic Tubing
   4. Rigid Galvanized Steel
   5. Flexible Non-Metallic Conduit.
   6. Install as recommended by the raceway manufacturer and construction documents.
   7. Flexible Metallic Conduit is not permitted in this project for interior installation.

D. Conduit Supports:
   1. Individual Conduit Hangers: Designed for the purpose, having a preassembled closure bolt and nut, and provisions for receiving a hanger rod.
   2. Install conduit supports at a maximum of 5-foot centers.

2.3 PATHWAY BEND MANAGEMENT

A. Device to control the bend radius must comply with National Electrical Code requirements and TIA Standards. In addition, the product must be RoHS compliant to meet environmental requirements, UL 94V-0 approved to reduce the spread of flame, and be approved by UL for use in air handling spaces.

B. UL Listed:

C. Provide at horizontal 4-inch conduits.

D. Provide at cable tray above equipment racks.

2.4 WIDE BASE CABLE SUPPORTS

A. Wide base J-hooks complying with most current revision of the TIA 568 and 569 structured cabling system requirements.

B. Minimum size is 1-5/16-inch diameter loop for 50, 4-pair UTP or 2 strand fiber optic cable or inner duct. Provide larger size or multiple hooks where required.

C. Minimum 1-inch width and flared edges where cables enter and leave support.
   1. 1.3-inch diameter loop for maximum 35, 4-pair UTP
   2. 2-inch diameter loop for maximum 50, 4-pair UTP

D. Accessories:
   1. Provide applicable accessories to independently support J-hooks from structure.
   2. Include extender bracket for mounting multiple J-hooks on a single support, fasteners, and clamps for connecting to wall, beams, rods, dedicated support wires and C and Z Purlins as required for specific construction.

E. Cable Retainers: Provide cable retainers at each J-hook.

F. Refer to cable bundling instructions specified herein.

G. Finish:
   1. Dry Locations, Above Lay-in Ceiling, Below Raised Floor – galvanized.
   2. Wet and Damp Locations: stainless steel.

2.5 ENCLOSURES AND PULLBOXES

A. Pull Boxes:
   1. Provide enclosure and pull boxes as shown in the construction documents.
   2. Measure and provide additional conduit offsets required by Contractor not shown in Drawings with properly sized pull boxes.

3. Pull Box Sizing:

Minimum Trade Size Conduit	Width	Length	Depth	Each Additional Conduit Increase (Width)
3/4-inch	4-inch	12-inch	3-inch	2-inch
1-inch	4-inch	16-inch	3-inch	2-inch
1-1/4-inch	6-inch	20-inch	3-inch	3-inch
1-1/2-inch	8-inch	27-inch	4-inch	4-inch
2-inch	8-inch	36-inch	4-inch	5-inch
2-1/2-inch	10-inch	42-inch	5-inch	6-inch
3-inch	12-inch	48-inch	5-inch	8-inch
3-1/2-inch	12-inch	54-inch	6-inch	6-inch
4-inch	15-inch	60-inch	8-inch	8-inch

2.6 FIRE RATED PATHWAYS

A. Self-closing through wall penetrations for cabling pathway, without the use of sealant, putty, foam pads, or other similar sealing means.
B. Meets hourly rating for the partition penetrated.
C. Accommodates frequent cable moves, adds, and changes.
D. Permits the allowable cable load to range from 0 to 100 percent visual fill.
E. Does not require additional action on the part of the installer to open or close the pathway device, such as, but not limited to:
   1. Opening or closing of doors.
   2. Twisting an inner liner.
F. Minimum STC rating empty or full: 45

2.7 ACOUSTICALLY SEPARATED PATHWAYS

A. Self-closing through wall penetrations for cabling pathway, without the use of sealant, putty, foam pads, or other similar sealing means.
B. Accommodates frequent cable moves, adds, and changes.
C. Permits the allowable cable load to range from 0 to 100 percent visual fill.
D. Does not require additional action on the part of the installer to open or close the pathway device, such as, but not limited to:
   1. Opening or closing of doors.
   2. Twisting an inner liner.
E. Minimum STC rating empty or full: 45

2.8 CABLE STRAPS

A. Use within telecommunications rooms and open cable pathways (cable tray). Provide for strapping groups of cables to raceway and for controlling/managing patch cables.
B. The use of plastic tie wraps for this purpose is not acceptable.
   1. Self-gripping, reusable, constructed of Velcro, and hook-and-loop style.
   2. Plenum rated cable straps to be used in plenum air handling spaces.
C. Quantity:
   1. Provide in sufficient quantity to strap cable bundles at intervals specific to the type of cable bundle. For the purposes of determining the quantity of straps to provide, the number of cables in a cable bundle and the intervals at which straps applied are as follows:
      a. Bundle size (use to determine strap quantity):
         1) For Patch Cables: Maximum of 25 patch cables per cable bundle with straps applied at 1-foot intervals.
         2) For horizontal cabling: Maximum of 25 station cables per cable bundle with straps applied at 3-foot intervals.
         3) For Backbone Cables: Maximum of 4 backbone cables per cable bundle with straps applied at 3-foot intervals.

D. Bundling (use to determine strap quantity):
   1. Bundle cables by application (patch, horizontal, backbone) and by cable type (Category X, MM Fiber, SM Fiber, etc.).
   2. Do not intermix cable applications and types within a bundle.

E. Color: Black

PART 3 – EXECUTION

3.1 CONDUIT INSTALLATION

A. Penetrations: Cutting or Holes:
   1. Locate holes in advance where they are proposed in the structural sections such as ribs or beams. Obtain the approval of the structural engineer prior to drilling through structural sections.
   2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by the Owner's Information Technology as required by limited working space.

B. Fire Stop:
   1. Where conduits, wire ways, and other communications raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke, and gases as specified in Division 07, Thermal and Moisture Protection , with rock wool fiber or silicone foam sealant only.
   2. Completely fill and seal clearances between raceways and openings with the fire stop material.

C. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal clearances around the conduit and make watertight as specified in Division 07, Thermal and Moisture Protection.

3.2 INSTALLATION, GENERAL

A. Install conduit as follows:
   1. In complete runs before pulling in cables or wires.
   2. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new undamaged material.
   3. Assure conduit installation does not encroach into the ceiling height headroom, walkways, or doorways.
   4. Cut square with a hacksaw, ream, remove burrs, and draw up tight.
   5. Mechanically continuous.
   6. Independently support conduit at 5-feet on center. No other supports allowed.
   7. Support within 1-foot of changes of direction, and within 1-foot of each enclosure to which connected.
   8. Close ends of empty conduit with plugs or caps at the rough-in stage to prevent entry of debris, until wires are pulled in.
   9. Conduit installations under fume and vent hoods are prohibited.
   10. Secure conduits to cabinets, junction boxes, pull boxes, and outlet boxes with bonding type locknuts. Do not use aluminum conduits in wet locations.
   11. Unless otherwise indicated on the drawings or specified herein, install conduits concealed within finished walls, floors, and ceilings.

B. Conduit Bends:
   1. Make bends only with manufacturer approved tools or fittings.
   2. Do not use standard conduit bending machines.
   3. Conduit hickey benders may be used for slight offsets, and for straightening stubbed out conduits.
   4. Bending of conduits with a pipe tee or vise is prohibited.

C. Layout and Homeruns:
   1. Deviations: Make only where necessary to avoid interferences and only after Drawings showing the proposed deviations have been submitted approved by the Owner Information Technology Team.

3.3 CONCEALED WORK INSTALLATION

A. In Concrete:
   1. Conduit: Rigid steel, IMC or EMT. Do not install EMT in concrete slabs that are in contact with soil, gravel, or vapor barriers.
   2. Align and run conduit in direct lines.
   3. Install conduit through concrete beams only when the following occurs:
      a. Where shown on the Structural Drawings.
      b. As approved by the Designer prior to construction, and after submittal of Drawing showing location, size, and position of each penetration.
   4. Installation of conduit in concrete that is less than 3-inches thick is prohibited.
      a. Conduit outside diameter larger than 1/4 of the slab thickness is prohibited.
      b. Space between conduits in slabs: Approximately six conduit diameters apart, except one conduit diameter at conduit crossings.
      c. Install conduits approximately in the center of the slab so that there will be a minimum of 3/4-inch of concrete around the conduits.
   5. Conduit for conductors 600V and below:
      a. Different type conduits mixed indiscriminately in the same system is prohibited.
   6. Align and run conduit parallel or perpendicular to the building lines.
   7. Connect recessed lighting fixtures to conduit runs with maximum 6 feet) of flexible metal conduit extending from a junction box to the fixture.
   8. Tightening set screws with pliers is prohibited.

3.4 EXPOSED WORK INSTALLATION

A. Unless otherwise indicated on the Drawings, exposed conduit is only permitted in mechanical and electrical rooms.
B. Conduit for Conductors 600V and below: Different type of conduits mixed indiscriminately in the system is prohibited.
C. Align and run conduit parallel or perpendicular to the building lines.
D. Install horizontal runs close to the ceiling or beams and secure with conduit straps.
E. Support horizontal or vertical runs at not over 8-foot) intervals.
F. Surface Metal Raceways:
   1. Use only where shown.
G. Painting:
   1. Paint exposed conduit as specified in Division 09, Finishes.
   2. Paint conduits containing cables rated over 600V safety orange.
   3. Refer to Division 09, Finishes for preparation, paint type, and exact color.
   4. Paint legends, using 2-inch high black numerals and letters, showing the cable voltage rating.
   5. Provide legends where conduits pass through walls and floors and at maximum 20-foot intervals in between.

3.5 EXPANSION JOINTS

A. Conduits 3-inches and larger secured to the building structure on opposite sides of a building expansion joint, require expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.
B. Provide conduits smaller than 3-inches with junction boxes on both sides of the expansion joint. Connect conduits to junction boxes with sufficient slack of flexible non-metallic conduit to produce 5-inch vertical drop midway between the ends.

C. Install expansion and deflection couplings where shown.
D. Seismic Areas:
   1. In seismic areas, provide conduits rigidly secured to the building structure on opposite sides of a building expansion joint with junction boxes on both sides of the joint.
   2. Connect conduits to junction boxes with 15-inches of slack flexible conduit.
   3. Flexible Conduit: Copper green ground bonding jumper installed.

3.6 CONDUIT SUPPORTS, INSTALLATION

A. Safe working load not to exceed 1/4 of proof test load of fastening devices.
B. Use pipe straps or individual conduit hangers for supporting individual conduits. Maximum distance between supports is 8-foot on center.
C. Support multiple conduit runs with trapeze hangers. Use trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger itself, and 200 pounds. Attach each conduit with U-bolts or other approved fasteners.
D. Support conduit independently of junction boxes, pull boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items.
E. Fasteners and Supports in Solid Masonry and Concrete:
   1. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
   2. Existing Construction:
      a. Steel expansion anchors not less than 1/4-inch bolt size and not less than 1-1/8-inch embedment.
      b. Power set fasteners not less than 1/4-inch diameter with depth of penetration not less than 3-inches.
      c. Use vibration and shock resistant anchors and fasteners for attaching to concrete ceilings.
F. Hollow Masonry:
   1. Toggle bolts are permitted.
G. Bolts supported only by plaster or gypsum wallboard are not acceptable.
H. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.
I. Attachment by wood plugs, raw plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.
J. Do not use chain, wire, or perforated strap to support or fasten conduit.
K. Spring steel type supports or fasteners are prohibited for uses except: horizontal and vertical supports/fasteners within walls.
L. Vertical Supports:
   1. Vertical Conduit:
      a. Riser clamps and supports in accordance with the NEC and as shown.
   2. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

3.7 BOX INSTALLATION

A. Boxes for Concealed Conduits:
   1. Flush mounted.
   2. Provide raised covers for boxes to suit the wall or ceiling, construction, and finish.
B. Install additional boxes where needed to prevent damage to cables and wires during pulling in operations.
C. Remove only knockouts as required and plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.

3.8 COMMUNICATION SYSTEM CONDUIT

A. Minimum conduit size of 1-inch, but not less than the size shown on the Drawings.
B. Equip conduit ends with insulated bushings.

C. 4-inch conduits within buildings include pull boxes after every two 90 degree bends. Size boxes per the NEC.

D. Vertical conduits/sleeves through closets floors terminate not less than 3-inches below the floor and not less than 12-inches) below the ceiling of the floor below.

E. Terminate conduit runs to/from a backboard in a closet or interstitial space at the top or bottom of the backboard. Conduits enter communication closets next to the wall and be flush with the backboard.

F. Where drilling is necessary for vertical conduits, locate holes so as not to affect structural sections such as ribs or beams.

G. Seal empty conduits located in communication closets or on backboards with a standard non-hardening duct seal compound to prevent the entrance of moisture and gases and to meet fire resistance requirements.

1. Conduit runs contain no more than 2 quarter turns (90 degree bends) between pull boxes/backboards. Minimum radius of communication conduit bends as follows (special long radius):

Sizes of Conduit Trade Size	Radius of Conduit Bends
3/4	6-inches
1	6-inch
1-1/4	7-1/5-inch
1-1/2	9-inch
2	12-inch
2-1/2	25-inch
3	30-inch
3-1/2	36-inch
4	40-inch

3.9 CABLE INSTALLATION

A. Install cables only when each cable tray run has been completed and inspected.

B. Fasten cables on vertical runs to cable trays every 18 inches, using specified Velcro cable straps. Plastic wire-ties are not permitted for communications use.

C. Fasten and support cables that pass from one cable tray to another or drop from cable trays to equipment enclosures. Fasten cables to the cable tray at the point of exit and support cables independent of the enclosure. The cable length between cable trays or between cable tray and enclosure no more than 72-inches.

D. Pathway cabling fill to not exceed a maximum of 40 percent, or per manufacturer's recommendations. Provide multiple support and pathway systems where required cable count exceeds 40 percent fill.

E. Unless otherwise noted, group cabling in separate supports and pathways by the following systems:

1. Voice and Data, Intercom and IP Video Surveillance Systems
2. Analog Video Surveillance and SMATV/CATV Systems
3. Access Control and Intrusion Systems
4. Audio-Visual Systems
5. Distributed Antenna Systems
6. Building Automation Systems
7. Lighting Control Systems
8. Motorized Shade Systems
9. Fire Alarm Systems

3.10 CONNECTIONS

A. Connect pathways to cable trays according to requirements in NEMA VE 2-2000 and NEMA FG 1-1993 where applicable.

3.11 FIELD QUALITY CONTROL

A. Perform the following tests and inspections, with the assistance of a factory-authorized service representative if necessary:
   1. After installing cable trays and after cabling has been energized, survey for compliance with requirements.
   2. Visually inspect cable insulation for damage. Correct sharp corners, protuberances in cable trays, vibrations, and thermal expansion and contraction conditions, which may cause or have caused damage.
   3. Verify that the number, size, and voltage of cables in cable trays do not exceed that permitted by NFPA 70. Verify that communications or data-processing circuits are separated from power circuits by physical barriers or are installed in separate cable trays. Barriers are required between different voltage types.
   4. Verify that there are no intruding items such as pipes, hangers, or other equipment in the cable tray.
   5. Remove dust deposits, industrial process materials, trash of description, and blockage of tray ventilation.
   6. Visually inspect each cable tray joint and each ground connection for mechanical continuity. Check bolted connections between sections for corrosion. Clean and re-torque in suspect areas.
   7. Check for improperly sized or installed bonding jumpers.
   8. Check for missing, incorrect, or damaged bolts, bolt heads, or nuts. When found, replace with specified hardware.
   9. Perform visual and mechanical checks for adequacy of cable tray grounding; verify that takeoff raceways are bonded to cable trays. Test entire cable tray system for continuity. Maximum allowable resistance is 1 Ohm.

B. Provide test and inspection reports.

3.12 PROTECTION

A. Protect installed cable trays and cables.
   1. Install temporary protection for cables in open trays to safeguard exposed cables against falling objects or debris during construction.
   2. Repair damage to galvanized finishes with zinc-rich paint recommended by cable tray manufacturer.
   3. Repair damage to paint finishes with matching touchup coating recommended by cable tray manufacturer.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Metallic Conduit
   2. Non-metallic Conduit
   3. Non-metallic Ducts and Duct Accessories
   4. Precast Concrete Hand Holes
   5. Precast Concrete Pull Boxes
   6. Precast Vaults
   7. Utility Structure Accessories
   8. Underground Enclosure Applications
   9. Duct Seal (Populated with Cabling)
   10. Duct Seal (Unpopulated Conduit)
   11. Cable Lubricant

B. Work covered by this Section consists of furnishing labor, equipment, supplies, materials, and testing unless otherwise specified for a complete grounding (earthing) and bonding system for the communications systems.

1.2 RELATED SECTIONS

1. Division 01, General Requirements
2. Division 27, Communications
3. Section 26 05 26, Grounding and Bonding for Electrical Systems
4. Section 26 05 33, Raceways and Boxes for Electrical Systems
5. Section 26 05 43, Underground Ducts and Raceways for Electrical Systems

1.3 REFERENCES

A. References, Codes and Standards as required by Section 27 05 00, Common Work Results for Communications and Division 01, General Requirements.

1.4 QUALITY ASSURANCE

A. Conform to the quality assurance requirements of Section 27 05 00, Common Work Results for Communications and Division 01, General Requirements.

1.5 SUBMITTALS

A. Including, but not limited to: Product Data Sheets, Shop Drawings, etc.

B. General: Submit in accordance with Section 270500, Common Work Results for Communications submittal requirements.

C. Closeout Submittals: Submit in accordance with Section 270500, Common Work Results for Communications submittal requirements.

D. Additional requirements specific to this Section:
   1. Shop Drawings:
      a. Submit descriptive details of the manufacturers' proposed standard product listings, including:
         1) Precast Vaults, Pull Boxes and Handholes
         2) Precast Vaults, Pull Boxes, and Handhole Accessories, includes covers and frames.
         3) Precast concrete 28-day compressive strength data.
         4) Vault, Pull Box and Handhole Cement Certification
         5) Duct Bank Cement Certification
         6) Duct Spacers
         7) Ducts and Raceways
         8) Conduit Expansion/Deflection Fittings
   2. Show drawings for vaults, pull boxes and handholes, including:
      a. Design criteria signed by professional structural engineer licensed by the State.

b. Reinforcing steel locations and concrete covers.
c. Layout of inserts, attachments, and openings.
d. Locations and types of joints.
e. Accessories, including covers, frames, and diamond plate doors where applicable.

3. Duct-Bank Coordination Drawings: show duct profiles and coordination with other utilities and underground structures.
   a. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.
   b. Drawings signed and sealed by a qualified professional engineer licensed by the State.

1.6 DEFINITIONS

A. Duct: Interchangeable term for a conduit.
B. Duct Bank: An assembly of conduits directly buried in the earth or encased in concrete.
C. Hand Hole: Small underground structure (15-inch by 20-inch by 10-inch, etc.) typically used for a maximum of two 1-1/4-inch conduits. Use for distribution to a single end point.
D. Pull Box: Small underground structure (15-inch by 26-inch by 18-inch, etc.) typically used for a maximum of two 2-inch conduits.
E. Vault: Large underground structure of varying size typically used for 4-inch conduits.
   1. Need to size vault to accommodate conduits installed and room for additional growth.

1.7 IDENTIFICATION

A. Vault Covers, pull box and handhole lids are to be factory labeled COMMUNICATIONS.
B. Label copper and fiber cables that run underground in each vault, pull box, hand hole, and pull box with a brass tag.

1.8 WARRANTY

A. Refer to Section 27 05 00, Common Work Results for Communications, for general details

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Metallic Conduits:
   1. Allied Tube & Conduit
   2. Republic Conduit
   3. Or approved equal.
B. Non-Metallic Conduit:
   1. Prime Conduit
   2. JM Eagle
   3. Cantex
   4. Or approved equal.
C. Non-Metallic Ducts and Duct Accessories:
   1. Lamson & Sessions; Carlon Electrical Products
   2. Manhattan/CDT; a division of Cable Design Technologies
   3. Spiraduct/AFC Cable Systems, Inc.
   4. Or approved equal.
D. Precast Concrete Hand Holes:
   1. Christy Concrete Products
   2. Oldcastle Precast Group
   3. Utility Concrete Products, LLC
   4. Utility Vault Co.
   5. Or approved equal.
E. Precast Concrete Pull Boxes:
   1. Christy Concrete Products
   2. Oldcastle Precast Group

3. Utility Concrete Products, LLC
4. Utility Vault Co.
5. Or approved equal.

F. Precast Vaults:
1. Oldcastle Precast Group
2. Christy Concrete Products
3. Utility Concrete Products, LLC
4. Utility Vault Co.
5. Or approved equal.

G. Utility Structure Accessories:
1. The Bilco Company
2. Campbell Foundry Company
3. Christy Concrete Products
4. McKinley Iron Works, Inc.
5. Oldcastle Precast Group
6. Utility Concrete Products, LLC
7. Utility Vault Co.
8. Or approved equal.

H. Duct Seal (Populated with Cabling):
1. Gardner Bender DS-130
2. Or approved equal.

I. Duct Seal (Unpopulated Conduits):
1. Osburn Associates Inc., Part Number: 40D402U

J. Cable Lubricant:
1. American Polywater Corporation
2. Or approved equal.

K. Equipment or Material of the same manufacturer throughout the facility. Multiple manufacturers not permitted, unless specifically noted otherwise.

2.2 METALLIC CONDUIT

A. Rigid Steel Conduit: Galvanized, comply with ANSI C80.1.

2.3 NON-METALLIC CONDUIT

A. RNC: NEMA TC 2, Type EPC-40-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complies with NEMA TC 3 and UL 514B.

2.4 NON-METALLIC DUCTS AND DUCT ACCESSORIES

A. Underground Plastic Utilities Duct:
1. NEMA TC 6 and 8, Type DB-40-PVC, ASTM F 512, with matching fittings by the same manufacturer as the duct, complying with NEMA TC 9.

B. Duct Separators:
1. Factory-fabricated rigid PVC interlocking spacers, sized for type and sizes of ducts with which used, and selected to provide minimum duct spacing indicated while supporting ducts during concreting or backfilling.

C. Warning Tape:
1. Detectable Tape
2. Color: Orange
3. Label: FIBER OPTIC CABLE

2.5 PRECAST CONCRETE HAND HOLES

A. Comply with ASTM C 858 for design and manufacturing processes.

B. Factory-fabricated, reinforced concrete, monolithically poured walls and bottom unless open-bottom enclosures are indicated. Frame and cover forms on top of enclosure and load rated consistent with that of the hand hole.

C. Cover Legend: Molded lettering, COMMUNICATIONS

D. Configuration: Design for flush burial and have open bottom, unless otherwise indicated.

2.6 PRECAST CONCRETE PULL BOXES

A. Comply with ASTM C 858 for design and manufacturing processes.

B. Factory-fabricated, reinforced concrete, monolithically poured walls and bottom. Frame and cover forms on top of enclosure. Load rating consistent with that of the pull box.

C. Frame and Cover: Weatherproof cast-iron frame, with cast-iron cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.

D. Cover Finish: Nonskid finish with minimum coefficient of friction of 0.50.

E. Cover Legend: Molded lettering, COMMUNICATIONS

F. Configuration: Design for flush burial.

G. Extensions and Slabs: Designed to mate with bottom of enclosure, same material as enclosure.
   1. Extension provides increased depth of 12-inches.
   2. Slab: Same dimensions as bottom of enclosure, and arranged to provide closure.

H. Windows:
   1. Precast openings in walls, arranged to match dimensions and elevations of approaching ducts and duct banks plus an additional 12-inches vertically and horizontally to accommodate alignment variations.
      a. Locate no less than 6-inches from interior surfaces of walls, floors, or frames and covers of pull boxes, but close enough to corners to facilitate racking of cables on walls.
      b. Window Openings:
         1) Cast-in-place, welded wire fabric reinforcement for field cutting and bending to tie in to concrete envelopes of duct banks.
         2) Frame with at least two additional number 4 steel reinforcing bars in concrete around each opening.

I. Duct Entrances in Pull Box Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
   1. Match type and size fittings to duct or conduit to be terminated.
   2. Align fittings with elevations of approaching ducts and be located near interior corners of pull boxes to facilitate racking of cable.
   3. Grout ducts entering pull boxes place flush with the finished surface.

J. Pull boxes 12-inches wide by 24-inches long and larger inserts for cable racks and pulling-in irons installed before concrete is poured.

2.7 PRECAST VAULTS

A. Comply with ASTM C 858, with structural design loading as specified in this Section and with interlocking mating sections, complete with accessories, hardware, and features.

B. Windows:
   1. Precast openings in walls, arranged to match dimensions and elevations of approaching ducts and duct banks plus an additional 12-inches vertically and horizontally to accommodate alignment variations.
      a. Locate windows no less than 6-inches from interior surfaces of walls, floors, or roofs of vaults, but close enough to corners to facilitate racking of cables on walls.
      b. Window Openings:
         1) Cast-in-place, welded wire fabric reinforcement for field cutting and bending to tie in to concrete envelopes of duct banks.
         2) Frame with at least two additional number 4 steel reinforcing bars in concrete around each opening.
      c. Duct Entrances in Vault Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
         1) Type and size match fittings to duct or conduit to be terminated.

2) Align fittings with elevations of approaching ducts and be located near interior corners of vaults to facilitate racking of cable.
3) Grout ducts entering vaults in place flush with the finished surface.

C. Concrete Knockout Panels: 1-1/2 to 2-inches thick, for future conduit entrance and sleeve for ground rod.

D. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at the installation location with the ground water level at grade.

2.8 UTILITY STRUCTURE ACCESSORIES

A. Vault Frames, Covers, and Chimney Components: Comply with structural design loading specified for vault.
1. Frame and Cover: Weatherproof, gray cast iron complying with ASTM A 48/A 48M, Class 30B with milled cover-to-frame bearing surfaces; diameter, 26-inches.
a. Cover Finish: Nonskid finish with a minimum coefficient of friction of 0.50.
b. Special Covers: Recess in face of cover designed to accept finish material in paved areas.
2. Cover Legend: Cast in.
a. Legend: COMMUNICATIONS, for telecommunications, data, and telephone duct systems.

B. Vault Sump Frame and Grate: ASTM A 48/A 48M, Class 30B, gray cast iron.

C. Pulling Eyes in Concrete Walls: Eyebolt with reinforcing-bar fastening insert, 2-inch- diameter eye, and 1-by- 4-inch bolt.
1. Working Load Embedded in 6-Inch, 4000-psi Concrete: 13,000-lbf minimum tension.

D. Pulling Eyes in Nonconcrete Walls: Eyebolt with reinforced fastening, 1-1/4-inch- diameter eye, rated 2500- lbf minimum tension.

E. Pulling-In and Lifting Irons in Concrete Floors:
1. 7/8-inch- diameter, hot-dip galvanized, bent steel rod; stress relieved after forming; and fastened to reinforcing rod. Exposed triangular opening.
2. Ultimate Yield Strength: 40,000-lbf shear and 60,000-lbf tension.

F. Bolting Inserts for Concrete Utility Structure Cable Racks and Other Attachments:
1. Flared, threaded inserts of noncorrosive, chemical-resistant, nonconductive thermoplastic material; 1/2-inch ID by 2-3/4 inches deep, flared to 1-1/4 inches minimum at base.
a. Tested Ultimate Pullout Strength: 12,000-lbf minimums.

G. Expansion Anchors for Installation after Concrete Is Cast: Zinc-plated, carbon-steel-wedge type with stainless-steel expander clip with 1/2-inch bolt, 5300-lbf rated pullout strength, and minimum 6800-lbf rated shear strength.

H. Cable Rack Assembly:
1. Steel, hot-dip galvanized, except insulators.
a. Stanchions: T-section or channel; 2-1/4-inch nominal size; punched with 14 holes on 1-1/2-inch centers for cable-arm attachment.
b. Arms: 1-1/2-inches wide, lengths ranging from 3-inches with 450 pounds minimum capacity to 18-inches with 250 pounds minimum capacity. Slots along full length for cable ties and be arranged for secure mounting in horizontal position at vertical location on stanchions. Provide two arms per stanchion section.
c. Insulators: High-glaze, wet-process porcelain arranged for mounting on cable arms.

I. Duct-Sealing Compound:
1. Non-hardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as 35 degrees F.

2. Capable of withstanding temperature of 300 degrees F without slump and adhering to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals.

J. Fixed Vault Ladders:
1. Arranged for attachment to wall of vault.
2. Fabricate ladder, mounting brackets, and braces from hot-dip galvanized steel.

K. Cover Hooks:
1. Heavy duty, designed for lifts 60 lbf and greater.
2. Two required.

2.9 UNDERGROUND ENCLOSURE APPLICATION

A. Hand Holes and Pull Boxes:
1. Units in Roadways and other Deliberate Traffic Paths: Precast concrete, AASHTO HB 17, H-10 structural load rating.
2. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Precast concrete, AASHTO HB 17, H-20 structural load rating.
3. Units in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Precast concrete, AASHTO HB 17, H-10 structural load rating.

B. Vaults: Precast or cast-in-place concrete.
1. Units Located in Roadways and Other Deliberate Traffic Paths by Heavy or Medium Vehicles: AASHTO HB 17, H-20 structural load rating.
2. Units Not Located in Deliberate Traffic Paths by Heavy or Medium Vehicles: AASHTO HB 17, H-10 structural load rating.

2.10 DUCT SEAL (POPULATED WITH CABLING)

A. Use only in situations where a fire rated assembly is not required.
B. Asbestos Free, easily formable clay.
C. Not dry hard, re-enterable/reusable.
D. Resistant to water, alcohols, solvents and fuels
E. Non-corrosive to metals or plastics and a non-irritant to skin.

2.11 DUCT SEAL (UNPOPULATED CONDUITS)

A. Use only in situations where a fire rated assembly is not required.
B. Removable and reusable compression type fittings.
C. 3Ccorrosion proof, watertight and gas-tight.
D. Equip with a rear side pull rope tie down

2.12 CABLE LUBRICANT

A. Use when pulling cable through long runs (>50-feet) of conduit.
B. UL or CSA listed.
C. Wet out evenly on surfaces. It will not bead up or rub off of the cable jacket.

PART 3 – EXECUTION

3.1 GENERAL

A. Cut trenches neatly and uniformly, and slope uniformly away from underground structures and building entrances.
B. Restore surface features at areas disturbed by excavation, and reestablish original grades except as otherwise indicated.
C. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work.
D. Replace removed sod immediately after backfilling is completed.
E. Comply with District's Telecommunications Infrastructure Standard:
1. Telecommunications vault placed between the main building and the portable closest to the main building to facilitate cabling to existing and future portables on the campus.
2. Minimum dimensions 48-inch by 24-inch by 24-inch.

3. The vault contains multiple concentric knockouts on the sides and at the ends for the placement of conduits.
4. Equip larger vaults with a sump of at least 6-inch in diameter and contain galvanized C channel racking for securing and managing the cabling routing through the vault.
5. In cases where the vault is installed in the pavement and is subject to vehicle traffic, the vault supplied with a traffic rated cover.
6. 15-foot service loop provided for the backbone cabling routing through the vault.
7. Secure service loop to the C channel racking.

3.2 QUANTITIES

A. Quantities of system elements shown on the drawings are illustrative only and meant to indicate the general configuration of the work.

B. Responsible for providing the correct quantities of materials to construct a system that meets the intent of these Specifications and the relevant codes.

3.3 INSTALLATION

A. Conduit and Duct Installation

1. Install nonmetallic conduit and duct as indicated according to manufacturer's written instructions.
2. Pitch ducts minimum of 0.125-inches per foot to drain away from building entrances.
3. Use manufactured long sweep bends with a minimum radius of 6-feet both horizontally and vertically at all locations.
4. Make joints in ducts and fittings watertight in accordance with manufacturer's instructions. Avoid duct joint sealings ambient temperature is over 86 degrees F. Stagger couplings so those adjacent ducts do not lie in the same plane.
5. Space cast-in-place end bells approximately 8 inches on center in a pattern that best meets the requirements of the arrangement of the duct bank for 5-inch ducts and varied proportionately for other duct sizes. Change from regular spacing to end bell spacing, 10-feet from the end bell without reducing duct line slope and without forming a trap in the line. Grout end bells into vault walls from both sides to provide watertight entrances.
6. Support concrete encased nonmetallic ducts on plastic separators coordinated with duct size and required duct spacing, and install according to the following:
   a. Space separators 4-feet on centers to prevent sagging and deforming of ducts, and secure separators to the earth and to ducts to prevent floating during concreting.
   b. Spade concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. Do not use power-driven agitating equipment unless specifically designed for duct bank application. Pour each run of envelope between vaults or other terminations in one continuous operation. When more than one pour is necessary, terminate each pour in a vertical plane, and install 3/4-inch reinforcing rod dowels extending 18-inches into the concrete on both sides of joint near the corners of the envelope.
   c. Use the walls of the trench to form the sidewalls of the duct bank where the soil is self-supporting and concrete envelope poured without soil inclusions, otherwise use forms.
   d. Three inches minimum clearance between ducts and exterior envelope wall, 7-1/2-inches minimum clearance between ducts for like services and 12-inches minimum clearance between power and signal ducts.
   e. Except as otherwise indicated on the civil drawings, install top of duct bank at least 36 inches below finished grade.
7. For equipment mounted on outdoor concrete pads, extend conduit a minimum of 5-feet from edge of pad.

8. Provide temporary closure at terminations of ducts wired under this Project. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15 psi hydrostatic pressure.
9. Install 600 pound test nylon rope as a pull rope in ducts, including spares.
10. In routes where copper cables are to be used, conduit section lengths no more than 600-feet between vaults, pull boxes, and hand holes.
11. In routes where single mode optical fiber cable will be the only media used, conduit section lengths should be no more than 1,312-feet between vaults, pull boxes and hand holes.
12. No more than 180 degrees of bends allowed in a single conduit run. If bends exceed 180 degrees, a vault, pull box or hand hole is required.

B. Duct Installation
1. Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48-inches, both horizontally and vertically, at other locations, unless otherwise indicated.
2. Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.
3. At duct entrances to vaults, pull boxes and hand holes, use end bells, spaced approximately 10-inches oc for 5-inch ducts, and vary proportionately for other duct sizes.
    a. Begin change from regular spacing to end-bell spacing 10-feet from the end bell without reducing duct line slope and without forming a trap in the line.
    b. Direct-Buried Duct Banks: Install an expansion and deflection fitting in each conduit in the area of disturbed earth adjacent to vaults, pull boxes and hand holes
    c. Grout end bells into structure walls from both sides to provide watertight entrances.
4. Building Wall Penetrations:
    a. Make a transition from underground duct to conduit at least 10-feet outside the building wall without reducing duct line slope away from the building, and without forming a trap in the line.
    b. Use fittings manufactured for duct-to-conduit transition.
5. Provide temporary closure at terminations of ducts wired under this Project. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15 psi hydrostatic pressure.
6. Concrete-Encased Ducts: Support ducts on duct separators.
    a. Space separators close enough to prevent sagging and deforming of ducts, with not less than four spacers per 20-feet of duct. Secure separators to earth and to ducts to prevent floating during concreting. Stagger separators approximately 6 inches between tiers. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
    b. Pour each run of envelope between vaults or other terminations in one continuous operation.
        1) Start at one end and finish at the other, allowing for expansion and contraction of ducts as their temperature changes during and after the pour. Use expansion fittings installed according to manufacturer's written recommendations, or use other specific measures to prevent expansion contraction damage.
        2) If more than one pour is necessary, terminate each pour in a vertical plane and install 3/4-inch reinforcing rod dowels extending 18 inches into concrete on both sides of joint near corners of envelope.

c. Spade concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Use a plank to direct concrete down sides of bank assembly to trench bottom. Allow concrete to flow to center of bank and rise up in middle, uniformly filling open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-bank application.

d. Reinforce concrete-encased duct banks where they cross disturbed earth and where indicated. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.

e. Use walls of trench to form sidewalls of duct bank where soil is self-supporting and concrete envelope poured without soil inclusions; otherwise, use forms.

f. Provide 3 inches minimum space between ducts and exterior envelope wall, 2 inches minimum space between ducts for like services, and 4 inches minimum space between power and signal ducts.

g. Install top of duct bank at least 24 inches below finished grade in areas not subject to deliberate traffic, and at least 30 inches below finished grade in deliberate traffic paths for vehicles, unless otherwise indicated.

h. Use manufactured conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

1) Couple of conduits to ducts with adapters designed for this purpose, and encase coupling with 3-inches of concrete.

2) Stub-Ups to Equipment: For equipment mounted on outdoor concrete bases, extend conduit horizontally a minimum of 60-inches from edge of base.

i. Bury warning tape approximately 12-inches above concrete-encased ducts and duct banks. Align tape parallel to and within 3-inches of the centerline of duct bank. Provide an additional warning tape for each 12-inch increment of duct bank width over a nominal 18-inches. Space additional tapes 12-inches apart, horizontally.

7. Direct-Buried Duct Banks:

a. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.

b. Space separators close enough to prevent sagging and deforming of ducts, with not less than four spacers per 20-feet of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6-inches between tiers.

c. Install ducts with a minimum of 3 inches between ducts for like services and 12-inches between power and signal ducts.

d. Install top of duct bank at least 36 inches below finished grade, unless otherwise indicated.

e. Set elevation of bottom of duct bank below the frost line.

f. Install manufactured conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

1) Couple of conduits to ducts with adapters designed for this purpose, and encase coupling with 3-inches of concrete.

2) For equipment mounted on outdoor concrete bases, extend conduit horizontally a minimum of 60-inches from edge of equipment pad or foundation.

8. Duct Entrances to Buildings:
    a. Entrances Using Steel or Schedule 40/80 PVC Conduit:
        1) Transformations from underground duct to conduit made 10-feet minimum, outside the building wall and use fittings manufactured for the purpose.
    b. Entrances Using Concrete-Encased Ducts:
        1) Install reinforcing in duct banks through disturbed earth near buildings and excavations and coordinate duct bank with structural design at wall so duct bank supported at wall without reducing structural or watertight integrity.
    c. Waterproof Entrances:
        1) Where ducts enter buildings through a waterproofed floor or wall. Install watertight entrance-sealing device with the sealing gland assembly on the inside.
        2) Securely anchor into the masonry construction with one or more integral flanges and the membrane waterproofing secured to the device in a permanently watertight manner.

C. Underground Utility Structure Installation:
1. Install vaults with roof top 24-inches below finished grade, typical. Adjust covers to finish grade and carefully grouted in to provide adequate bearing for H-20 traffic loading.
2. Install removable hardware including cable stanchions, cable arms, and insulators as required for installation and support of cable and conductors.
3. Do not drill deeper than 3-7/8-inches for anchor bolts installed in the field.
4. Install precast concrete underground structures as indicated, according to manufacturer's written instructions and ASTM C 891.
    a. Install units plumb and level and with orientation and depth coordinated with arrangement of connecting ducts to minimize bends and deflections required for proper entrances.
    b. Support units on a 12-inch level bed of crushed stone or gravel, graded from the 1-inch sieve to the number 4 sieve and compacted to same density as adjacent undisturbed earth.

D. Installation of Concrete Vaults, Pull Boxes, and Hand Holes:
1. Precast Concrete Vault and Pull Box:
    a. Comply with ASTM C 891, unless otherwise indicated.
    b. Install units level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances.
    c. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1-inch sieve to number 4 sieve and compacted to same density as adjacent undisturbed earth.
2. Elevations:
    a. Vault Roof: Install with rooftop at least 15 inches below finished grade.
    b. Vault Frame: In paved areas and traffic ways, set frames flush with finished grade.
    c. Pull Box Covers: In paved areas and traffic ways, set surface flush with finished grade.
    d. Where indicated, cast pull box cover frame integrally with pull box structure.
3. Install drains in bottom of vaults where indicated. Coordinate with drainage provisions indicated.
4. Circular opening in Vault roof; sized to match cover size.
    a. Vaults with Fixed Ladders: Offset access opening from vault centerlines to align with ladder.

b. Install chimney, constructed of precast concrete collars and rings to support frame and cover and to connect cover with vault roof opening. Provide moisture-tight masonry joints and waterproof grouting for cast-iron frame to chimney.
c. No more than a total of 24-inch of traffic rings are to be used.

5. Apply waterproofing to exterior surfaces of vaults and pull boxes after concrete has cured at least three days. After ducts have been connected and grouted, and before backfilling, waterproof joints and connections and touch up abrasions and scars. Waterproof exterior of vault chimneys after mortar has cured at least three days.
6. Install removable hardware, including pulling eyes, cable stanchions, and cable arms, and insulators, as required for installation and support of cables and conductors and as indicated.
7. Install fixed vault ladders to provide for safe entry with maximum clearance from cables and other items in vaults.

E. CLEANING
1. Pull brush through full length of ducts. Use round bristle brush with a diameter 1/2-inch greater than internal diameter of duct.
2. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.
3. Clean internal surfaces of vaults, including sump. Remove foreign material.

3.4 GROUNDING AND BONDING

A. Install ground rod through floor of each vault with top protruding 4 inches above floor. Install ground rod during placement of the vault, in a corner of the vault. Do not place ground rod in the center of the vault.
B. Seal the floor opening against water penetration with waterproof non-shrink grout.
C. Ground exposed metal components and hardware with 2 AWG bare copper ground conductor. Train conductors neatly around corners. Install on walls and roof using cable clamps secured with expansion anchors.
D. A continuous 2 AWG bare copper conductor extend with each conduit or duct bank entering and leaving the structure to the next underground structure or building. Bond to duct bank steel reinforcement bar every 20-feet.
E. Install ground connections for underground structures using exothermic welding.
F. Refer to Section 27 05 26, Grounding and Bonding for Communication Systems, for additional details.

3.5 TESTING

A. Test and inspect precast concrete utility structures according to ASTM C 1037.
1. Strength tests of complete boxes and covers by either an independent testing agency or the manufacturer. Qualified registered professional engineer to certify tests by manufacturer.
2. Testing machine pressure gages have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

B. Testing:
1. Demonstrate capability and compliance with requirements upon completion of installation of underground duct and utility structures.
a. Test vault grounding to ensure electrical continuity of bonding and grounding connections. Measure ground resistance at each ground rod and report results. Use an instrument specifically designed for ground-resistance measurements.
b. Rod ducts with a mandrel 1/4-inch smaller in diameter than internal diameter of ducts. Where rodding indicates obstructions in ducts, remove the obstructions and retest.

c. Test for water leaks.

C. Correct installations where possible, and retest to demonstrate compliance. Remove and replace defective products and retest.

D. Test results given and approved by a designated telecommunications representative.

3.6 ACCEPTANCE

A. Once the installation and testing is completed and the telecommunications representative is satisfied that work is in accordance with the Contract Documents, the representative will notify the Contractor and/or project manager in writing or via email.

3.7 RECORD (AS-BUILT) DRAWINGS

A. Show the position of underground telecommunications vaults; pull boxes, hand holes, ducts, duct banks, and conduits.

B. Drawings are also to indicate as-built fill percentages on conduits within the project scope.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Preparing subgrades
2. Excavating and backfilling for buildings and structures.
3. Base course and subbase course for concrete pavements.
4. Base course and subbase course for asphalt paving.
5. Excavating and backfilling for utility trenches.
6. Drainage fill for infiltration facilities.

1.2 SUBMITTALS

A. Product Data.

B. Aggregate Sieve Analysis.

1.3 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Course placed between the subbase course, or subgrade, and concrete, or hot-mix asphalt paving.

C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

F. Fill: Soil materials used to raise existing grades.

G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

H. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or cement concrete.

I. Subgrade: Surface or elevation remaining after completing excavation, or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

J. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

K. Drainage Fill: Free draining, open-graded aggregate course used to support pervious pavement or in drainage zones in flow-through planters, vegetated stormwater facilities and infiltration galleries.

L. Growing media: Non-native soil mixture made up of sand, loam, and compost; used on surface stormwater facilities.

M. Unified Soil Classification System:

1. GW: Well-graded gravels; gravel/sand mixtures with little or no fines.
2. GP: Poorly-graded gravels; gravel/sand mixtures with little or no fines.
3. GM: Silty gravels; poorly-graded gravel/sand/silt mixtures.
4. GC: Clayey gravels; poorly-graded gravel/sand/clay mixtures.
5. SW: Well-graded sands' gravelly sands with little or no fines.
6. SP: Poorly-graded sands; gravelly sands with little or no fines.
7. SM: Silty sands; poorly, graded- sand/gravel/silt mixtures.
8. SC: Clayey sands; poorly-graded sand/gravel/clay mixtures.
9. ML: Inorganic silts; sandy, gravelly, or clayey silts.
10. CL: Lean clays; inorganic, gravelly, sandy, or silty, low to medium-plasticity clays.
11. OL: Organic, low-plasticity clays and silts.
12. MH: Inorganic, elastic silts; sandy, gravelly or clayey elastic silts
13. CH: Fat clays; high-plasticity, inorganic clays.
14. OH: Organic, medium to high-plasticity clays and silts
15. PT: Peat, humus, hydric soils with high organic content.

1.4 PROJECT CONDITIONS

A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.

B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

C. Site Information: Research public utility records and verify existing utility locations prior to ordering any material. Notify the Architect immediately if any discrepancies are found in the project survey.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

E. Base Course: Use Oregon Standard Specifications for Construction 3/4-inch-0".

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 3-inch sieve and not more than 12 percent passing a No. 200 sieve.

G. Bedding Course: Use Oregon Standard Specifications for Construction 3/4-inch-0".

H. Drainage Course: Narrowly graded mixture of [**washed**]crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

I. Backfill and Fill:

1. Satisfactory soil materials

2. Initial trench backfill: Use Oregon Standard Specifications for Construction 3/4-inch-0".

J. Drainage Fill: Angular, granular material with a maximum particle size of 2 inches and shall meet Oregon Standard Specification 00430.11. The material shall be free of roots, organic material, and other unsuitable materials; have less than 2 percent passing the No. 200 sieve (washed analysis); and have at least two mechanically fractured faces.

2.2 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored to comply with local practice or requirements of authorities having jurisdiction or as follows:

1. Red: electric.

2. Yellow: Gas, oil, steam, and dangerous materials.

3. Orange: telephone and other communications.

4. Blue: Water systems.

5. Green: Sewer systems.

B. Tracer Wire: 12 AWG minimum solid copper insulated High Molecular Weight Polyethylene (HMW PE) tracer wire or approved equal. The tracer wire insulation shall be green for sewer pipe and blue for waterlines and be a minimum of 45 mil. thick. Joints or splices shall be waterproof. The wire shall be rated for 30 Volt.

C. Drainage Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:

1. Grab Tensile Strength: 110 lbf ; ASTM D 4632.

2. Tear Strength: 40 lbf ; ASTM D 4533.

3. Puncture Strength: 220 lbf ; ASTM D 4833.

4. Apparent Opening Size: No. 40 ; ASTM D 4751.

5. Permativity (minimum): .5 sec^{-1}; ASTM D 4491.

D. Separation Fabric: Woven geotextile, specifically manufactured as a separation geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:

1. Grab Tensile Strength: 180 lbf ; ASTM D 4632.
2. Tear Strength: 68 lbf ; ASTM D 4533.
3. Puncture Strength: 371 lbf ; ASTM D 4833.
4. Apparent opening size: No. 30; ASTM D 4751.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations. Provide protective insulating materials as necessary.

B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 31 Section “Site Clearing.”

C. Protect and maintain erosion and sedimentation controls, which are specified in the Commercial Erosion Permit during earth moving operations.

D. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

E. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

F. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

G. Protect all areas designated to be infiltration facilities from foot or equipment traffic and surface water runoff. Do not use proposed infiltration facilities to dispose of surface water runoff during construction. Under no circumstances shall material and equipment be stored on top of the installation area. Contractor shall not backfill facility until Engineer has inspected it and signed off.

H. Protect all areas designated to receive pervious pavers or pervious pavement from excessive compaction.

3.2 EXPLOSIVES

1. Explosives: Do not use explosives.

3.3 EXCAVATION

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions without prior approval by the Architect.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 6 inches each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade and bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course. Hand excavate for bell of pipes.

2. Excavate utility structures to provide 6 inches clearance (enlarge as needed) to allow for compaction of backfill material.

3.6 EXCAVATION FOR STORMWATER INFILTRATION FACILITIES

A. Excavate facilities to the indicated gradients, lines, depths, and elevations. All excavations shall be performed with the lightest practical excavation equipment. Excavation equipment shall not be operated within the limits of the facility.

B. To help prevent subgrade soil contamination and clogging by sediment, facility construction shall be delayed until all other construction within its drainage basin is completed and the drainage area stabilized. Provide additional sediment control measures such as diversion berms around the facility as needed. Additional excavation and backfill required to restore any infiltration rate lost due to clogging or over-compaction during construction shall be performed by the contractor at no cost to the owner.

3.7 INFILTRATION TESTING

A. The contractor shall perform one open-pit falling head infiltration test within each proposed infiltration facility to verify the infiltration rate of the native soils. Pre-soak prior to testing.

1. Open Pit Falling Head Procedure:

a. Excavate a hole with bottom dimensions of approximately 2 feet by 2 feet into the native soil to the elevation of the proposed facility bottom. If smooth auguring tools or a smooth excavation bucket is used, scratch the sides and bottom of the hole with a sharp pointed instrument, and remove the loose material from the bottom of the test hole.

b. Fill the hole with clean water a minimum of 1 foot above the soil to be tested and maintain this depth of water for at least 4 hours (or overnight if clay soils are present) to presoak the native material. In sandy soils with little or no clay or silt, soaking is not necessary. If after filling the hole twice with 12 inches of water, the water seeps completely away in less than 10 minutes, the test can proceed immediately.

c. The measurements should be made with reference to a fixed point. A lath placed in the test pit prior to filling or a sturdy beam across the top of the pit are convenient reference points. The tester and excavator should conduct all testing in accordance with OSHA regulations.

d. After the presaturation period, refill the hole with water to 12 inches above the soil and record the time. Alternative water head heights may be used for testing provided the presaturation height is adjusted accordingly and the water head height used in infiltration testing is 50 percent or less than the water head height in the proposed stormwater system during the design storm event. Measure the water level to the nearest 0.01 foot (1/8 inch) at 10-minute

intervals for a total period of 1 hour (or 20-minute intervals for 2 hours in slower soils) or until all of the water has drained. In faster draining soils (sands and gravels), it may be necessary to shorten the measurement interval in order to obtain a well-defined infiltration rate curve.

e. Repeat the test. Successive trials should be run until the percent change in measured infiltration rate between two successive trials is minimal. The trial should be discounted if the infiltration rate between successive trials increases. At least three trials must be conducted. After each trial, the water level shall be readjusted to the 12 inch level.

f. The average infiltration rate over the last trial should be used to calculate the un-factored infiltration rate. The final rate must be reported in inches per hour.

g. Upon completion of the testing, the excavation must be backfilled.

h. For very rapidly draining soils, it may not be possible to maintain a water head above the bottom of the test pit. If the infiltration rate meets or exceeds the flow of water into the test pit, conduct the test in the following manner:

1) Approximate the area over which the water is infiltrating.

2) Using a water meter, bucket, or other device, measure the rate of water discharging into the test pit.

3) Calculate the infiltration rate by dividing the rate of discharge (cubic inches per hour) by the area over which it is infiltrating (square inches).

i. Provide all test results to the Engineer.

3.8 SUBGRADE INSPECTION

A. Proof-roll subgrade with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades. Do not proof-roll subgrade in infiltration facilities.

B. Soft pockets and areas of excess yielding that have been identified shall be scarified and moistened or aerated, or removed and replaced with suitable soil materials to the depth required. Re-compact and retest until specified compaction is obtained.

C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILLS AND FILLS

A. Backfill: Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for record documents.
3. Inspecting and testing underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.12 UTILITY TRENCH BEDDING

A. Place bedding on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

3.13 UTILITY TRENCH BACKFILL

A. Trenches under Footings: Backfill trenches excavated under footings with satisfactory soil or approved backfill to within 18 inches from the bottom of footings elevation; fill remaining trench excavation with concrete up to the elevation of bottom of footings. Concrete is specified in "Cast-in-Place Concrete."

B. Place and compact initial trench backfill material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

C. Place and compact final backfill of satisfactory soil to final subgrade elevation.

D. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

E. Install tracer wire in a continuous fashion above the utility in such a manner as to be able to properly trace utility lines without loss or deterioration of signal or without the transmitted signal migrating off the tracer wire. Bring tracer wire to the surface at every box, vault, drainage structure, or manhole.

3.14 DRAINAGE FILL

A. Compaction of the native soil subgrade should be limited in order to prevent a reduction in the permeability of the soil.

1. Where erosion of subgrade has caused accumulation of fine materials and/or surface ponding, this material shall be removed with light equipment and underlying soils scarified to a minimum depth of 3 inches with a York rake or equivalent and light tractor.
2. Where subgrade has been compacted due to construction traffic, subgrade shall be scarified or removed to a depth sufficient to match the naturally occurring insitu state. Add additional base course material to meet design grades at no cost to the owner.
3. Bring subgrade of base course to line, grade, and elevations indicated. Fill and lightly re-grade any areas damaged by erosion, ponding, or traffic compaction before the placing of stone.

B. Place drainage geotextile over prepared subgrade, overlapping ends and edges at least 12 inches. Secure in place to prevent wrinkling.

C. Place drainage fill and compact by tamping with a plate vibrator, and screed to depth indicated. For drainage fill that exceeds 8 inches in compacted thickness, place fill in layers of equal thickness, with no compacted layer more than 8 inches or less than 4 inches thick.

D. Place drainage geotextile over compacted drainage fill, overlapping ends and edges at least 12 inches.

3.15 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.

2. Under walks and pavements, use base course.

3. Under steps and ramps, use base course.

4. Under and around utility structures, use engineered fill.

3.16 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.

2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 3 percent and is too wet to compact to specified dry unit weight.

3.17 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.

2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.

3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.

4. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent.

3.18 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1/2 inch.
3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.19 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:

1. Shape subbase course and base course to required crown elevations and cross-slope grades.
2. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
3. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.20 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

D. Testing Agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and building slab areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100 feet or less of wall length, but no fewer than two tests.
3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150 feet or less of trench length, but no fewer than two tests.

E. With the approval of the Engineer, proof-roll testing of subgrade and/or aggregate base may be substituted for other compaction testing.

F. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.21 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

D. Weather permitting and as approved, stormwater infiltration facility plants shall be installed as soon as possible after placing and grading the growing media in order to minimize erosion and further compaction.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hot-mix asphalt paving.

B. Related Requirements:

1. Section 31 20 00 "Earth Moving" for subgrade preparation, fill material, aggregate subbase and base courses, and aggregate pavement shoulders.

1.2 SUBMITTALS

A. Product Data: For each type of product. Include technical data and tested physical and performance properties.

1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the work.

2. Job-mix Designs: For each job mix proposed for the Work.

B. Material Certificates: For each paving material.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Section 0744 of the 2018 Oregon Standard Specifications for Construction for asphalt paving work.

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expect before time required for adequate cure, or if the following conditions are not met:

1. Tack Coat: Minimum surface temperature of 60 deg F.

2. Asphalt Base and Surface Course:

Dense Graded Mixes	Surface Temperature
Less than 2 inches	60 degrees F
2 inches – 2 1/2 inches	50 degrees F
Greater than 2 1/2 inches	40 degrees F

3. If placing asphalt between March 15 and September 30, temperature may be lowered 5 degrees F.

4. Do not use field burners or other devices to heat the pavement to the specified minimum temperature.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. Conform to the requirements of 00744 of the 2015 Oregon Standard Specifications for Construction.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO M 320 or AASHTO MP 1a, PG 64-22.

B. Tack Coat: ASTM D 977 or AASHTO M 140 emulsified asphalt.

2.3 AUXILIARY MATERIALS

A. Recycled Materials for Hot-Mix Asphalt Mixes: Reclaimed asphalt pavement; reclaimed, unbound-aggregate base material; and recycled tires, asphalt shingles, or glass from sources and gradations that have performed satisfactorily in previous installations, equal to performance of required hot-mix asphalt paving produced from all new materials.

2.4 MIXES

A. Recycled Content of Hot-Mix Asphalt: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 10 percent or more than 30 percent by weight.

B. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
2. Provide mixes conforming to section 00744 of the 2018 Oregon Standard Specifications for Construction.
3. Base Course: Level 2, ½ inch dense, HMAC.
4. Surface Course: Level 2, ½ inch dense, HMAC.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd..

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.3 PLACING HOT-MIX ASPHALT

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Spread mix at a minimum temperature of 250 deg F.
2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

D. Provide adequate lighting to illuminate the paver and the roadway in front of and behind the paver during the period from 30 minutes after sunset to 30 minutes before sunrise, or as deemed necessary by the Engineer. Provide a minimum light level of 10 foot-candles as measured on the paved surface at a distance of 16 feet from the front and back edge of the paver. Shield lighting from adjacent traffic and roadways as necessary.

3.4 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

3.5 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent or greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

H. Provide adequate lighting to illuminate each roller and the roadway in front of and behind the roller during the period from 30 minutes after sunset to 30 minutes before sunrise, or as deemed necessary by the Engineer. Provide a minimum light level of 10 foot-candles as measured on the paved surface at a distance of 60 feet from the front and back edge of each roller. Shield lighting from adjacent traffic and roadways as necessary.

I. Compaction to a specified density will not be required for thin pavements such as leveling, patches, or where the nominal compacted thickness of a course of asphalt concrete pavement will be less than 2 inches.

3.6 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch.

2. Surface Course: Plus 1/4 inch, no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Surface Course: 1/8 inch.

2. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3. Difference between adjacent panels: 1/8 inch .

3.7 CORRECTION OF DEFECTS

A. Correct all defects in materials and work at no additional cost to the owner, as follows:

1. Fouled Surfaces: Immediately repair, clean, and re-tack fouled surfaces that would prevent full bond between successive lifts of mixture.

2. Boils, Slicks, and Oversized Material: Immediately remove and replace boils, slicks, and oversized materials with fresh mixture.

3. Segregation: Take immediate corrective measures when segregation or non-uniform surface texture is occurring in the finished mat. If segregation continues to occur, stop production until a plan for providing uniform surface texture is approved by the Port.

4. Roller Damage to the Surface: Immediately correct surface damage from rollers with additional fresh mixture or by other means approved by the owner.

5. Longitudinal Joints: Take immediate corrective measures when open longitudinal joints are being constructed or when the elevation of the two sides of a longitudinal joint does not match. If problems with the longitudinal joint continue to occur, stop production until a plan for providing tight, equal elevation longitudinal joints is approved by the owner.

6. Corrective Measures: Take immediate corrective measures when the specified compaction density is not being achieved.

7. Other Defects: Remove and replace any HMAC that:

a. Is loose, broken, or mixed with dirt.

b. Visually shows too much or too little asphalt.

c. Is defective in any way.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.

B. Verify density by random testing of the compacted surface with calibrated nuclear gauges. Determine the density by averaging QC tests performed by a Certified Density Technician (CDT) with the nuclear gauge operated in the backscatter mode according to AASHTO T 335 at one random location for each

100 tons of asphalt concrete placed, but take no less than 10 tests per shift. Do not locate the center of a density test less than 1 foot from the panel edge. Calculate the Moving Average Maximum Density (MAMD) according to ODOT TM 305.

C. Replace and compact hot-mix asphalt where core tests were taken.

D. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.9 WASTE HANDLING

A. Except for material indicated to be recycled, remove excavated materials from Project Site and legally dispose of them in an EPA-approved landfill.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sidewalks & mow strips.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Admixtures
4. Curing compounds
5. Applied finish materials.
6. Bonding agent or epoxy adhesive.
7. Joint fillers.

1.3 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.

C. ACI Publications: Comply with ACI 301 unless otherwise indicated.

D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.4 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

1. Use flexible or curved forms for curves with a radius 100 feet or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.

C. Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars**;** zinc coated (galvanized) after fabrication according to ASTM A 767/A 767M, Class I coating. Cut bars true to length with ends square and free of burrs.

D. Tie bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified.

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2. For epoxy-coated reinforcement, use epoxy-coated or other dialectric-polymer-coated wire bar supports.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C 150, gray portland cement Type II.

a. Fly Ash: ASTM C 618, Class C.

b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, Class 4S, uniformly graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: Potable and complying with ASTM C 94/C 94M.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

2. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

3. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

2.4 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry, or cotton mats.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

F.White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B, dissipating.

2.5 RELATED MATERIALS

A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber in preformed strips.

B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to requirements.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, with the following properties:

1. Compressive Strength (28 Days): 3500 psi.

2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.

3. Slump Limit: 4 inches, plus or minus 1 inch.

4. Air Content: 5-1/2 percent plus or minus 1.5 percent for 1-inch (25-mm) nominal maximum aggregate size.

B. Use a qualified testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.

C. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When temperature is between 85 deg F and 90 deg F , reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F , reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction. Limit vehicle speed to 3 mph.

2. Proof-roll with a loaded 10-wheel tandem-axle dump truck weighing not less than 15 tons.

3. Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch require correction according to requirements in Division 31 Section "Earth Moving."

C. Remove loose material from compacted subbase surface immediately before placing concrete.

D. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. After the forms have been set to correct grade, the grade shall be thoroughly tamped, either mechanically or by hand, at both the inside and outside edges of the base of the forms. Forms shall be staked into place with no less than 3 pins for each 10-foot section. A pin shall be placed at each side of every joint.

C. Form sections shall be tightly locked and shall be free from play or movement in any direction. The forms shall not deviate from true line by more than 1/4 inch at any joint. Forms shall be so set that they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment.

D. The alignment and grade elevations of the forms shall be checked and corrections made by the Contractor immediately before placing the concrete. When any form has been disturbed or any grade has become unstable, the form shall be reset and rechecked.

E. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

3.4 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints. If sufficient concrete is not available to finish the current panel, the Contractor shall remove the fresh concrete back to the nearest transverse joint.

1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.

2. Provide tie bars at sides of pavement strips where indicated.

3. Butt Joints: Use epoxy bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.

5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint or install plastic dowel sleeves per manufacturer’s recommendations.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

1. Locate isolation joints at intervals of 200 feet, unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Longitudinal Joints: A longitudinal joint shall be considered a joint parallel with the long dimension of the paving area.

1. Construction: Longitudinal construction joints necessary for lane construction shall be formed against suitable side forms (usually made of steel) with or without keyways, as indicated in the Drawings. Wooden forms may be used under special conditions, when approved by the Engineer. When the concrete is placed using slip-form pavers, the keyway shall be formed in the plastic concrete by means of preformed metal keyway liners which are inserted during the slip-form operations to form the female side of the key and which may be left in place. The dimensions of the keyway forms shall not vary more than plus or minus 1/4 inch from the dimensions indicated and shall not deviate more than plus or minus 1/4 inch from the mid-depth of the pavement. A male keyway may be used providing the keyway and edge tolerances are met. Where butt-type joints with dowels are designated, the dowels for this type shall be painted and greased. The edges of the joint shall be finished with a grooving tool or edging tool, and a space or slot shall be formed along the joint of the dimensions, as indicated, to receive the joint sealing material. Longitudinal construction joints shall be sawed to provide a groove at the top conforming to the details and dimensions indicated on the Drawings. Provisions shall be made for the installation of tie bars as noted on the Drawings.
2. Contraction or Weakened-Plane Type: the longitudinal groove formed or sawed in the top of the slab shall be installed where indicated on the Drawings. The groove shall be formed in the plastic concrete with suitable tools or material to obtain the width and depth specified, or it shall be sawed with approved equipment in the hardened concrete to the dimensions required. When the groove is formed in plastic concrete, it shall be true to line with not more than 1/4 inch variation in 10 feet; it shall be uniform in width and depth; and the sides of the groove shall be finished even and smooth with an edging tool. If an insert material is used, the installation and edge finish shall be according to the manufacturer's instructions. The sawed groove shall be straight and of uniform width and depth. In either case, the groove shall be clean cut so that spalling will be avoided at intersections with transverse joints. Tie bars shall be installed across these joints where indicated on the Drawings.

E. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness**,** to match jointing of existing adjacent concrete paving:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooved marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete once concrete has hardened sufficiently such that the cutting action will not tear, abrade, or otherwise damage the surface and before developing random contraction cracks. The sawing of any joints shall be discontinued or omitted if a crack occurs at or near the joint location before or during sawing. Concrete panels

that have started cracking before or during the saw cutting of the joints shall be removed and replaced at no expense to the Owner.

3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

F. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a ¼-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.5 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, placing, and consolidating concrete.

E. Do not add water to concrete during delivery or at Project site.

F. Do not add water to fresh concrete after testing.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

H. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

1. Remove and replace concrete that has been placed for more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.

I. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

J. Screed paving surface with a straightedge and strike off.

K. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

L. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.

M. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

N. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

O. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.

2. Do not use frozen materials or materials containing ice or snow.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.

P. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.6 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

2. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

C. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a ¼ inch (6mm) radius. Repeat tooling of edges after applying surface finished. Eliminate tool marks on concrete surfaces.

3.7 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows.

1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

a. Water.

b. Continuous water-fog spray.

c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.8 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: ¼ inch .

2. Thickness: Plus 3/8 inch, minus 1/4 inch.

3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed ¼ inch.

4. Joint Spacing: ½ inch .

5. Contraction Joint Depth: Plus 1/4 inch, no minus.

6. Joint Width: Plus 1/8 inch, no minus.

7. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.

8. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.

9. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.

10. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd or fraction thereof of each concrete mix placed each day.

a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.
    a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Chain-link fences.
2. Swing gates with related hardware.
3. Privacy slats.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete for cast-in-place concrete equipment bases/pads for gate operators and controls and post footings.

1.2 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

C. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric; 2011a (Reapproved 2017).

D. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.

E. ASTM F567 - Standard Practice for Installation of Chain-Link Fence; 2014a.

F. ASTM F1043 - Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework; 2018.

G. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures; 2018.

H. CLFMI CLF-FIG0111 - Field Inspection Guide; 2014.

I. CLFMI CLF-PM0610 - Product Manual; 2017.

J. CLFMI CLF-SFR0111 - Security Fencing Recommendations; 2014.

K. CLFMI WLG 2445 - Wind Load Guide for the Selection of Line Post and Line Post Spacing; 2018.

1.3 SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
    a. Fence and gate posts, rails, and fittings.
    b. Chain-link fabric, reinforcements, and attachments.
    c. Gates and hardware.

B. Shop Drawings: For each type of fence and gate assembly.

1. Include plans, elevations, sections, details, spacing of components, post foundation dimensions, hardware anchorage, and attachments to other work.

2. Include schedule of components, accessories, hardware, gate operation, and operational clearances.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of experience.

B. Fence Installer: Company with demonstrated successful experience installing similar projects and products, with not less than five years of experience.

C. Emergency Access Requirements: According to requirements of authorities having jurisdiction for gates with automatic gate operators serving as a required means of access.

1.5 FIELD CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.6 WARRANTY

A. Special Warranty: Installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to comply with performance requirements.

b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Chain Link Fences and Gates:

1. Master-Halco, Inc: www.masterhalco.com/#sle

2. Merchants Metals: www.merchantsmetals.com/#sle

3. Substitutions: See Section 01 60 00 – Product Requirements.

2.2 CHAIN-LINK FENCE FABRIC

A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:

1. Fabric Height: As indicated on Drawings.

2. Steel Wire for Fabric: Wire diameter of 0.148 inch.

a. Mesh Size: 2 inches.

b. Zinc-Coated Fabric: ASTM A392, Type II.

c. Black-polymer coating where noted: ASTM F934 applied to zinc coated steel chain link fabric.

3. Top selvage knuckle end closed, bottom selvage knuckle end closed.

2.3 FENCE FRAMEWORK

A. Posts and Rails: ASTM F1043 for framework, including rails, braces, and line; terminal; and corner posts. ASTM A1011/A1011M, Designation SS; hot-rolled steel strip, cold formed to pipe configuration, longitudinally welded construction, minimum yield strength of 50 ksi. Provide members with mini-

mum dimensions and wall thickness according to ASTM F1043 and ASTM F1083 based on the following:

1. Fence Height: As indicated on Drawings.
2. Line Post: 1.9 inches in diameter.
3. End, Corner, and Pull Posts: 2.875 inches.
4. Horizontal Framework Members: Top and brace rails according to ASTM F1043.
    a. Top and Brace Rails: 1.66 inches in diameter, plain end, sleeve coupled.
5. Gate Posts: 3.5 inches in diameter.
6. Gate Frame: 1.66 inch diameter for welded fabrication.
7. Black polymer coating where noted: ASTM F934

2.4 TIE WIRE

A. 11 gage galvanized steel. Aluminum is not allowed.

2.5 MANUAL GATES AND RELATED HARDWARE

A. Hardware for Single Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; Rolo latch with gravity drop and padlock hasp; keeper to hold gate in fully open position.

B. Hardware for Double Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; drop bolt on inactive leaf engaging socket stop set in concrete, active leaf latched to inactive leaf preventing raising of drop bolt, padlock hasp; keepers to hold gate in fully open position.

C. Swing gates:

1. Fabricate gate frames of same material and finish of adjoining fencing. Assemble gate frames by welding prior to galvanizing.
2. Prepare gates for industrial drop rod type latches for pad lock. Locks to be provided by Owner.

D. Hinges: Finished to match fence components.

1. Brackets: Round.
2. Mounting: Center.
3. Products:
    a. TruClose Series 3 by D&D Technologies USA, Inc: www.ddtech.com/#sle.
    b. Substitutions: See Section 01 60 00 - Product Requirements.

E. Panic Hardware: Owner Furnished, Contractor Installed. Complete system for panic hardware, including mounting plate, weatherproof surface mounted push bar, strike latch, and lock box.

1. Von Duprin exit devices.
2. Weld mounting plate to gate prior to galvanizing.
3. Strike: Provide metal angle stop full height of gate.
4. Hold-Opens: Provide wall-mounted or post-mounted hasp for locking gate in open position.

2.6 FITTINGS

A. Provide fittings according to ASTM F626. Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; galvanized steel.

B. Post Caps: Provide for each post. Cast steel galvanized; sized to post diameter, set screw retainer.

C. Rail and Brace Ends: For each gate, corner, pull, and end post.

2.7 FINISHES

A. Components (Other than Fabric):

1. Galvanized in accordance with ASTM A123/A123M, at 2.0 ounces per square foot.

2. Black powder coated over coating of 1.8 oz per square foot galvanizing

B. Hardware:

1. Hot-dip galvanized to weight required by ASTM A153/A153M.

2. Powder coated over hot-dip galvanized to weight required by ASTM A153/A153M

C. Accessories: Same finish as framing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

B. Remove obstructions or debris.

3.3 CHAIN-LINK FENCE INSTALLATION

A. Install chain-link fencing according to ASTM F567 and more stringent requirements specified.

1. Install fencing on established boundary lines inside property line.

B. Place fabric on outside of posts and rails.

C. Set intermediate posts plumb, in concrete footings with top of footing 2 inches above finish grade. Slope top of concrete for water runoff.

D. Line Post Footing Depth Below Finish Grade: ASTM F567.

E. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F567.

F. Brace each gate and corner post to adjacent line post with horizontal center brace rail. Install brace rail one bay from end and gate posts.

G. Provide top rail through line post tops and splice with 6 inch long rail sleeves.

H. Install center brace rail on corner gate leaves.

I. Install bottom rail between posts.

J. Do not stretch fabric until concrete foundation has cured 28 days.

K. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.

L. Position bottom of fabric 2 inches above mow strip or adjacent finished grade.

M. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.

N. Attach fabric to all fence elements (posts, braces, tension rods and braces) with specified wire at maximum 15 inches on center.

O. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

P. Install bottom tension wire stretched taut between terminal posts.

Q. Do not attach the hinged side of gate to building wall; provide gate posts.

R. Install hardware and gate with fabric to match fence.

S. Provide concrete center drop to footing depth and metal sleeve set in concrete for drop rod at center of double gate openings.

T. Install gate locking device specified in Section 08 71 00.

U. Peen all bolts upon installation.

V. Perform three random field inspections confirming proper installation.

3.4 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

3.5 TOLERANCES

A. Maximum Variation from Plumb: ¼ inch.

B. Maximum Offset from True Position: 1 inch.

3.6 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Layout: Verify that fence installation markings are accurate to design, paying attention to gate locations, underground utilities, and property lines.

C. Post Settings: Randomly inspect three locations against design for:

1. Hole diameter.

2. Hole depth.

3. Hole spacing.

D. Fence Height: Randomly measure fence height at three locations or at areas that appear out of compliance with design.

E. Gates: Inspect for level, plumb, and alignment.

F. Workmanship: Verify neat installation free of defects. See CLFMI CLF-FIG0111 for field inspection guidance Testing

3.7 ADJUSTING

A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

3.8 CLEANING

A. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material if required.

B. Clean fence with mild household detergent and clean water rinse well.

C. Remove mortar from exposed posts and other fencing material using a 10 percent solution of muriatic acid followed immediately by several rinses with clean water.

D. Touch up scratched surfaces using materials recommended by manufacturer. Match touched-up paint color to factory-applied finish.

E. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

END OF SECTION

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. Section Includes:

1. Piping.
2. Encasement for piping.
3. Manual valves.
4. Automatic control valves.
5. Transition fittings.
6. Dielectric fittings.
7. Miscellaneous piping specialties.
8. Sprinklers.
9. Controllers.
10. Boxes for automatic control valves.

1.3 DEFINITIONS

A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.

B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.

C. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.

D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.4 PERFORMANCE REQUIREMENTS

A. Irrigation zone control shall be automatic operation with controller and automatic control valves.

B. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain head to head irrigation coverage of areas indicated.

C. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties unless otherwise indicated:

1. Irrigation Main Piping: 60 psig
2. Circuit Piping: 40 psig

1.5 REGULATORY AGENCY REQUIREMENTS

A. Obtain and pay for any permits and inspections required by Governing Agencies and Utility Companies.

1.6 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Record Drawings

1. Contractor shall maintain a current legible set of irrigation plans in a safe and accessible location on site at all times for review by Landscape Architect or inspector. Design and actual locations of pipe and valves shall be noted on the plans daily as the irrigation system is constructed.
2. Record actual locations of all concealed components, piping system, sleeves and drain valves. Indicate two dimensions for all valves (including hose bibb and drain valves), stub-outs, and main line T's, L's, and ends. Dimension mainline pipes and wire runs at the beginning, mid-point, and end of each curve, or at each change of direction, or at 25' intervals along the curve if longer than 50'. Submit to Landscape Architect for approval.
3. Record Drawing to be updated daily prior to backfilling.
4. Google map appended to existing 4J Google Map. Request map sharing and editing privileges from 4J representative.
5. System as-built hard-copy and AutoCAD digital file.
6. Google map and as-built shall indicate the following:
    a. Mainline Path
    b. Branch lines and head locations.
    c. Wire path.
    d. Valve locations.
    e. Zone numbers as wired at the controller.
    f. Zone flow values as tested during commissioning.
7. As-built to include:
    a. Dynamic pressure per zone
    b. Estimated precipitation rate for each zone based on:
        1) Zone area
        2) Dynamic pressure readings
        3) Type of emission device

C. Zoning Chart: Provide laminated, color coded reduction of overall irrigation plan for mounting on wall near controller. Show each irrigation zone and its control valve.

D. Controller Timing Schedule: Provide schedule indicating length of time each valve is required to be open to provide a determined amount of water for 3 seasons. Schedule is to account for differing water requirements of lawns, shrubs and different solar orientations.

E. Operation and Maintenance Data: Provide instructions for operation and maintenance of system and controls, seasonal activation and shutdown, and manufacturer's parts catalog.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. For irrigation work: Valid Oregon Landscape Contractors License for irrigation, and a valid Oregon Landscape Business License.
2. For plumbing work: Valid Oregon Plumbing License. This includes all potable water lines. For backflow preventer installations, a valid Oregon Landscape Contractors License for irrigation and backflow or a valid Oregon Plumbing License.

3. Control panel modifications, communication, Maxicom programming and Tucor 3D Hybrid testing and installation at controller shall be completed by Water Wise LLC or a 4J approved. Approved equal requires both Rain Bird and Tucor factory authorized service training. Contact Water Wise at 503-381-6282 or rick@waterwisenorthwest.com.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.8 REGULATORY REQUIREMENTS

A. Conform to applicable code for piping and component requirements.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.9 PRE-INSTALLATION MEETING

A. Convene on site meeting with general contractor, irrigation contractor, landscape architect and appointed member of 4J irrigation team two weeks before starting work of this section.

1.10 NOTICES

A. Notify Landscape Architect at least 48 hours before time for inspections. Request inspections at the following times:

1. Upon completion of the main line, with all valves installed, prior to backfilling.

2. At start and end of pressure test.

3. System performance inspection upon completion of the entire system and after plant installation.

4. An appointed member of 4J irrigation team shall be present for all requested inspections.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.12 SPECIAL WARRANTY

A. Warranty all material for one year after date of completion or longer if manufacturer furnishes a longer guarantee.

B. Correct immediately any failure caused by poor material or workmanship during warranty period. "Immediately" shall mean within 72 hours, as determined by the Owner depending upon the immediacy of the needed repair

C. Owner shall proceed with repairs and bill Contractor for costs and any damages when Contractor fails to comply.

1.13 TREE PROTECTION

A. Protect trees and roots over 2” in diameter from damage. Route pipes under roots over 2” in diameter. All trenching within critical root zones (drip lines) of trees to be performed by hand.

1.14 PROJECT CONDITIONS

A. Environmental Conditions:

1. In freezing weather: Do no P.V.C. solvent welding.

2. In Rainy Weather: Do no P.V.C. solvent welding, except under cover.

3. Maximum temperature of mating surfaces of Plastic Pipe and Fittings: 110 º F.

B. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of water service.

2. Do not proceed with interruption of water service without Architect's written permission.

1.15 EXISTING UTILITIES

A. Locate existing utilities prior to work. Protect active Pipes encountered; notify Pipe Owners. Repair or replace Utility lines damaged by Work of this Section. Remove inactive or abandoned Utilities.

1.16 CLEANING AND PROTECTION

A. Maintain Public Streets and Driveways clean and Drains open at all times.

B. Protect Persons and Property from damage and discomfort caused by dust; water as necessary and when directed.

C. Protect other work against damage and discoloration caused by work of this Section.

1.17 MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. (2) Sprinkler heads of each type and size.

2. (2) Nozzles of each type and size.

3. (1) Valve Box Key.

4. (1) Wrench for each type of head core and for removing and installing each type of head.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Main Lines: Polyvinyl Chloride (PVC) 1120, Schedule 40, ASTM D-2466

B. Lateral Lines: Polyvinyl Chloride (PVC) 1120, Schedule 40, ASTM D-2466

C. Swing Joints at Spray Head: Triple elbow assembly using approved flexible tubing. 15" minimum length, 30" maximum.

D. Socket Type Fittings: ASTM D-2466, Schedule 40 P.V.C.

E. Threaded Fittings: ASTM D-2464 Schedule 80 P.V.C.

F. Sleeve Piping: ASTM D-2466, PVC 1120, Schedule 40 P.V.C.

2.2 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick unless otherwise indicated; full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. PVC Cleaner and Primer: R. G. Sloan "Weld-on P-70" or equal.

D. Solvent Cements for Joining PVC Piping: R. G. Sloan "Weld-on 711" or equal. Ensure that manufacturer's expiration date is not exceeded.

E. Pipe Joint Tape: Teflon tape or virgin Teflon paste on all threaded joints. Minimum of 4 wraps. No pipe dope.

F. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.3 MANUAL VALVES

A. Gate Valves:

1. Nibco T-113-LF.

B. Master Shut-off Valve: Existing to be reused.

C. Backflow Preventer: Existing to be reused.

2.4 AUTOMATIC CONTROL VALVES

A. Plastic, Automatic Control Valves:

1. Existing to be relocated.

B. Automatic Control Valve Tags: Christy's ID-STD-Y1 or other permanent hang tag indicating zone number.

C. Valve Sump: Double valve box assembly. Provide inverted valve box sump as detailed on drawings.

2.5 SPRINKLERS

A. Plastic, Pop-up Spray Rotator Sprinklers: Makes and models indicated on drawings.

2.6 CONTROLS (Existing to be reused)

A. Wire Connectors: DBY by 3M or approved.

B. Conduit and Fittings:

1. Under ground: Plastic, Class III, Federal Specification W-C-1094.

2. Above ground: Aluminum, Federal Specification WW-G-540.

C. Wire: Match existing

2.7 TRACER WIRE AND TRACER WIRE BOX (If used)

A. Contractor shall place a UF #18 minimum blue tracer wire to allow for location and marking of all otherwise unlocatable buried pipe containing pressurized water. Tracer wire shall be continuous without splices unless approved prior to the work. If approved, splices shall be made using a high-pressure type solderless connector. All splice kits shall be approved.

B. Splices shall be insulated and waterproofed. Tape wrapped around splices will not be accepted as waterproofing. Label wire with zone numbers on each side of splice.

C. Provide and neatly coil 24" of extra wire at each splice.

2.8 VALVE BOXES

A. Valve Box Lid Color: Black.

B. Drainage Backfill at Manual Drain Valves: (1) cu. foot cleaned ¾"-1" round rock with filter fabric surround.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earthwork."

B. Provide minimum cover over top of underground piping according to the following:

1. Irrigation Main Piping: Minimum depth of 24" below finished grade to top of pipe.

2. Circuit Piping: Minimum depth of 18” below finished grade to top of pipe.
3. Sleeves: Minimum depth of 24” below finished grade to center of pipe.

3.2 PREPARATION

A. Set stakes to identify locations of proposed irrigation system. Obtain Architect's approval before excavation.

3.3 PIPING INSTALLATION

A. Location and Arrangement:
   1. Piping layout indicated is diagrammatic.
   2. Route piping and valve boxes to avoid trees, shrubs, ground cover, and structures.
   3. If conditions differ significantly from those shown on plan, contact Landscape Architect immediately.
   4. Review layout requirements with plantings and other affected work. Contractor is responsible for insuring irrigation equipment locations do not conflict with proposed plant locations.
B. Install pipe, valves, controls, and outlets in accordance with manufacturer's instructions and details on drawings.
C. Provide 3” sand bedding below all main line piping. Provide 3” sand bedding or clean topsoil fill below all lateral piping.
D. Provide 3” minimum debris free cover over all main and lateral line piping.
E. Install piping at minimum uniform slope of 0.5 percent down toward drain valves.
F. Install piping free of sags and bends.
G. Provide for thermal movement of components in system.
H. Install groups of pipes parallel to each other, spaced to permit valve servicing.
I. Install fittings for changes in direction and branch connections.
J. Lay piping on even bed, uniformly sloped without humps or depressions.
K. Install PVC piping in dry weather when temperature is above 40 deg F. Allow joints to cure at least 24 hours at temperatures above 40 deg F before testing.
L. Install piping in sleeves under parking lots, roadways, and sidewalks.

3.4 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.
B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Use Teflon tape or virgin Teflon paste on all threaded joints unless dry seal threading is specified. Minimum of 4 wraps. No pipe dope.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
D. Flanged Joints: Select rubber gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

E. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.

2. PVC Pressure Piping: Join schedule number, ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.

3. PVC Nonpressure Piping: Join according to ASTM D 2855.

3.5 VALVE INSTALLATION

A. Automatic Control Valves: Coil 30" length of control wires around ¾" pipe in box. Install plumb in valve box extending from grade to valve body. Minimum clearance from finish grade to valve top: 4 inches. Install per detail. Top of box to be flush with finished grade.

3.6 SPRINKLER INSTALLATION

A. Install sprinkler nozzles after system flushing is completed.

B. Install sprinklers at manufacturer's recommended heights.

C. Locate part-circle sprinklers to maintain a minimum distance of 8 inches from walls and 2 inches from other boundaries unless otherwise indicated.

D. immediately before and after each turn or plant root ball and (2) stakes at every root ball crossing.

3.7 CONTROL SYSTEM INSTALLATION (To be coordinated with 4J and to use existing components where applicable)

A. See paragraph 1.7.A.3 for installer qualifications to modify existing control panels.

B. Controller shall connect with 4J Maxicom software. Work with 4J representative to program Maxicom software for operation utilizing existing CCU channel located at 4J Grounds office.

C. Final acceptance requires proper programming and commissioning of satellite channel settings and network communication and updates to Maxicom software data base. System operation from Maxicom software is required prior to final acceptance.

D. Install control cable in same trench as irrigation piping and at least 2 inches below or beside piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas.

3.8 CONNECTIONS

A. Install piping adjacent to equipment, valves, and devices to allow service and maintenance.

B. Connect wiring between controllers and automatic control valves.

3.9 IDENTIFICATION

A. Provide permanent hang tags at automatic control valves indicating zone number and correlating to controller chart.

B. Provide reduced, color-coded, laminated copy of irrigation plan with valve schedule on each automatic controller.

3.10 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Leak Test: After installation, charge system to 100 PSI and test for leaks. Pressure piping to lose no more than 4 PSI in 24 hours. Repair leaks and retest until no leaks exist.

2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
4. Perform coverage test of lawn areas prior to seeding or sodding lawns.

B. Irrigation Site Commissioning:

1. Set-up and verify proper communication to district's Maxicom computer.
2. Populate Maxicom data base with flow values from new work.
3. At final acceptance, system shall run from Maxicom remotely using smart-phone or tablet or similar.
4. Walk system to verify operation and consistency with as-built drawings.
5. Test dynamic pressure for new work.
6. Any irrigation product will be considered defective if it does not pass tests and inspections.
7. Prepare test and inspection reports.

3.11 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Verify that controllers are installed and connected according to the Contract Documents.
3. Verify that electrical wiring installation complies with manufacturer's submittal.

3.12 ADJUSTING

A. Adjust settings of controllers.

B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.

C. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with finish grade.

D. Adjust radii and arcs of sprinklers to provide head to head coverage and prevent overspray onto buildings and paving.

3.13 CLEANING

A. Flush dirt and debris from piping before installing sprinklers and other devices.

B. Drip System Cleaning: Contractor to clean all drip system filters and flush system one month after installation.

3.14 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain automatic control valves and controllers.

END OF SECTION

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. Section Includes:

1. Seeding.
2. Sodding.
3. Turf renovation.

B. Related Sections:

1. Section 31 10 00 "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
2. Section 31 20 00 "Earth Moving" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
3. Section 32 84 00 “Planting Irrigation”.

1.3 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

C. Finish Grade: Elevation of finished surface of planting soil.

D. Topsoil: As defined in PART 2 - PRODUCTS.

E. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

F. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

G. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, including soils. Provide 1 quart bagged sample of topsoil for approval.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass sod and seed. Include identification of source and name and telephone number of supplier.

C. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience if requested. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of similar landscape installations.

1. Experience: Five years experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."

2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

B. Preinstallation Conference: Convene on site meeting with General Contractor, Landscape Contractor and Landscape Architect two weeks before starting work of this section, see also Irrigation Specifications. Combine and coordinate with irrigation conference per section 32 84 00.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed and other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

3. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.8 WARRANTY

A. Repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.

b. Structural failures including plantings falling or blowing over.

c. Faulty performance of tree stabilization.

2. Warranty Period: 1 year from Date of approved Final Completion.
3. Include the following remedial actions as a minimum:
   a. Lawn Warranty: Include until end of specified maintenance period. Re-seed areas larger than 12 sq. inches not uniformly covered by grass over entire area.

1.9 MAINTENANCE SERVICE

A. Initial Maintenance Service for all plant materials: Provide maintenance by skilled employees of landscape installer. Maintain as required in Part 3. Begin maintenance immediately after planting and continue until acceptable turf is established and date of final completion but for not less than the following periods:

1. Seeded Turf: 30 days from date of planting completion.
2. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.
3. Sodded Turf: 30 days from date of planting completion.

B. Service must include operation of irrigation, weed removal, mowing and clipping removal, rut filling and general lawn maintenance.

1.10 REQUIRED INSPECTIONS FOR APPROVAL

A. Request visitation by the Landscape Architect 3 days minimum in advance of the following:

1. Installation Inspection: At time of Substantial Completion Inspection, Landscape Architect will review installation of all work of this Section. Installation Review will not occur until completion of all planting. A punchlist will be prepared by Landscape Architect. All punchlist items must be satisfactorily completed to obtain Final Completion.
2. Warranty Inspection: Immediately prior to the expiration of the Project Warranty, review all work of this Section for compliance with requirements. Make any corrections required by these reviews.

PART 2 - <u>PRODUCTS</u>

2.1 SEED MIXTURES (If used)

A. Provide only current or last season's crop at manufacturer's high rate.

B. Purity: 98% by volume.

C. Germination: 92 percent.

D. Lawn Seed Mixture: JB Signature 3-Way Perennial Ryegrass blend.

2.2 TURFGRASS SOD

A. Turfgrass Sod: Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

B. Turfgrass Sod Product: JB Signature 3-Way Perennial Ryegrass blend.

2.3 FERTILIZER: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight or approved ratio.

2.4 SOIL

A. Topsoil: Imported, natural, fertile, friable, topsoil loam with at least 10% humus, free from subsoils, clay, stones, lumps, roots, clods, sticks, weeds, weed seed and other foreign matter. Submit sample for approval. Available as "Processed Loam" by RiverBend Materials or approved. Topsoil to be free from horsetail.

2.5 MULCH

A. At Seeded Areas: Clean, seed-free hay, straw, fiber or well-composted organic material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be seeded or sodded for compliance with requirements and conditions affecting installation and performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
5. Verify that previous subgrade grading operations satisfactorily meet specifications and have been approved by Landscape Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 SOIL PLACEMENT SCHEDULE

A. Confirm sub-grade material is acceptable to Landscape Architect before placing any fill. **Gravel, debris and hardpan material are not permitted within 18" of finished grade. Contractor is to ensure that soil is free of gravel or foreign materials.**

B. Fill with minimum 6" imported, compacted topsoil at new irrigated lawns. Excavate as needed to allow for placement. Fill with compacted imported topsoil to flush with adjacent finished grade or adjacent paving or curb at restored lawns. Fill to eliminate low areas, prevent puddling and provide smooth transitions to existing grades.

3.4 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets,

and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

3.5 SEEDING

A. Immediately prior to seeding, till into top 4" of soil:

1. Fertilizer: 15 lbs. per 1000 sq. ft.

B. Rake and drag to remove from top 4" of soil: Stones, clods, sticks and other foreign matter larger than 1 inch in any dimension; establish smooth, fine textured seed bed. Compact as necessary to prevent future settling.

C. Planting Season – Between March 15th and October 15th.

D. Do not sow immediately following rain, when ground is too dry, or during windy periods.

E. Apply half of seed in one direction and remaining at right angles to first seeding at the specified rates.

F. Lightly rake to cover seed, roll, mulch and water with a fine spray.

3.6 MULCHING

A. Immediately following seeding and compacting, apply mulch to a thickness of 1/8 inches.

3.7 LANDSCAPE MAINTENANCE

A. Fill in as necessary soil subsidence that may occur because of settling or other processes.

B. Grass Mowing: Mow all new and restored lawn areas for specified maintenance period. Do not attempt first mowing until grass is firmly rooted and secure in place. When grass reaches 3 inches in height, mow to 2 inches in height. Maintain grass until end of Maintenance Period or until final completion, whichever is later. Do not remove more than 1/3 of grass leaf in any mowing operation. Remove clippings from project. Provide 3 mowings minimum.

C. Grass Mowing: Do not attempt first mowing until grass is firmly rooted and secure in place.

3.8 CLEANUP AND PROTECTION

A. During work of this section, keep adjacent paving and construction clean and work area in orderly condition.

B. Protect lawn from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods.

C. Erect temporary fencing as required to protect new and restored lawn areas. Maintain fencing throughout initial maintenance period and remove after lawn is established.

D. After installation and before Final Completion remove all construction debris from planting areas and Project site

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes gravity-flow nonpressure storm drainage outside the building, with the following components:

1. Pipe and fittings.
2. Cleanouts.
3. Nonpressure transition couplings.
4. Catch basins.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Backwater valves.
2. Cleanouts.
3. Inlets.
4. Pipe.
5. Fittings.
6. Drains.

B. Shop Drawings:

1. Precast Concrete Manholes: Include plans, elevations, sections, details, frames, and covers.
2. Catch basins and area drains. Include plans, elevations, sections, details, frames, covers, and grates.
3. Cast-in-place concrete manholes, including frames and covers.
4. Pre-cast concrete structures, including frames and covers.

C. Field quality-control reports.

1.3 PROJECT CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without Owner's written permission.

B. Site Information: Research public utility records, and verify existing utility locations prior to ordering any materials. Notify Architect immediately if any discrepancies are found in the project Survey.

PART 2 - PRODUCTS

2.1 Refer to Part 3 “Piping Applications” for applications of pipe, fitting, and joining materials.

2.2 DUCTILE-IRON, GRAVITY SEWER PIPE AND FITTINGS

A. Pipe: ASTM A 746, for push-on joints.

B. Standard Fittings: AWWA C110, ductile or gray iron, for push-on joints.

C. Compact Fittings: AWWA C153, for push-on joints.

D. Gaskets: AWWA C111, rubber.

2.3 PE PIPE AND FITTINGS

A. Corrugated PE Drainage Pipe and Fittings NPS 3 to NPS 10: AASHTO M 252M, Type S, with smooth waterway for coupling joints.

1. Soiltight Couplings: AASHTO M 252M, corrugated, matching tube and fittings.

2.4 PVC PIPE AND FITTINGS

A. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 35 with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

2.5 NONPRESSURE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Concrete Pipes: ASTM C 443, rubber.

2. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.

3. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded, Flexible Couplings:

1. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Shielded, Flexible Couplings:

1. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

E. Ring-Type, Flexible Couplings:

1. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.6 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Description: Cleanouts: At grade cleanouts shall have an adjustable sleeve-type housing, a threaded brass plug with counter sunk slot, and cast iron frame and cover.

2. Top-Loading Classification(s): Light Duty, Medium Duty, Heavy Duty, and Extra-Heavy Duty.

3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

B. Plastic Cleanouts:

1. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

2.7 CATCH BASINS AND AREA DRAINS

A. Trapped Catch Basins: 10-Gauge steel plate bituminous coated as manufactured by Lynch, Gratemaster, Gibson Steel Basins, or approved equivalent. Reinforced concrete collars shall be installed per the Drawings.

B. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for heavy-duty service H-20, structural loading. Include flat grate with small square or short-slotted drainage openings.

1. Size: Per Plan.

2. Grate Free Area: Approximately 50 percent unless otherwise indicated.

C. Nyloplast Catch Basins:

1. Description: Round catch basin structure as indicated on the Contract Drawings.

2. Material: Structure shall be made out of PVC meeting ASTM D 1784. Joint tightness shall conform to ASTM D 3212. Flexible elastomeric seals shall conform to ASTM F 477.

3. Grates: Grates and frames shall be ductile iron and made specifically for each basin so as to provide a round bottom flange that closely matches the diameter of the catch basin. Grates shall be capable of supporting H-20 wheel loading for traffic areas or hold loading for pedestrian areas. Metal shall conform to ASTM A 536 grade 70-50-05 for ductile iron and be painted black.

4. Reinforced concrete collar shall be installed per the drawings.

PART 3 - EXECUTION

3.1 EARTHWORK

1. Excavation, trenching, and backfilling are specified in Section 31 20 00 "Earth Moving." Install tracer wire directly over piping and at outside edges of underground structures. See section 31 20 00 “Earth Moving” for tracer wire material requirements.

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process or microtunneling.

F. Install gravity-flow, nonpressure drainage piping according to the following:

1. Install piping pitched down in direction of flow at a minimum slope of 1 percent, unless otherwise indicated.

2. Install piping with 36-inch minimum cover, unless otherwise indicated.

3. Install ductile-iron piping and special fittings according to AWWA C600 or AWWA M41.

4. Install PE corrugated sewer piping according to ASTM D 2321.

5. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.

6. Install piping below frost line.

7. Install hub-and-spigot cast iron piping according to CISPI's "Cast Iron Soil Pipe and Fittings" handbook.
8. Install hubless cast iron piping according to CISPI 301 and CISPI's "Cast Iron Soil Pipe and Fittings" handbook.

G. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105:

1. Ductile-iron pipe and fittings.

H. Clear interior of piping and manholes of dirt and superfluous material as work progresses.

3.3 PIPE JOINT CONSTRUCTION

A. Basic pipe joint construction is specified in Division 33 Section "Common Work Results for Utilities." Where specific joint construction is not indicted, follow piping manufacturer's written instructions.

B. Join gravity-flow, nonpressure drainage piping according to the following:

1. Join ductile-iron culvert piping according to AWWA C600 for push-on joints.
2. Join ductile-iron piping and special fittings according to AWWA C600 or AWWA M41.
3. Join corrugated PE piping according to ASTM D 3212 for push-on joints.
4. Join PVC corrugated sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints.
5. Join nonreinforced-concrete sewer piping according to ASTM C 14 and ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
6. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
7. Join dissimilar pipe materials with nonpressure-type flexible couplings.
8. Join hub-and-spigot cast iron soil piping with gasketed joints according to CISPI's "Cast Iron Soil Pipe and Fittings" handbook for compression joints.
9. Join hubless cast iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings" handbook for hubless-coupling joints.

C. Pipe couplings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
    a. Unshielded flexible couplings for pipes of same or slightly different OD.
    b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
    c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.4 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use PVC fittings in sewer pipes at branches for cleanouts and PVC pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.

3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.

4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.

B. Set cleanout frames and covers in earth in cast-in-place concrete block, as indicated on plans. Set with tops 1 inch above surrounding earth grade.

C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.5 CATCH BASIN & AREA DRAIN INSTALLATION

A. Set frames and grates to elevations indicated.

3.6 NYLOPLAST CATCH BASIN INSTALLATION

A. Set frames and grates to elevations indicated per the manufacturer’s recommendations.

3.7 CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Section 22 14 13 "Facility Storm Drainage Piping."

B. Make connections to existing piping and underground manholes.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.

b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

C. Pipe couplings and expansion joints with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.

a. Shielded flexible couplings for same or minor difference OD pipes.

b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.

c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.8 IDENTIFICATION

A. Install green tracer wire directly over piping and at outside edges of underground structure. See Section 31 20 00 “Earth Moving” for tracer wire material requirements.

3.9 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:
    a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
    d. Infiltration: Water leakage into piping.
    e. Exfiltration: Water leakage from or around piping.
3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
    a. Option: Test plastic piping according to ASTM F 1417.
    b. Option: Test concrete piping according to ASTM C 924.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes subdrainage systems for stormwater infiltration facilities:

1. Perforated-wall pipe and fittings.
2. Geotextile filter fabrics.

1.2 SUBMITTALS

A. Product Data:

1. For geotextile filter fabrics.
2. Perforated pipe.
3. Solid-wall pipe.

B. Inspection report.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 “Piping Applications” for applications of pipe, fitting, and joining materials.

2.2 PERFORATED-WALL PIPES AND FITTINGS

A. Perforated schedule 40 ABS Pipe and Fittings: ASTM F628 or D2661, solvent welded joints.

B. Perforated schedule 40 PVC Sewer Pipe and Fittings: ASTM D 1785, D2665 or F891, solvent welded joints.

2.3 SOLID-WALL PIPES AND FITTINGS

A. ABS Schedule 40 Pipe and Fittings: ASTM D 2661 or F628 with solvent welded fittings.

B. PVC Schedule 40 Sewer Pipe and fittings: ASTM D 1785, F 1488, or D2665 with solvent welded fittings (ASTM D 2665, or DF 1866).

2.4 SPECIAL PIPE COUPLINGS

A. Comply with ASTM C1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of the same sizes as piping to be joined and corrosion-resistant metal tension band and tightening mechanism on each end.

2.5 CLEANOUTS

A. Cast-Iron Cleanouts: ASME A112.36.2M; with round-flanged, cast-iron housing; and secured, scoriated, Medium-Duty Loading class, cast-iron cover. Include cast-iron ferrule and countersunk, brass cleanout plug.

B. PVC Cleanouts: ASTM D 3034, PVC cleanout threaded plug and threaded pipe hub.

2.6 SOIL MATERIALS

A. Backfill, drainage course, and satisfactory soil materials are specified in Division 31 Section 31 20 00 "Earth Moving."

2.7 GEOTEXTILE FILTER FABRICS

A. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. when tested according to ASTM D 4491.

B. Structure Type: Nonwoven, needle-punched continuous filament.

1. Style(s): Flat and sock.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 31 Section 31 20 00 "Earth Moving."

3.2 PIPING APPLICATIONS

A. Stormwater Infiltration Facility

1. Perforated PE Pipe and fittings, couplings, and coupled joints.
2. Perforated PVC Sewer Pipe and fittings, and loose, bell-and-spigot joints.

3.3 PIPING INSTALLATION

A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.

1. Stormwater Infiltration Facilities: Install Piping flat, at elevation shown on Plans.
2. Lay perforated pipe with perforations down.
3. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.

B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

C. Install PE piping according to ASTM D 2321.

D. Install PVC piping according to ASTM D 2321.

3.4 PIPE JOINT CONSTRUCTION

A. Join PE pipe, tubing, and fittings with couplings for soil-tight joints according to AASHTO's "Standard Specifications for Highway Bridges," Division II, Section 26.4.2.4, "Joint Properties."

B. Join perforated PE pipe and fittings with couplings for soil-tight joints according to AASHTO's "Standard Specifications for Highway Bridges," Division II, Section 26.4.2.4 "Joint Properties"; or according to ASTM D 2321 with loose banded, coupled, or push-on joints.

C. Join PVC pipe and fittings according to ASTM D 3034 with elastomeric seal gaskets according to ASTM D 2321.

D. Join perforated PVC pipe and fittings according to ASTM D 2729, with loose bell-and-spigot joints.

E. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.5 CLEANOUT INSTALLATION

A. Comply with requirements for cleanouts specified in Section 33 41 00 "Storm Utility Drainage Piping."

3.6 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.

2. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

B. Drain piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.7 CLEANING

A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION

Play Fields and Synthetic Turf Field Construction

The subgrade beneath the proposed new play fields and the synthetic turf field south of Kelly Middle School was relatively stiff at the time of the field exploration. However, the subgrade soils are moisture-sensitive and will tend to soften significantly when exposed to rainfall (as indicated above). If moist, the subgrade will tend to pump or rut under truck or construction equipment traffic. In addition, an excessively moist subgrade cannot be compacted.

We have assumed herein that the construction of these fields will be delayed until the soils are sufficiently dry and stiff to permit moisture-conditioning and compaction, and to support the required construction activities without damage to the subgrade. If soft soils are present, subgrade stabilization in the form of a separation geotextile and additional granular subbase will be required. Subgrade treatment in the form of lime or cement is possible to mitigate soft, wet soils, but could significantly add to earthwork costs. Development of construction guidelines for this option of subgrade stabilization was beyond the current scope of work.

On-Site Storm Retention

The site is underlain by a relatively thin mantle of silt followed by gravel. Local water wells suggest the local ground water level typically lies at ±10 to 12 feet below the ground surface in the summer and fall, rising to ±7 to 10 feet in the winter. At the time of exploration (November 2013), ground water was encountered in some of the borings at ±14 to 14.5 feet. However, no long-term ground water data is available. A log for a well drilled on the Kelly Middle School property reported a static water level at ±7 feet. That is the closest available information and we have assumed this depth to be representative of a seasonally high ground water levels.

Supplemental infiltration tests are planned. Results of those tests will be provided in a supplemental memorandum.

ENGINEERING ANALYSIS

Foundations for Structures

We have assumed the new buildings will have a finished floor elevation (FFE) of ±El. 397. Assuming ±1 foot for the floor slab and crushed rock leveling course, we estimate the subgrade elevation will be ±El. 396. As a result, very little site grading (i.e., new site fill or excavation) will be required.

For our foundation analysis, we assumed new footings would bear on a nominal 1 foot of compacted crushed rock followed by medium stiff silt. At most locations, the gravels are deep enough that they lie below the influence depth of the footings. At BH-2 and BH-5, the gravels are relatively shallow and provide a positive influence on the foundations by reducing overall settlement.

Bearing Capacity. Footing dimensions and loads were not available for the building unit foundations at the time this report was prepared. Vikki Bourcier, S.E. (HLI) provided an estimate of the loads based on their previous experience with similar schools. They indicated a maximum column load of 50 kips (22 kips dead plus 28 kips live) and a maximum wall load of 2.5 kips per lineal foot (klf) (1.1 klf dead plus 1.4 klf live). The live load is estimated to comprise ±56% of the total load, which should represent the worst case condition.

We have assumed that column spread footings will have maximum dimensions of 4x4 to 5x5 feet. Continuous wall footings are expected to be 2 to 3 feet wide.

We estimated a bearing capacity of the foundation soils assuming a nominal footing depth of ±2 feet (below FFE), bearing on 12 inches of Select Fill followed by silt with a minimum undrained shear strength of 1,000 psf for the native silt. Our analysis suggests an allowable bearing pressure of 2,300 psf for column footings and 2,100 psf for strip footings. This assumes a typical factor of safety of 3.

Our bearing capacity analysis assumes that FEI will be present during foundation construction to confirm the presence and extent of any soft soils beneath new footings. If present, soft soils will be mitigated by recompaction or replacement with granular fill.

Settlement. Potential foundation settlements were estimated using the assumed range of footing dimensions and preliminary foundation loads provided by HLI. For settlement analysis we included the dead load and half of the estimated live load, resulting in a maximum column load of ±36 kips and maximum wall load of ±1.8 klf. The subsurface profile encountered in the exploratory borings was used to model foundation conditions. Results of the consolidation test (Appendix C) were used to estimate the compressibility of the fine-grained soil that underlies the site. The gravels were assumed to be relatively incompressible.

Our analysis indicates total settlement under the largest column loads should less than ± ¾ inch. Total settlement of a 2 to 3-foot wide continuous wall footing is estimated to be less than ± ¼ inch for the maximum wall load. For design, we recommend assuming a maximum differential settlement of ± ½ inch between the columns or between the columns and perimeter walls. Because the bearing pressure used in our analysis is close to the estimated preconsolidation pressure, it is important that we review the final design loads to confirm the calculated settlements.

Our settlement analysis assumes that FEI will be present during foundation construction to confirm the presence and extent of any soft soils beneath new footings and slabs. If present, soft soils will be mitigated by recompaction or replacement with granular fill.

Pavement Analysis and Design

A bus loop and a parking lot are planned for the new school. Additional paved access to the back of the new school is also planned but its location had not been determined at the time this report was prepared.

For the bus loop an estimate of average daily traffic (ADT) of 37 was provided to us by the design team. The traffic consists of 16 full-sized buses, 8 smaller special needs buses and 5 delivery trucks (2 to 3-axle). An ADT of 300 was estimated for the parking lot. We have assumed 1% of the total traffic for the parking area would consist of 2 to 3-axle delivery trucks.

Equivalent (18-kip) Single-Axle Loads (ESALs) for design were calculated using ESAL-conversion factors from the 2011 ODOT Pavement Design Guide. Car and pickup truck factors were obtained from the 1993 AASHTO Pavement Design Guide and bus values were obtained from the 2003 Asphalt Pavement Design Guide prepared by the Asphalt Pavement Association of Oregon (APAO). A 20-year and 30-year design life was assumed for flexible and rigid pavements, respectively.

The pavement subgrade is expected to consist of predominantly medium stiff to stiff, medium plasticity, clayey silt. The DCP test results suggest the subgrade resilient modulus (M_r) value ranges from $\pm$3,100 to 4,600 lb/in^2 (psi). For design, a M_r value of 3,100 psi was selected to account for variability within the subgrade.

Pavement analysis was completed using the AASHTO (1993) procedure and input parameters recommended in the ODOT Pavement Design Guide (ODOT, 2011). Using the design traffic and M_r value, we calculated a flexible pavement section consisting of 2.5 inches of asphaltic concrete (AC) over 13 inches of base rock for the parking lot, and a flexible pavement section of 4 inches of AC over 14 inches of base rock for the bus loop and for other areas subject to increase truck traffic (e.g., in driveways and near trash/recycle bins). These sections are similar to the sections currently used by the school district.

It is anticipated that most pavements will consist of flexible sections. However, areas at cross walks or for emergency vehicle access may be designed with PCC concrete. We calculated a minimum rigid section would consist of 6 inches of PCC over a 6-inch thick leveling course of base rock. However, ODOT typically recommends a minimum PCC section of 8 inches, with consideration to a thicker panel at bus stops. Therefore, we recommend using a rigid pavement section consisting of a minimum 8 inches of PCC over 6 inches of base rock.

Native gravel or gravel fill from past site grading may be present north of, or in the vicinity of, the existing school buildings. Where gravel is present, the thickness of the base rock section may be reduced. The presence of shallow gravel and a subsequent reduction in base rock thickness should be confirmed by an FEI representative at the time of construction.

Seismic Analysis

A spectral acceleration response spectrum for the site was established based on Section 1613 of the Oregon Structural Specialty Code (OSSC) 2010. Based on our explorations, we recommend using a Site Class D. The seismic design parameters and OSSC response spectrum are shown on Figure 3A (Appendix A).

DISCUSSION OF SEISMIC HAZARDS

A site-specific hazard study was completed by Brooke Running, C.E.G. for the school site and provided in Appendix D. That study concluded there are not seismic hazards that would preclude the construction of the planned school project.

To expedite review by the City, we have summarized the soil and seismic issues based on the requirements of OSSC Sections 1803.2 through 1803.6, and the headings from the code.

1803.2 Investigations Required

The field exploration and sampling program and the associated geotechnical investigation performed by FEI for this site meet the requirements of this section and address the appropriate items listed.

1803.5.1 Classification

Soils present at the site are described in this report and on the test pits logs (Appendix B). Laboratory tests used to classify the soils are described above and are summarized in Appendix C.

1803.5.2 Questionable Soils

There are no questionable soils on the site. However, soft subgrade conditions were noted in isolated conditions. Furthermore, the surficial soils are moisture sensitive and are expected to soften significantly when exposed to rainfall. It is anticipated the site grading will remove and replaced or reprocess any soft surficial soil beneath the planned structures. We have recommended herein that an FEI representative be present to confirm foundation conditions in new footing excavations.

1803.5.3 Expansive Soils

No high plasticity clays were encountered during the field exploration. Therefore, no significant impact to foundations is anticipated from expansive soils.

1803.5.4 Ground Water Table

No below-grade construction is planned. Ground water levels at the site should lie below footings and slab levels and should not adversely impact foundations. Perimeter foundation drains are recommended to deal with potential perched ground water during the winter.

1803.5.5 Deep Foundations

No piles or piers are planned.

1803.5.6 Rock Strata

Alluvial gravel is estimated to extend to a relatively great depth below the site. Therefore, no bedrock is anticipated within the excavation limits.

1803.5.7 Excavation near Foundations

No excavations near foundations are planned.

1803.5.8 Compacted Fill Material

Specifications for fill materials and compaction are described below in the Recommendation section.

1803.5.9 Controlled low-strength material (CLSM)

All foundations will bear on compacted Select Fill underlain by native soil.

1803.5.10 Alternate setback and clearance

The site is relatively flat; therefore, no natural or man-made slopes are present and no minimum setback or clearance is required.

1803.5.11 Seismic Design Category C through F

Individual seismic-related items addressed within this category of the code are discussed below.

Slope Instability. The site is relatively flat. Therefore, there is no risk of slope instability or earthquake-induced landslides. The Relative Earthquake Hazard Map of the Eugene-Springfield Metropolitan Area, Lane, County (Black et al., 2000) indicates the school site lies within Zone D - the lowest hazard designation.

Liquefaction. The new school buildings will be supported by spread footings, bearing on a layer of structural fill followed by medium stiff silt underlain by medium dense to very dense gravel. Based on the stiffness and plasticity of the foundation soil and the relative density of the underlying gravel, there is no significant risk of liquefaction. Consequently, there is no significant risk of loss of strength of the foundations soils or settlement due to a seismic event. As a result, no mitigation measures are required for the foundations.

Differential Settlement. There is no risk of significant differential settlement due to the conditions described under liquefaction.

Surface displacement due to faulting or lateral spreading. The site is underlain by a relatively thick layer of alluvial deposits. There is no known displacement of the alluvial deposits and there are no potentially active, nearby faults that would cause a surface rupture at the site.

There are no natural slopes near the planned school buildings or liquefiable soils that would allow lateral spreading to occur.

1803.6 Reporting

FEI dug exploratory test pits, drilled exploratory borings, completed laboratory tests, conducted engineering analyses and summarized our findings in this report, which was prepared to meet the requirements of OSSC 2010, Section 1803.

RECOMMENDATIONS

We recommend the earthwork be completed during dry weather when aeration is more practical and the subgrade is less prone to pumping and disturbance. However, we understand the construction schedule is not currently known. Therefore, recommendations are provided for both wet and dry weather construction. The contractor may still experience pumping problems in the summer if the surficial soils have not adequately dried. Therefore, we recommend an on-site conference with the contractor prior to the grading work to review site conditions.

A site grading plan was not available at the time this report was prepared. For purposes of our analysis, we assumed individual building pads will extend at least 1 foot (possibly more) above existing grades.

Foundation Design and Construction

Design the foundations and slabs for the classroom and gym/cafeteria buildings as follows:

1. Design all continuous wall footings and isolated column footings using allowable bearing pressures of 2,100 and 2,300 psf, respectively.

2. Use of coefficient of friction of 0.35 at the base of the footing for analysis of sliding resistance, assuming all footings bear on compacted Select Fill. A lateral bearing of 200 psf can be assumed for footings backfilled with Select Fill.

3. Provided all new footings are designed and built as specified herein, assume settlement under the maximum anticipated column load to be less than ± ¾ inch, settlement under the maximum anticipated wall load to be less than ± ¼ inch. Assume a potential differential settlement between columns and walls of up to ± ½ inch.

4. Provide a minimum footing width of 2 feet for all continuous wall footings. This minimum does not apply to grade beams or thickened slab sections that support non-load bearing walls.

5. Use a modulus of subgrade reaction, k_s, of 250 kcf for floor slab design. Reinforce all floor slabs to reduce cracking, warping and the risk of ground water infiltration. Rebar, instead of wire mesh, is recommended. The use of fiber as the sole method of reinforcement is

not recommended. Provide a suitable vapor barrier under the slab that is compatible with the proposed floor covering and the method of slab curing.

6. Design the building assuming a Site Class D and the seismic parameters provided in Figure 3A (Appendix A). These values are based on OSSC 2010 (Section 1613). The corresponding response spectrum for the OSSC 2010 General Procedure is also shown in Figure 3A. The liquefaction potential of the foundation soils is negligible due to the plasticity of the surficial soils and the density of the underlying gravel.

Perimeter Foundation Drainage System for Buildings

7. Install foundation drains along the perimeter of the building. The drains should consist of 3 or 4-inch diameter, perforated or slotted, PVC pipe wrapped in a Filter Fabric (specified below). The flowline of the pipe should be set as deep as possible (i.e., on top of the perimeter footings or near the base of the building pad fill). The pipe should be bedded in at least 6 inches of 2-inch minus, clean drain rock and backfilled to the full depth with drain rock. The entire mass of drain rock should be wrapped in a similar filter fabric that laps at least 12 inches at the top.

8. Provide clean-outs at appropriate locations for future maintenance of the drainage system.

Materials and General Earthwork Specifications

9. Select Fill as defined herein should consist of 1 or ¾-inch minus, clean (i.e., less than 5% passing (by weight) the #200 U.S. Sieve), well-graded, durable, crushed rock that is free of plastic clay, organic matter and construction debris. We should be provided a sample of the intended fill for approval, prior to delivery to the site.

10. Granular Site Fill should consist of 3-inch minus, clean, well-graded, crushed (quarry) rock or approved bar-run gravel. The latter is appropriate only if placed during dry weather or when the gravel is adequately dry for compaction.

11. Compact all Select Fill, Granular Site Fill or native material in loose lifts not exceeding 12 inches, unless specified otherwise below. Thinner lifts will be required if light or hand-operated equipment is used. Compact the fill to a minimum of 95% relative compaction. The maximum dry density of ASTM D698 should be used as the standard for estimating relative compaction. Field density tests should be run frequently to confirm adequate compaction.

12. The Separation Geotextile should have Mean Average Roll Value (MARV) strength properties meeting the requirements of an AASHTO M 288-06 Class 2 woven geotextile.

    The geotextile should have MARV hydraulic properties meeting the requirements of AASHTO M 288-2006 (geotextile for separation) with a permitivity greater than 0.05 $sec.^{-1}$ and an AOS less than 0.6 mm. We should be provided a specification sheet on the selected geotextile for approval prior to delivery to the site. This geotextile is not suitable for construction during wet weather.

13. Filter Fabric should consist of a non-woven geotextile with a grab tensile strength greater than 200 lb., an apparent opening size (AOS) of between #70 and 100 (US Sieve) and a permitivity greater than 0.1 sec^{-1}.

14. Inform contractors that utility construction will require dewatering for any deep excavations completed during the winter. Shoring will be needed in all trenches to protect workers from sloughing or caving soils. Assume an OR-OSHA Type C soils for planning utility trenching and/or shoring.

Site Preparation for the Building Pad and Staging Areas (Dry Weather)

Prepare the pads for the new classroom and gym/cafeteria buildings, and any staging areas in dry weather as follows:

15. Strip the existing ground ±4 inches, or as required to remove roots, sod or unsuitable soil. The actual depth of stripping should be confirmed by FEI during construction. Dispose of all strippings outside of construction areas. The strippings should be hauled from the site or reused only in landscape areas. No strippings should be placed beneath foundations, slabs, sidewalks or pavements.

16. Compact the subgrade as specified in Item 11.

17. Proof-roll the completed subgrade with an approved vehicle. Where soft soil is present, moisture condition the soil (i.e., dry it) and re-compact as specified in Item 11. This option requires dry weather and sufficient time for aeration. If the zone of soft soil is more than 12 inches thick, excavation, stockpiling, aeration and recompaction in lifts may be required.

    Alternatively, over-excavate the soft soil and replace with Select Fill or a combination of Granular Site Fill and Select Fill. The actual depth of overexcavation should be confirmed by FEI during construction. The final excavation for areas requiring removal of soft soil should be done with a hoe equipped with a smooth bucket. The surface of the subgrade should be left clean, free of loose or disturbed soils or large clods.

We recommend the bid documents include a unit cost for the option of on-site aeration and recompaction of soft, wet soil in lifts and for the option of over-excavation and replacement with compacted, granular fill.

18. Overexcavate any test pits that extend beneath the footprint of the building and replace with compacted Select Fill or Granular Site Fill.

19. Place a Separation Geotextile on the prepared subgrade that meets the requirements specified above. The geotextile should be laid smooth, without wrinkles or folds in the direction of construction traffic. Overlap adjacent rolls a minimum of 2 feet. Pin fabric overlaps or place the building pad fill in a manner that will not separate the overlap during construction. Seams that have separated will require removal of the building pad fill to establish the required overlap. The geotextile may be eliminated if the building pad fill will not be subjected to wet weather and heavy construction traffic.

20. Place at least 12 inches of Select Fill to create the individual building pads, provided the subgrade is stiff and stable. If more than 12 inches of granular fill is required for grading purposes or to stabilize the subgrade under building pads, Granular Site Fill capped with a minimum of 12 inches of Select Fill can be used. Compact the building pad fill as specified in Item 11.

21. Provide at least 12 inches of Select Fill beneath all footings. Depending on the grading plan, trenching through the building pad may be required to place the structural fill beneath the footings. At most locations, we expect the footing excavations will terminate in silt. The bottom of the excavations should be left free of clods and disturbed soil. The subgrade at the bottom of the footing excavations should have a minimum undrained shear strength of 1,000 psf (to be confirmed by FEI during construction). Any soft soil present at the bottom of the excavation should be removed and replaced with additional Select Fill. In the event any footings extend to native gravel, the Select Fill may be reduced to a leveling course over the undisturbed gravels.

22. Prepared the subgrade for staging areas as described above for the building pad. We recommend that any staging areas subject to heavy truck or construction equipment or to wet weather should consist of at least 24 inches of granular fill (Select Fill or a combination of Granular Site Fill and Select Fill) over a Separation Geotextile. Do not allow continuous construction traffic on the rock section until a minimum of 24 inches of rock is placed.

Site Preparation for the Building Pad and Staging Areas (Wet Weather)

If site grading and construction of building pads for the new classroom and gym/cafeteria buildings and any staging areas extend into wet weather, the following recommendations are applicable:

23. Strip the existing ground ±4 inches, or as required to remove roots, sod or unsuitable soil. The actual depth of stripping should be confirmed by FEI during construction. Dispose of all strippings outside of construction areas. The strippings should be hauled from the site or reused only in landscape areas. No strippings should be placed beneath foundations, slabs, sidewalks or pavements.

    Overexcavate the surficial soils at least 24 inches. The overexcavation should extend at least 5 feet beyond the limits of the new foundations. The actual depth of overexcavation should be confirmed by FEI during construction and may vary depending on soil conditions at the time of construction. The excavation should be done with a hoe equipped with a smooth bucket. The surface of the subgrade should be left clean, free of loose or disturbed soils or large clods.

    We recommend the bid documents include a unit cost for the option of overexcavation and replacement with compacted, granular fill (beyond the recommended minimum depth of 24 inches, if required).

24. Do not compact the subgrade. Attempts to compact the subgrade when the soil is wet of optimum are likely to lead to rutting or subgrade disturbance.

25. Overexcavate any test pits that extend beneath the footprint of the building and replace with compacted Select Fill or Granular Site Fill.

26. Place a Separation Geotextile on the subgrade that meets the requirements specified above. The geotextile should be laid smooth, without wrinkles or folds in the direction of construction traffic. Overlap adjacent rolls a minimum of 3 feet. Pin fabric overlaps or place the building pad fill in a manner that will not separate the overlap during construction. Seams that have separated will require removal of the building pad fill to establish the required overlap. The geotextile may be eliminated if the building pad fill will not be subjected to wet weather and heavy construction traffic.

27. Place at least 24 inches of Select Fill to create the individual building pads, provided the subgrade is stiff and stable. Alternatively, Granular Site Fill capped with a minimum of 12 inches of Select Fill can be used. The initial lift should be ±18 inches thick and compacted with a vibratory roller. Do not allow construction traffic on the rock section until a minimum of 24 inches of Select Fill and/or Granular Site fill is placed.

28. Provide at least 12 inches of Select Fill beneath all footings. Depending on the grading plan, trenching through the building pad may be required to place the structural fill beneath the footings. At most locations, we expect the footing excavations will terminate in silt. The bottom of the excavations should be left free of clods and disturbed soil. The subgrade at the bottom of the footing excavations should have a minimum undrained shear strength of 1,000 psf (to be confirmed by FEI during construction). Any soft soil present at the bottom of the excavation should be removed and replaced with additional Select Fill. In the event any footings extend to native gravel, the Select Fill may be reduced to a leveling course over the undisturbed gravels.

29. Prepare the subgrade for staging areas as described above for the building pad. Do not allow continuous construction traffic on the rock section until a minimum of 24 inches of rock is placed.

Subgrade Preparation and Pavement Construction

The required site grading for the proposed paved parking lots is not currently known. Subgrade preparation should be done in dry weather to avoid the need for subgrade stabilization and/or overexcavation of any remaining surficial fill.

30. Strip the existing ground ±2 to 4 inches, or as required to remove roots and sod, or any existing demolition debris. Haul all strippings and demolition debris from the site.

31. Grade the subgrade as required. Do not reuse soils generated by site grading under any sidewalks, parking lots or foundation areas.

32. Strip any remaining unsuitable fill or other deleterious material. The extent or depth of additional site stripping should be established by an FEI representative during construction. We recommend that a unit cost for overexcavation and replacement of unsuitable soil or fill be included in the construction bid documents.

33. Compact the subgrade under pavements to a depth of at least 12 inches. Compaction may not be practical if the soils are too wet of optimum. Therefore, the site work should not be attempted during wet weather and should be delayed until the subgrade soils are sufficiently dry or until weather permits efficient aeration.

    If wet weather construction cannot be avoided, do not compact the subgrade. Instead, overexcavate the subgrade to provide a minimum 24-inch thick base rock section.

    Place a Separation Geotextile under any areas to be used as a staging area, haul roads or subject to heavy traffic (e.g., at entrances). A Separation Geotextile is also recommended if overexcavation and

additional subbase is planned in lieu of subgrade compaction. We recommend a Separation Geotextile be placed at least under all bus lanes and driveways. A geotextile should be considered under parking lots if they are built during wet weather. Where dense gravels are shallow, the base rock thickness may be reduced. We recommend such an adjustment be made during construction based on actual conditions exposed during site grading.

34. Backfill the prepared subgrade with base rock (Select Fill) immediately to reduce exposure to weather and compact to 95% relative compaction, as specified in Item 11.

35. Proof-roll the prepared base rock. Overexcavate and replace any areas of base rock and/or subgrade pumping with additional compacted Select Fill.

36. Provide a minimum flexible pavement section of 2.5 inches of AC over 13 inches of base rock for all parking lots, parking stalls, and driveways not subject to buses or truck traffic. Do not allow loaded trucks or heavy construction equipment on the finished base rock prior to paving.

    Increase the pavement section to 4 inches of AC over 14 inches of base rock for bus lanes and driveways or any paved areas that will be subject to truck traffic. Where rigid pavements are planned, we recommend a minimum PCC thickness of 8 inches over 6 inches of base rock. Increase the base rock thickness for the individual pavement sections to 24 inches (as indicated in Item 33 for wet weather construction).

Subgrade Preparation Under Playfield and Synthetic Turf Field

We have assumed all site grading for the new play fields and the new synthetic turf field will be completed during dry weather (i.e., late summer or early fall). Otherwise, moisture conditioning and subgrade compaction will not be practical.

At the time this report was prepared, a site grading plan was not available for the new fields. Therefore, we do not know to what extent the subgrade for the new fields will include the existing topsoil within the track/soccer field or the underlying native silt.

The subgrade beneath the fields should be prepared as specified above for the building pads (or as specified by the turf manufacturer, if different). If soft subgrade conditions are present or develop this winter, additional mitigation measures will be required. Mitigation of a relatively thin (i.e., 12 inches or less) layer of soft, wet soil can be accomplished by aeration and re-compaction. If the soft layer is relatively deep, over-excavation and replacement with granular fill will be required. Other mitigation options include lime or cement stabilization.

Development of measures for subgrade stabilization is beyond the present scope of work. We recommend the subgrade be examined prior to bidding (and after a site grading plan is known) to confirm the moisture levels in the soil. Options for mitigation, if needed, should be established at that time.

DESIGN REVIEW/CONSTRUCTION OBSERVATION/TESTING

We should be provided the opportunity to review all drawings and specifications that pertain to site preparation, foundation construction and pavements. Preparation of the building pads and subgrade preparation for new fields will require field confirmation of the soil condition. Mitigation of any unsuitable fill or soil, ground water infiltration, or subgrade pumping will also require engineering review and judgment. That judgment should be provided by one of our representatives. Frequent field density tests should be run on all engineered fill, subgrade and base rock. We recommend that we be retained to provide the necessary construction observation.

VARIATION OF SUBSURFACE CONDITIONS, USE OF THIS REPORT AND WARRANTY

The analysis, conclusions and recommendations contained herein are based on the assumption that the soil profiles and ground water levels encountered in the borings and test pits are representative of overall site conditions. No changes in the enclosed recommendations should be made without our approval. We will assume no responsibility or liability for any engineering judgment, inspection or testing performed by others.

This report was prepared for the exclusive use of Lane County School District 4J and their design consultants for the Howard Elementary School in Eugene, Oregon. Information contained herein should not be used for other building sites or for unanticipated construction without our written consent. This report is intended for planning and design purposes. Contractors using this information to estimate construction quantities or costs do so at their own risk. Our services do not include any survey or assessment of potential surface contamination or contamination of the soil or ground water by hazardous or toxic materials. We assume that those services, if needed, have been completed by others.

Climate conditions in western Oregon typically consist of wet weather for almost half of the year (typically between mid-October and late May). The recommendations for foundation design and drainage are not intended to represent any warranty (expressed or implied) against the growth of mold, mildew or other organism that grows in a humid or moist environment.

Our work was done in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

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Appendix A

Figures

Professional
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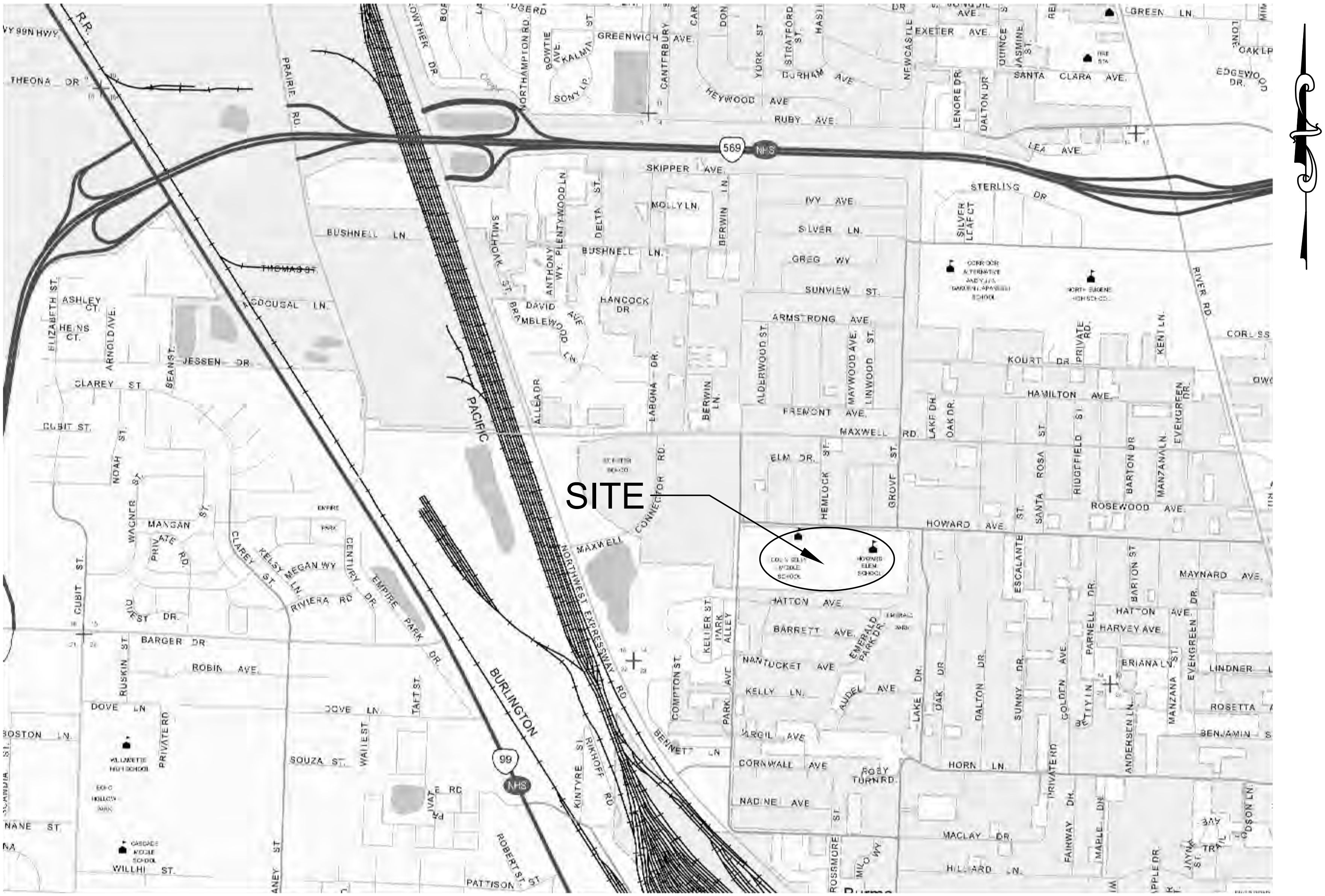

Not to Scale

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PROFESSIONAL GEOTECHNICAL SERVICES
820 NW CORNELL AVENUE
CORVALLIS, OR 97330-4517
BUS. (541) 757-7645 FAX (541) 757-7650

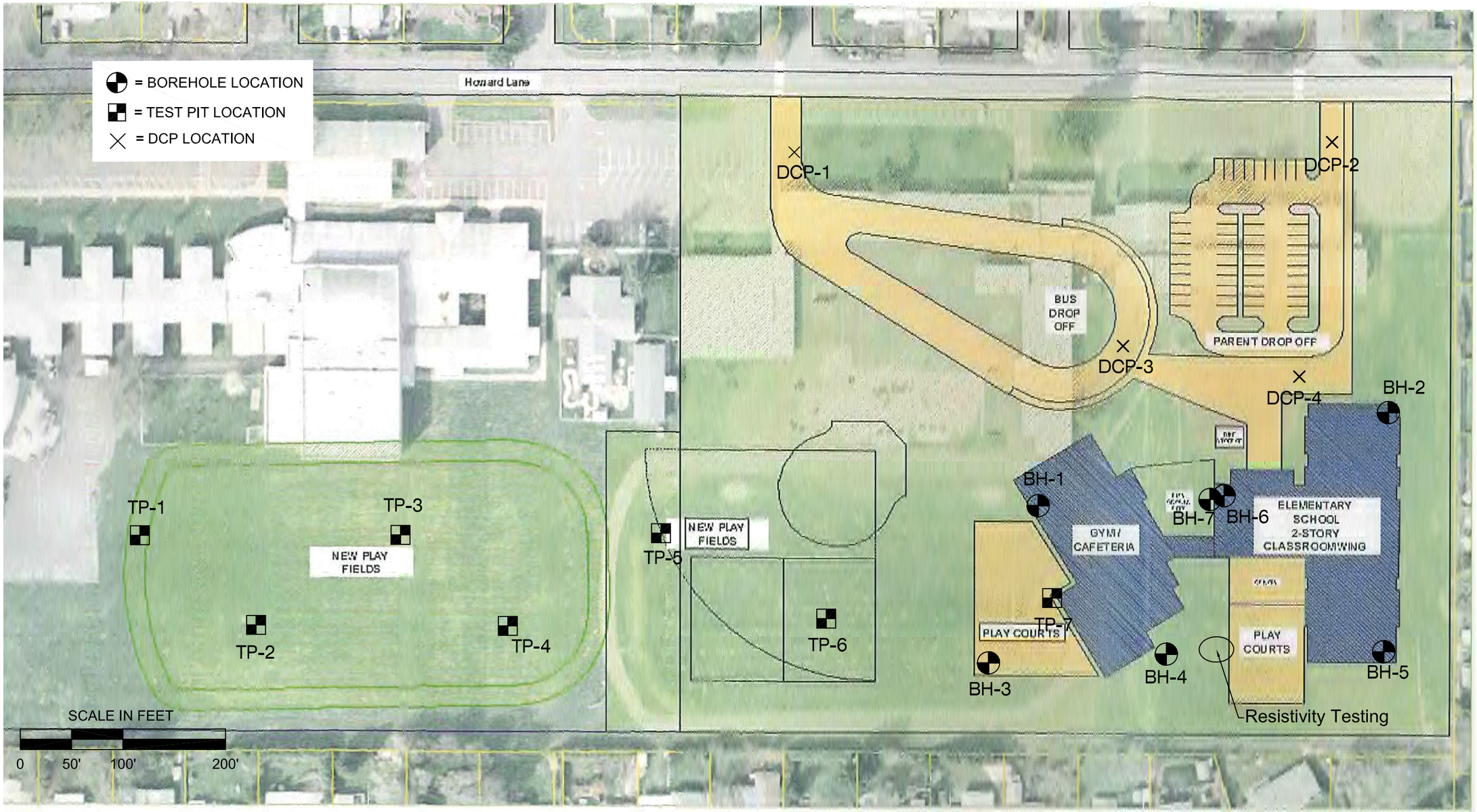
DATE NOV. 2013
DWN. mdm
APPR.
REVIS.
PROJECT NO.
2131078

VICINITY MAP

HOWARD ELEMENTARY SCHOOL
EUGENE, OREGON

FIGURE NO.
1A

FILE NAME:FIG1A



NOTES:
1. EXPLORATION LOCATIONS ARE APPROXIMATE ONLY.
2. SEE REPORT FOR A DISCUSSION OF SUBSURFACE CONDITIONS.
3. BASE MAP PROVIDED BY PIVOT ARCHITECTURE.

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PROFESSIONAL GEOTECHNICAL SERVICES
820 NW CORNELL AVENUE
CORVALLIS, OR 97330-4517
BUS. (541) 757-7645 FAX (541) 757-7650

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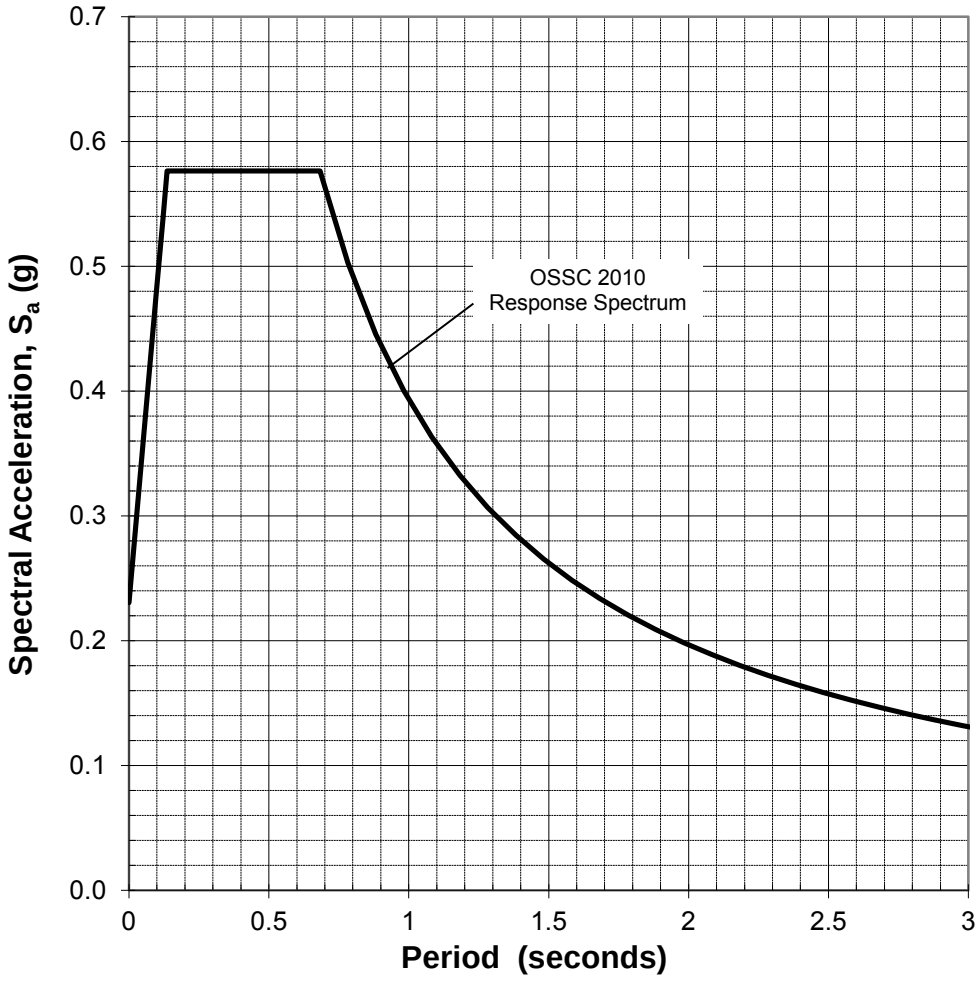
SITE LAYOUT AND EXPLORATIONS

HOWARD ELEMENTARY SCHOOL
EUGENE, OREGON

FIGURE NO. **2A**

FILE NAME:FIG 2A



Notes:

1. The Design Response Spectrum is based on OSSC 2010 Section 1613 using the following parameters:

   Site Class= D Damping = 5%

S_S =	0.70	F_a =	1.24	S_{MS} =	0.86	S_{DS} =	0.58
S_1 =	0.35	F_v =	1.71	S_{M1} =	0.59	S_{D1} =	0.39

2. S_S and S_1 values for 5% damping are based on the USGS 2002 mapped maximum considered earthquake spectral acclerations for 2% probability of exceedence in 50 years. The corresponding peak ground acceleration on rock is 0.29g.

3. F_a and F_v were established based on OSSC 2010, Tables 1613.5.3(1) and 1613.5.3(2) using the selected S_S and S_1 values. S_{DS} and S_{D1} values include a 2/3 reduction on S_{MS} and S_{M1} as discussed in OSSC 2010 Section 1613.5.4.

4. Site location is: Latitude 44.0876, Longitude -123.1392.

FIGURE 3A
OSSC 2010 SITE RESPONSE SPECTRUM
Howard Elementary School
Eugene, Oregon
FEI Project 2131078

Appendix B

Boring and Test Pit Logs

Professional
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Services

Foundation Engineering, Inc.

DISTINCTION BETWEEN FIELD LOGS AND FINAL LOGS

A field log is prepared for each boring or test pit by our field representative. The log contains information concerning sampling depths and the presence of various materials such as gravel, cobbles, and fill, and observations of ground water. It also contains our interpretation of the soil conditions between samples. The final logs presented in this report represent our interpretation of the contents of the field logs and the results of the laboratory examinations and tests. Our recommendations are based on the contents of the final logs and the information contained therein and not on the field logs.

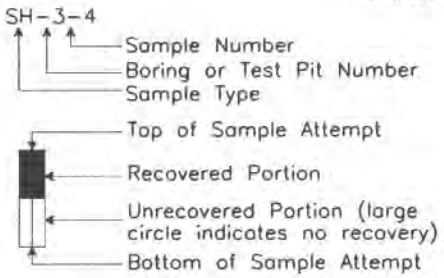
VARIATION IN SOILS BETWEEN TEST PITS AND BORINGS

The final log and related information depict subsurface conditions only at the specific location and on the date indicated. Those using the information contained herein should be aware that soil conditions at other locations or on other dates may differ. Actual foundation or subgrade conditions should be confirmed by us during construction.

TRANSITION BETWEEN SOIL OR ROCK TYPES

The lines designating the interface between soil, fill or rock on the final logs and on subsurface profiles presented in the report are determined by interpolation and are therefore approximate. The transition between the materials may be abrupt or gradual. Only at boring or test pit locations should profiles be considered as reasonably accurate and then only to the degree implied by the notes thereon.

SAMPLE OR TEST SYMBOLS



S – Grab Samples
SS – Standard Penetration Test Sample (split-spoon)
SH – Thin-walled Shelby Tube Sample
C – Core Sample
CS – Continuous Sample

▲ Standard Penetration Test Resistance equals the number of blows a 140 lb. weight falling 30 in. is required to drive a standard split-spoon sampler 1 ft. Practical refusal is equal to 50 or more blows per 6 in. of sampler penetration.

● Water Content (%).

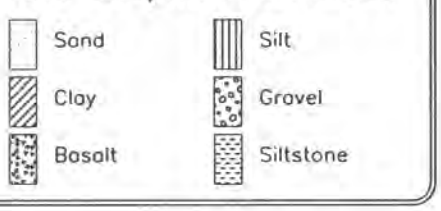
UNIFIED SOIL CLASSIFICATION SYMBOLS

G – Gravel	W – Well Graded
S – Sand	P – Poorly Graded
M – Silt	L – Low Plasticity
C – Clay	H – High Plasticity
Pt – Peat	O – Organic

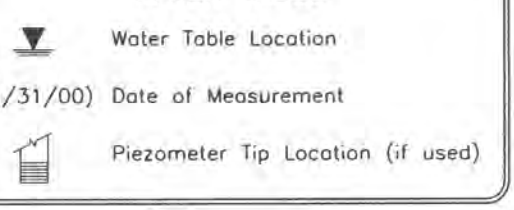
FIELD SHEAR STRENGTH TEST

Shear strength measurements on test pit side walls, blocks of soil or Shelby tube samples are typically made with Torvane or pocket penetrometer devices.

TYPICAL SOIL/ROCK SYMBOLS



WATER TABLE



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PROFESSIONAL GEOTECHNICAL SERVICES
820 NW CORNELL AVE.
CORVALLIS, OR 97330-4517
BUS. (541) 757-7645 FAX (541) 757-7650

SYMBOL KEY
BORING AND TEST PIT LOGS

Explanation of Common Terms Used in Soil Descriptions

Field Identification	Cohesive Soils			Granular Soils	
	SPT	S_u^* (tsf)	Term	SPT	Term
Easily penetrated several inches by fist.	0 – 1	< 0.125	Very Soft	0 – 4	Very Loose
Easily penetrated several inches by thumb.	2 – 4	0.125–0.25	Soft	5 – 10	Loose
Can be penetrated several inches by thumb with moderate effort.	5 – 8	0.25 – 0.50	Medium Stiff (Firm)	11 – 30	Medium Dense
Readily indented by thumb but penetrated only with great effort.	9 – 15	0.50 – 1.0	Stiff	31 – 50	Dense
Readily indented by thumbnail.	16 – 30	1.0 – 2.0	Very Stiff	> 50	Very Dense
Indented with difficulty by thumbnail.	31 – 60	> 2.0	Hard		

* Undrained shear strength

Term	Soil Moisture Field Description
Dry	Absence of moisture. Dusty. Dry to the touch.
Damp	Soil has moisture. Cohesive soils are below plastic limit and usually moldable.
Moist	Grains appear darkened, but no visible water. Silt/clay will clump. Sand will bulk. Soils are often at or near plastic limit.
Wet	Visible water on larger grain surfaces. Sand and cohesionless silt exhibit dilatancy. Cohesive silt/clay can be readily remolded. Soil leaves wetness on the hand when squeezed. "Wet" indicates that the soil is wetter than the optimum moisture content and above the plastic limit.

Term	PI	Plasticity Field Test
Nonplastic	0 – 3	Cannot be rolled into a thread.
Low Plasticity	3 – 15	Can be rolled into a thread with some difficulty.
Medium Plasticity	15 – 30	Easily rolled into thread.
High Plasticity	> 30	Easily rolled and rerolled into thread.

Term	Soil Structure Criteria
Stratified	Alternating layers at least 1 inch thick – describe variation.
Laminated	Alternating layers at less than 1 inch thick – describe variation.
Fissured	Contains shears and partings along planes of weakness.
Slickensides	Partings appear glossy or striated.
Blocky	Breaks into lumps – crumbly.
Lensed	Contains pockets of different soils – describe variation.

Term	Soil Cementation Criteria
Weak	Breaks under light finger pressure.
Moderate	Breaks under hard finger pressure.
Strong	Will not break with finger pressure.

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PROFESSIONAL GEOTECHNICAL SERVICES
820 NW CORNELL AVE.
CORVALLIS, OR 97330-4517
BUS. (541) 757-7645 FAX (541) 757-7650

COMMON TERMS
SOIL DESCRIPTIONS

Depth Feet	Soil and Rock Description and Comments	Log	Elev. Depth	Samples	SPT, N-Value / Recovery / Moisture, % / RQD., % (0 – 50 – 100)	Installations/ Water Table
			397.7			
1	Stiff clayey SILT; brown, moist, medium plasticity, (alluvium). Fine roots to ±4 inches.		0.0	S-1-1		Capped with native soil
2						
3				SS-1-2	7	Backfilled with bentonite chips
4						
5	Grades to low plasticity silt below ±5 feet.			SH-1-3		
6	Field vane on SH-1-3: S_u >1 tsf at ±5 feet. Iron-stained below ±5 feet.					
7	Field vane on SH-1-3: S_u = 0.6 tsf at ±7 feet.			SS-1-4	6	
8						
9						
10			387.7			
11	Dense sandy GRAVEL, trace to some silt; brown, moist, low plasticity silt, fine to coarse sand, fine to coarse, subrounded to rounded gravel, (alluvium).		10.0	SS-1-5	49	
12						
13						
14						
15				SS-1-6	35	
16	Silty sand lens (±6 inches) at ±16 feet.					
	BOTTOM OF BORING		381.2 16.5			

Project No.: 2131078

Surface Elevation: 397.7 feet (Approx.)

Date of Boring: November 13, 2013

Boring Log: BH-1

Howard Elementary School

Eugene, Oregon

Foundation Engineering, Inc.

Depth Feet	Soil and Rock Description and Comments	Log	Elev. Depth	Samples	SPT, N-Value / Moisture, % / Recovery / RQD., % (0 – 50 – 100)	Installations/ Water Table
1	Medium stiff clayey SILT; brown, damp, medium plasticity, (alluvium). Fine roots to ±4 inches.		0.0	S-2-1		Capped with native soil
2						
3	Grey, wet, low plasticity and soft below ±2.5 feet. Field vane on SH-2-2: S_u = 0.18 tsf at ±2.5 feet.		0.0	SH-2-2		Backfilled with bentonite chips
	Medium stiff sandy SILT; brown, wet, low plasticity silt, fine sand, (alluvium).		3.0			
4	Field vane on SH-2-2: S_u = 0.4 tsf at ±4 feet.		0.0			
5	Medium dense sandy GRAVEL, trace to some silt; grey, damp, low plasticity silt, fine to coarse sand, fine to coarse, subrounded to rounded gravel, (alluvium).		4.0	SS-2-3	24	
6						
7						
8	Dense and moist below ±7.5 feet.			SS-2-4	47	
9						
10	Very dense below ±9.5 feet.			SS-2-5	55	
11	BOTTOM OF BORING		0.0 11.0			

Project No.: 2131078

Surface Elevation: N/A (Approx.)

Date of Boring: November 11, 2013

Boring Log: BH-2

Howard Elementary School

Eugene, Oregon

Foundation Engineering, Inc.

Depth Feet	Soil and Rock Description and Comments	Log	Elev. Depth	Samples	SPT, N-Value / Moisture, % / Recovery / RQD., % (0 – 50 – 100)	Installations/ Water Table
			398.39			
1	Stiff clayey SILT; brown, damp, medium plasticity, (alluvium). Fine roots to ±4 inches.		0.0	S-3-1		Capped with native soil
2						
3				SS-3-2	8	Backfilled with bentonite chips
4	Grades to low plasticity silt with depth below ±5 feet.					
5	Moist below ±6.5 feet.			SH-3-3		
6						
7	Field vane on SH-3-3: S_u = 0.8 tsf at ±6.5 feet.			SS-3-4	8	
8						
9						
10				SS-3-5	6	
11						
12						
13						
14						
15	Sandy below ±15 feet.			SS-3-6	26	
			382.9			
16	Medium dense gravelly SAND, some silt; grey-brown, moist, low plasticity silt, fine to coarse sand, fine to coarse, subrounded to rounded gravel, (alluvium).		15.5			
			381.9			
	BOTTOM OF BORING		16.5			

Project No.: 2131078

Surface Elevation: 398.4 feet (Approx.)

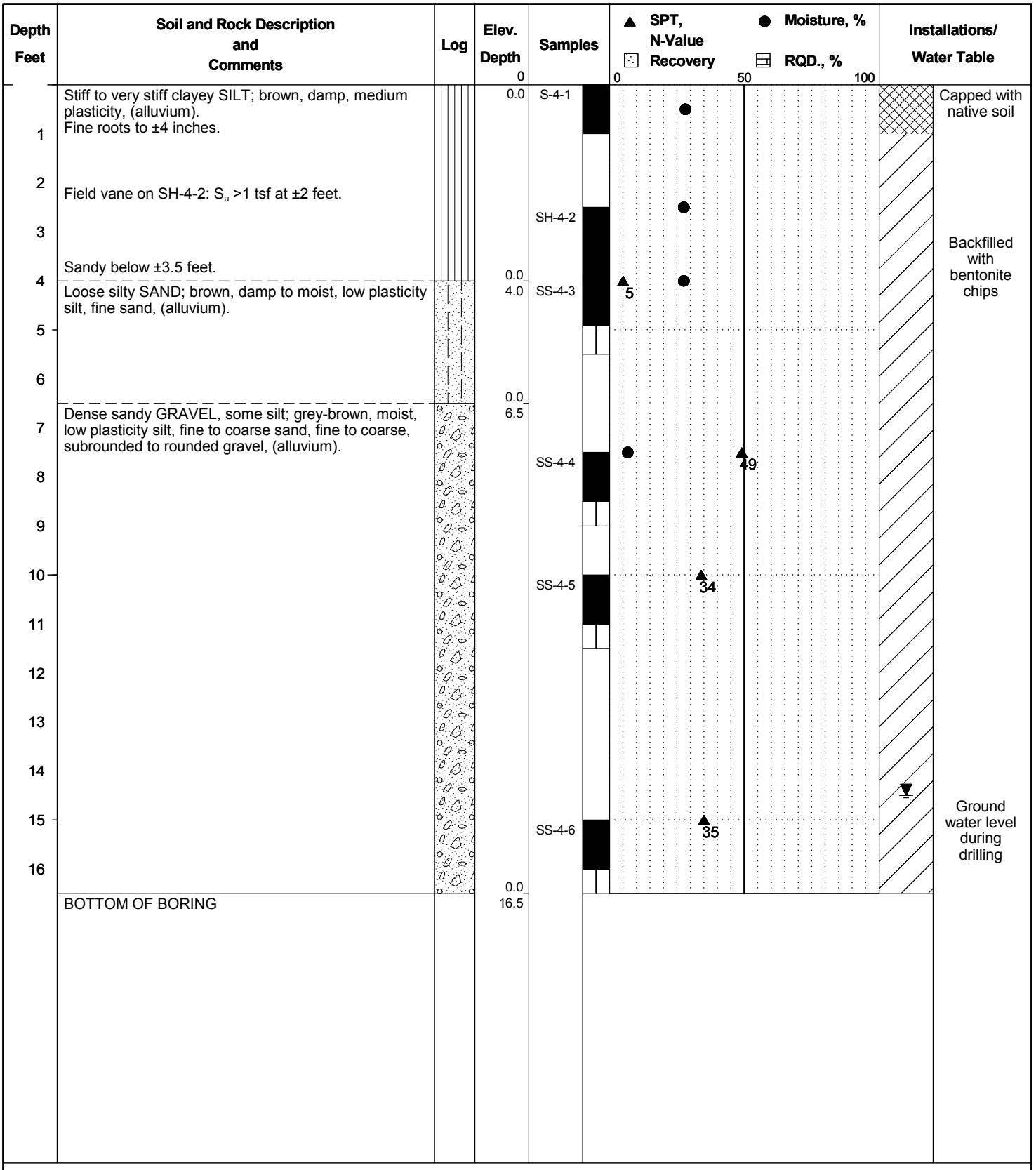
Date of Boring: November 13, 2013

Boring Log: BH-3

Howard Elementary School

Eugene, Oregon

Foundation Engineering, Inc.



Project No.: 2131078

Surface Elevation: N/A (Approx.)

Date of Boring: November 13, 2013

Boring Log: BH-4

Howard Elementary School

Eugene, Oregon

Foundation Engineering, Inc.

Depth Feet	Soil and Rock Description and Comments	Log	Elev. Depth	Samples	SPT, N-Value / Recovery / Moisture, % / RQD., % (0 – 50 – 100)	Installations/ Water Table
1	Medium stiff SILT, trace sand, scattered organics; brown, moist, low plasticity, fine to coarse sand, organics consist of fine roots, (fill).		0.0	S-5-1		Capped with native soil
			0.0			
2	Medium stiff SILT, some sand; brown, moist, low plasticity, fine sand, (alluvium).		1.0	S-5-2		
			0.0			
3	Medium dense sandy GRAVEL, trace to some silt; grey-brown, moist, low plasticity silt, fine to coarse sand, fine to coarse, subrounded to rounded gravel, (alluvium).		2.5	SS-5-3	23	Backfilled with bentonite chips
4						
5	Dense below ±5 feet.			SS-5-4	48	
6						
7						
8						
9						
10				SS-5-5	50	
11						
12						
13	Medium dense at ±12.5 feet.			SS-5-6	26	
14			0.0			
	BOTTOM OF BORING		14.0			

Project No.: 2131078

Surface Elevation: N/A (Approx.)

Date of Boring: November 11, 2013

Boring Log: BH-5

Howard Elementary School

Eugene, Oregon

Foundation Engineering, Inc.

Depth Feet	Soil and Rock Description and Comments	Log	Elev. Depth 394.6	Samples	SPT, N-Value / Moisture, % / Recovery / RQD., % (0 – 50 – 100)	Installations/ Water Table
1	Stiff clayey SILT; brown, damp, medium plasticity, (alluvium). Fine roots to ±4 inches. Field vane at 0.8 feet: S_u > 1 tsf.		0.0	S-6-1		Capped with native soil
2						
3	Medium stiff, low plasticity and moist with trace to some sand below ±2.5 feet. Field vane on SH-6-2 S_u = 0.3 tsf at ±2¾ feet.			SH-6-2		Backfilled with bentonite chips
4	Soft to medium stiff sandy SILT; brown, wet, low plasticity, fine sand, (alluvium). Field vane on SH-6-2: S_u = 0.35 tsf at ±4 feet.		390.9 3.8			
5				SS-6-3	7	
6	Medium dense sandy GRAVEL, trace to some silt; brown, low plasticity silt, fine to coarse sand, fine to coarse, subrounded to rounded gravel, (alluvium).		388.6 6.0			
7						
8				SS-6-4	24	
9						
10	Dense at ±10 feet.			SS-6-5	38	
11						
12						
13						
14						Ground water level during drilling
15				SS-6-6	19	
16						
17						
18						
19						
20				SS-6-7	27	
21						

Project No.: 2131078

Surface Elevation: 394.6 feet (Approx.)

Date of Boring: November 13, 2013

Boring Log: BH-6

Howard Elementary School

Eugene, Oregon

Foundation Engineering, Inc.

Depth Feet	Soil and Rock Description and Comments	Log	Elev. Depth 372.6	Samples	▲ SPT, N-Value / ⬚ Recovery / ● Moisture, % / ⊞ RQD., % (0 — 50 — 100)	Installations/ Water Table
23						
24						
25	Dense sandy GRAVEL, trace to some silt; brown, wet, low plasticity silt, fine to coarse sand, fine to coarse, subrounded to rounded gravel, (alluvium).		369.6 25.0	SS-6-8	▲ 40	
26						
27	Scattered cobbles below ±27 feet.					
28						
29						
30				SS-6-9	▲ 38	
31						
32						
33						
34						
35	Very dense and grey-brown below ±35 feet.			SS-6-10	▲ 67	
36						
	BOTTOM OF BORING		358.1 36.5			

Project No.: 2131078

Surface Elevation: 394.6 feet (Approx.)

Date of Boring: November 13, 2013

Boring Log: BH-6

Howard Elementary School

Eugene, Oregon

Foundation Engineering, Inc.

Depth Feet	Soil and Rock Description and Comments	Log	Elev. Depth	Samples	SPT, N-Value / Recovery / Moisture, % / RQD., % (0 – 50 – 100)	Installations/ Water Table
1	Stiff clayey SILT; brown, damp, medium plasticity, (alluvium). Fine roots to ±4 inches.		0.0			Capped with native soil
2						
3	Grades to low plasticity silt with trace to some sand below ±3.5 feet.					
4	Field vane on SH-7-1: S_u 0.5 tsf at ±3.5 feet.			SH-7-1		Backfilled with bentonite chips
			0.0			
5	Soft sandy SILT; brown, wet, low plasticity, fine sand, (alluvium).		4.8			
6	Field vane on SH-7-1: S_u = 0.25 tsf at ±5 feet.			SS-7-2	▲ 5	
			0.0			
7	Medium dense sandy GRAVEL, trace to some silt; brown, wet, low plasticity, fine to coarse sand, fine to coarse, subrounded to rounded gravel, (alluvium).		6.5			
			0.0			
	BOTTOM OF BORING		7.0			

Project No.: 2131078

Surface Elevation: N/A (Approx.)

Date of Boring: November 13, 2013

Boring Log: BH-7

Howard Elementary School

Eugene, Oregon

Foundation Engineering, Inc.

Comments	Depth, Feet	Sample #	Location	Class Symbol	Water Table	C, TSF	Symbol	Soil and Rock Description
Surface: grass. Fine roots to ±2 inches.	1	S-1-1				0.8 tsf		Stiff SILT, trace sand; brown, damp, low plasticity, fine to coarse sand, (topsoil/fill).
	2							Medium stiff clayey SILT; brown, moist, medium plasticity, (alluvium).
	3	S-1-2				0.5 tsf		
						0.5 tsf		
	4	S-1-3						Medium dense silty GRAVEL, some sand, scattered cobbles; brown, moist, low plasticity silt, fine to coarse sand, fine to coarse, subrounded to rounded gravel, cobbles up to ±4 inches in diameter, (alluvium).
No seepage or groundwater encountered to the limit of excavation.	5							BOTTOM OF TEST PIT
	6							
	7							
	8							
	9							
	10							
	11							

Project No.: 2131078

Surface Elevation: 397.4 feet (Approx.)

Date of Test Pit: November 14, 2013

Test Pit Log: TP-1

Howard Elementary School

Eugene, Oregon

Comments	Depth, Feet	Sample #	Location	Class Symbol	Water Table	C, TSF	Symbol	Soil and Rock Description
Surface: grass. Fine roots to ±4 inches.	1	S-2-1				0.7 tsf		Stiff SILT, trace sand and gravel; brown, damp, low plasticity, fine to coarse sand, fine, subrounded gravel, (topsoil/fill).
						1 tsf		Stiff clayey SILT; brown, moist, medium plasticity, (alluvium).
	2	S-2-2						
	3							Medium dense silty GRAVEL, some sand; brown, moist, low plasticity silt, fine to coarse sand, fine to coarse, subrounded to rounded gravel, (alluvium).
No seepage or groundwater encountered to the limit of excavation.	4							BOTTOM OF TEST PIT
	5							
	6							
	7							
	8							
	9							
	10							
	11							

Project No.: 2131078

Surface Elevation: 397.1 feet (Approx.)

Date of Test Pit: November 14, 2013

Test Pit Log: TP-2

Howard Elementary School

Eugene, Oregon

Comments	Depth, Feet	Sample #	Location	Class Symbol	Water Table	C, TSF	Symbol	Soil and Rock Description
Surface: grass. Fine roots to ±7 inches.	1	S-3-1 S-3-2				0.5 tsf 0.9 tsf		Stiff SILT, trace sand; brown, moist, low plasticity, fine to coarse sand, (topsoil/fill). Stiff clayey SILT; brown, moist, medium plasticity, (alluvium).
No seepage or groundwater encountered to the limit of excavation.	2 3 4 5 6 7 8 9 10 11							BOTTOM OF TEST PIT

Project No.: 2131078 **Test Pit Log: TP-3**

Surface Elevation: 397.5 feet (Approx.) **Howard Elementary School**

Date of Test Pit: November 14, 2013 **Eugene, Oregon**

Comments	Depth, Feet	Sample #	Location	Class Symbol	Water Table	C, TSF	Symbol	Soil and Rock Description
Surface: grass. Fine roots to ±4 inches.	1	S-4-1 S-4-2				0.9 tsf		Stiff SILT, trace sand and gravel; brown, damp, low plasticity, fine to coarse sand, fine, subrounded gravel, (topsoil/fill). Stiff clayey SILT; brown, moist, medium plasticity, (alluvium).
	2 3	S-4-3				0.6 tsf		
	4					0.7 tsf		
	5 6							Grades to low plasticity silt below ±5 feet.
	7	S-4-4						
	8 9							Iron-stained below ±8 feet.
No seepage or groundwater encountered to the limit of excavation.	10 11							BOTTOM OF TEST PIT

Project No.: 2131078 **Test Pit Log: TP-4**

Surface Elevation: 397.5 feet (Approx.) **Howard Elementary School**

Date of Test Pit: November 14, 2013 **Eugene, Oregon**

Comments	Depth, Feet	Sample #	Location	Class Symbol	Water Table	C, TSF	Symbol	Soil and Rock Description
Surface: grass. Fine roots to ±4 inches.	1	S-5-1						Medium stiff SILT, trace sand and gravel; brown, moist, low plasticity, fine to coarse sand, fine, subrounded gravel, (topsoil/fill).
	2	S-5-2				0.35 tsf		
	3	S-5-3				0.75 tsf		Stiff clayey SILT; brown, moist, medium plasticity, (alluvium).
No seepage or groundwater encountered to the limit of excavation.	4							BOTTOM OF TEST PIT
	5							
	6							
	7							
	8							
	9							
	10							
	11							

Project No.: 2131078 **Test Pit Log: TP-5**

Surface Elevation: 398.0 feet (Approx.) **Howard Elementary School**

Date of Test Pit: November 14, 2013 **Eugene, Oregon**

Comments	Depth, Feet	Sample #	Location	Class Symbol	Water Table	C, TSF	Symbol	Soil and Rock Description
Surface: grass. Fine roots to ±4 inches.	1	S-6-1				0.6 tsf		Stiff SILT, trace sand; brown, damp, low plasticity, fine to coarse sand, (topsoil/fill).
	2	S-6-2				0.75 tsf		Stiff clayey SILT; brown, moist, medium plasticity, (alluvium).
No seepage or groundwater encountered to the limit of excavation.	3							BOTTOM OF TEST PIT
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							

Project No.: 2131078 **Test Pit Log: TP-6**

Surface Elevation: 398.6 feet (Approx.) **Howard Elementary School**

Date of Test Pit: November 14, 2013 **Eugene, Oregon**

Comments	Depth, Feet	Sample #	Location	Class Symbol	Water Table	C, TSF	Symbol	Soil and Rock Description
Surface: grass. Fine roots to ±4 inches.	1	S-7-1						Stiff clayey SILT; brown, damp, medium plasticity, (alluvium).
	2							
	3	S-7-2						
No seepage or groundwater encountered to the limit of excavation.	4							BOTTOM OF TEST PIT
	5							
	6							
	7							
	8							
	9							
	10							
	11							

Project No.: 2131078

Surface Elevation: 398.4 feet (Approx.)

Date of Test Pit: November 14, 2013

Test Pit Log: TP-7

Howard Elementary School

Eugene, Oregon

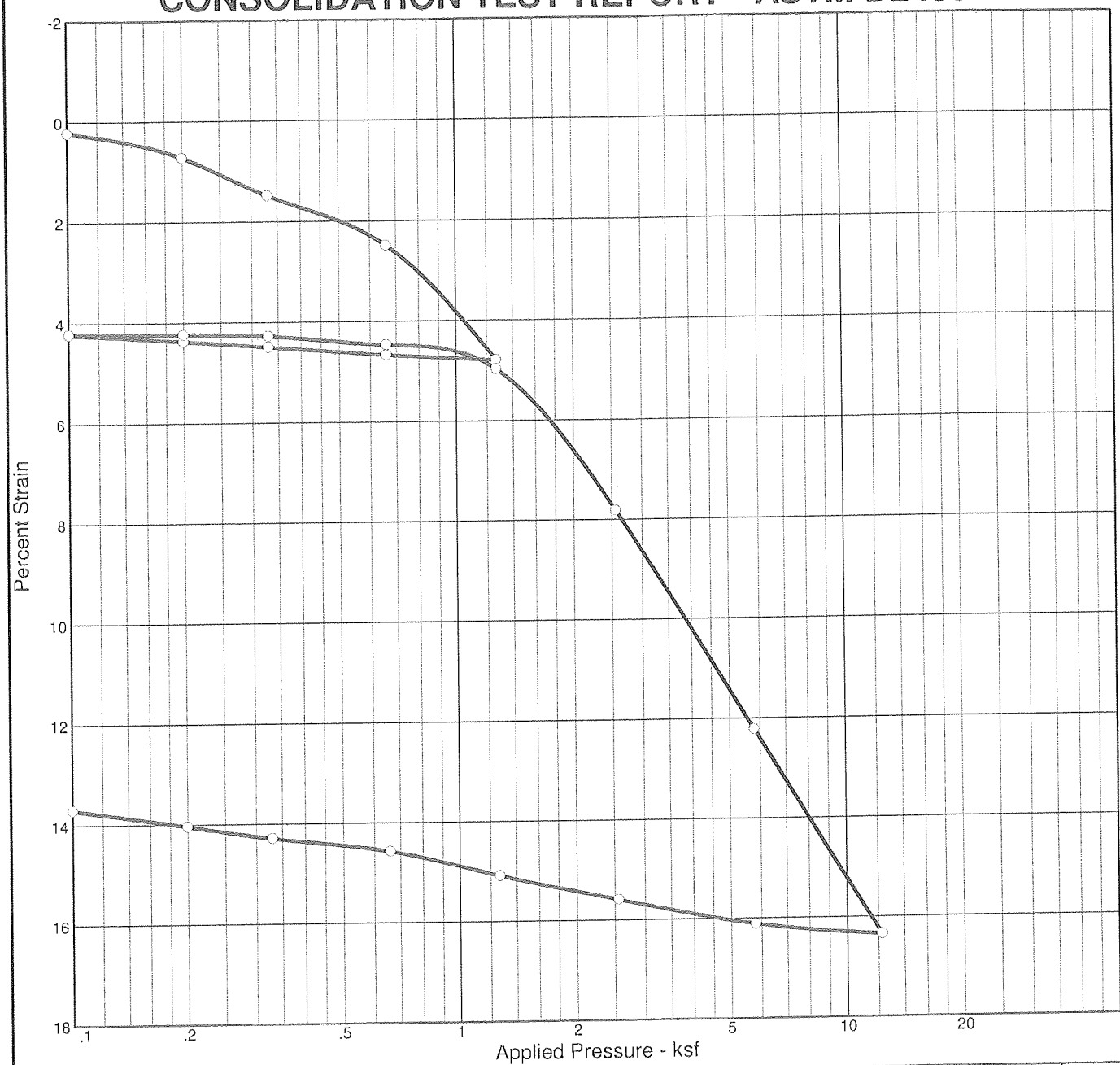
Appendix C

Field and Laboratory Test Results

Professional Geotechnical Services

Foundation Engineering, Inc.

CONSOLIDATION TEST REPORT - ASTM D2435



Natural Sat.	Natural Moist.	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Swell Press. (ksf)	Swell %	e_o
84.2 %	33.9 %	80.1			2.65		1.10	0.26	0.02			1.066

MATERIAL DESCRIPTION	USCS	AASHTO
Brown, stiff, medium plasticity, clayey SILT		

Project No. 2136001-527 **Client:** Foundation Engineering, Inc.; Project #2131078

Project: Howard Elementary School

Source: 5329 **Sample No.:** SH-7-1 **Elev./Depth:** 3.5-5.5'

CONSOLIDATION TEST REPORT - ASTM D2435

FEI Testing & Inspection, Inc.
Corvallis, OR

Remarks:

Figure 1C

Table 1C. Atterberg Limits, Natural Water Contents, and Percent Fines (Borehole Samples)

Sample Number	Sample Depth (feet)	Moisture Content (percent)	LL	PL	PI	USCS Classification	Percent Fines
S-1-1	0-1.0	30.6					
SS-1-2	2.5-4.0	32.8	56	33	23	MH	
SH-1-3	5.0-7.0	40.0					
SS-1-4	7.0-8.5	35.0	43	31	12	ML	
S-2-1	0-1.0	30.6					
SH-2-2	2.5-4.0	27.4					
S-3-1	0-1.0	30.5					
SS-3-2	2.5-4.0	28.4					
SH-3-3	5.0-7.0	36.1					
SS-3-4	7.0-8.5	30.0					
S-4-1	0-1.0	28.1					
SH-4-2	2.5-4.0	27.5					
SS-4-3	4.0-5.5	27.5					47.8
SS-4-4	7.5-9.0	6.7					7.2
S-5-1	0-1.0	27.2					
SS-5-2	1.0-1.5	29.3					
S-6-1	0-0.8	25.1					
SH-6-2	2.5-4.5	35.6					
SS-6-3	4.5-6.0	38.5					
SH-7-1	3.5-5.5	32.8					64.8
SS-7-2	5.5-7.0	36.8					

Table 1C. Atterberg Limits, Natural Water Contents, and Percent Fines (Test Pit Samples)

Sample Number	Sample Depth (feet)	Moisture Content (percent)	LL	PL	PI	USCS Classification	Percent Fines
S-1-1	0.5-1.5	27.2					
S-1-2	2.5-3.5	32.7					
S-2-1	0-1.0	25.3	42	29	13	ML	
S-3-1	0-0.8	28.8					
S-3-2	1.0-2.	36.4					
S-4-2	1.0-2.0	40.3	59	39	20	MH	
S-5-1	0-0.5	25.5					
S-5-2	1.0-2.0	25.0					
S-6-1	0.5-1.5	21.7					
S-6-2	2.0-3.0	37.2					

Table 2C. pH Test Results (ASTM G51)

Sample Number	Sample Depth (ft)	Sample Description	pH
SS-4-3	4.0 – 5.5	Silty SAND	6.2
SS-5-1	0.0 – 1.0	SILT, trace sand, scattered organics	6.3

Table 3C. Summary of Resistivity Testing

Location	Pin Spacing (ft.)	Resistivity (Ω-cm)
Near BH-4 (See Figure 2A)	2	3,064
	4	3,983
	6	5,171
	8	6,128

Foundation Engineering, Inc.
Howard Elementary School
FEI Project 2131078

Table 4C. Summary of DCP Test Results

Test Hole	Initial Test Depth (inches)	Soil Description	[1]Average DCP (mm/blow)	[2]Average M_r (psi)	[3]Corrected M_r (psi)
DCP-1	1	Medium stiff, clayey SILT (alluvium)	67.7	9,474	3,126
DCP-2	1	Medium stiff, clayey SILT (alluvium)	69.7	9,368	3,091
DCP-3	1	Stiff, clayey SILT (alluvium)	34.4	12,331	4,069
DCP-4	1	Stiff, clayey SILT (alluvium)	25.2	13,931	4,597

Notes:
1. DCP (mm/blow) based on the average of several readings from the initial test depth.
2. M_r value based on average DCP value at the test depth and the ODOT recommended correlation: $M_r = 49023(DCP)^{-0.39}$. Values may vary slightly due to rounding.
3. Corrected M_r values are based on the ODOT recommended correction factors of 0.33 for fine-grained soil.

Appendix D

Seismic Hazard Study

Professional
Geotechnical
Services

Foundation Engineering, Inc.

HOWARD ELEMENTARY SCHOOL
SEISMIC HAZARD STUDY
EUGENE, OREGON

INTRODUCTION

A seismic hazard study was completed to identify potential geologic and seismic hazards and evaluate the effect those hazards may have on the proposed project. The study fulfills the requirements presented in the 2010 Oregon Structural Specialty Code, Section 1803.7, for site-specific seismic hazard reports for essential and hazardous facilities, and major and special-occupancy structures (OSSC, 2010).

LITERATURE REVIEW

Available geologic and seismic publications and maps were reviewed to characterize the local and regional geology and evaluate relative seismic hazards at the site. The literature review included geologic and seismic hazard studies completed in western Lane County and the Eugene/Springfield metropolitan area. Information from several geotechnical and seismic hazard investigations completed by Foundation Engineering, Inc. (FEI) and local water well logs, available from the Oregon Department of Water Resources (ODWR) website were also reviewed to help establish the subsurface conditions.

SEISMIC CONSIDERATIONS

Regional Geologic and Tectonic Setting

The site is located at the southern end of the Willamette Valley, which is a broad north-south-trending basin separating the Coast Range to the west from the Cascade Range to the east. In the early Eocene (±50 to 58 million years ago), the Willamette Valley was part of a broad continental shelf extending west from the Western Cascades beyond the present coastline (Orr and Orr, 1999). Basement rock underlying most of the Valley includes Siletz River Volcanics, which erupted as part of a submarine oceanic island-arc. The thickness of the volcanic basement rock is unknown, but is estimated to be ±3 to 4 miles (Yeats et al., 1996). The island-arc collided with and was accreted to the western margin of the converging North American plate near the end of the early Eocene. Volcanism subsided and a fore arc basin was created. The basin was then infilled (primarily to the south) with marine sediments of the Flournoy, Yamhill, Spencer and Eugene Formations throughout the late Eocene and Oligocene, and terrestrial sedimentary and volcanic deposits of the late Eocene Fisher Formation, Miocene-Oligocene Little Butte Volcanics and other basaltic flow and volcaniclastic sedimentary rocks (Orr and Orr, 1999; Madin and Murray, 2006; McClaughry et al., 2010).

After emerging from a gradually shallowing ocean, the marine and volcanic formations were covered by terrestrial Columbia River Basalt (middle Miocene; ±17 to 10 million years ago). The basalt poured through the Columbia Gorge from northeastern Oregon and southwestern Washington, spreading as far south as Salem with some flows reaching west to the Pacific Ocean. Uplift and tilting of the

Coast Range and the Western Cascades during the late Miocene formed the trough-like configuration of the Willamette Valley. Thick layers of Pleistocene and Holocene fluvial and floodplain deposits blanket the Columbia River Basalt (northern Willamette Valley) and older Tertiary deposits (Orr and Orr, 1999).

The Southern Willamette Valley is located ±130 miles inland from the surface expression of the Cascadia Subduction Zone (CSZ) (Peterson et al., 1986; Goldfinger et al., 1992; Geomatrix Consultants, 1995). The CSZ is a converging, oblique plate boundary where the Juan de Fuca plate is being subducted beneath the western edge of the North American continent (Geomatrix Consultants, 1995). The CSZ extends from central Vancouver Island in British Columbia, Canada, through Washington and Oregon to Northern California. The CSZ is capable of generating earthquakes within the descending Juan de Fuca plate (intraplate), along the inclined interface between the two plates (interface), or within the overriding North American Plate (crustal) (Weaver and Shedlock, 1996). Western Oregon is located in an area of potentially high seismic activity due to its proximity to the CSZ.

Local Faulting

A review of nearby faults was completed to establish the seismic setting and the seismic sources. Numerous concealed and inferred crustal faults are located within ±20 miles of Eugene (Yeats et al., 1996; Madin and Murray, 2006). However, none of these faults show any evidence of movement in the last ±1.6 million years (Geomatrix Consultants, 1995; USGS, 2006). Four potentially active Quaternary (<1.6 million years or less) crustal fault zones have been mapped within ±40 miles of the site (Geomatrix Consultants, 1995; Personius et al., 2003; USGS, 2006; USGS, 2013) and are listed in Table 1D. The approximate locations of these faults in the central Willamette Valley are shown on Figure 1D (attached) (Personius et al., 2003).

Table 1D. Potentially Active Quaternary Crustal Faults within ± 40 miles of Howard Elementary School, Eugene

Fault Name	Length (miles)	Last Known Activity	Distance from Site (miles)	Slip Rate (mm/yr)
Upper Willamette River (#863)	±27	<1.6 million years	±25 SE	<0.20
Owl Creek (#870)	±9	<750,000 years	±30 N	<0.20
Unnamed faults near Sutherlin (#862)	±17	<750,000 years	±33 SW	<0.20
Corvallis (#869)	±25	<1.6 million years	±35 NW	<0.20

Note: Fault data based on USGS, 2006 and USGS, 2013.

The Owl Creek fault is the only fault considered a USGS Class A fault (geologic evidence supporting tectonic movement in the Quaternary with movement known or presumed to be associated with large-magnitude earthquakes). The remaining three are Class B faults.

The source of the coseismic displacement on faults located within the Cascadia forearc (along the coast) is not fully known. The displacement might be caused by subduction zone megathrust earthquakes or other smaller earthquakes within the North American plate (USGS, 2006). The USGS (2002) interactive deaggregation indicates that the primary seismic sources affecting the site are the CSZ faults. Additional fault information can be found in the literature (Personius et al., 2003; USGS, 2006).

Historic Earthquakes

No significant interface (subduction zone) earthquakes have occurred on the CSZ in historic times; however, several large-magnitude (>M ~8.0, M = unspecified magnitude scale) subduction zone earthquakes are thought to have occurred in the past few thousand years. This is evidenced by the discovery of tsunami inundation deposits, combined with geologic evidence for episodic subsidence along the Oregon and Washington coasts (Peterson et al., 1993; Atwater et al., 1995). The Oregon Department of Geology and Mineral Industries (DOGAMI) and USGS estimates the maximum magnitude of an interface subduction zone earthquake ranges from moment magnitude (M_w) 8.5 to M_w 9.0 (Wang and Leonard, 1996; Wang et al., 1998; Wang et al., 2001; Petersen et al., 2008), and the rupture may potentially occur along the entire length of the CSZ (Weaver and Shedlock, 1996). Interface earthquakes are believed to have an average return period of 400 to 700 years (Nelson and Personius, 1996), with the last event occurring ±313 years ago (January 26, 1700) (Nelson et al., 1995; Satake et al., 1996). Turbidite deposits in the Cascadia Basin has been investigated recently as a paleoseismic record for the CSZ (Goldfinger et al., 2012). Turbidite findings (based on the last 10,000 years) suggest an average recurrence interval of ±240 years for a large interface earthquake on the southern portion of the CSZ. The estimated recurrence interval for a large interface earthquake on the northern portion of the CSZ is ±500 to 530 years (Goldfinger et al., 2012).

Intraplate (Benioff Zone) earthquakes occur within the Juan de Fuca Plate at depths of ±28 to 37 miles (Weaver and Shedlock, 1996). The maximum estimated magnitude of an intraplate earthquake is about M_w 7.5 (Wang et al., 2001). No intraplate earthquakes have been recorded in Oregon in historic times; however, the Puget Sound region of Washington State has experienced three intraplate events in the last ±64 years including a surface wave magnitude (M_s) 7.1 event in 1949 (Olympia), a M_s 6.5 event in 1965 (Seattle/Tacoma) (Wong and Silva, 1998), and a M_w 6.8 event in 2001 (Nisqually) (USGS, 2001).

Crustal earthquakes dominate Oregon's seismic history. Crustal earthquakes occur within the North American Plate, typically at depths of ±6 to 12 miles. The estimated maximum magnitude of the relatively shallow crustal earthquake in the Willamette Valley and adjacent physiographic regions is about M_w 6.5 (Wang and

Leonard, 1996; Wang et al., 1998; Wang et al., 2001). Only two major crustal events in Oregon have reached Richter local magnitude (M_L) 6 (the 1936 Milton-Freewater M_L 6.1 earthquake and the 1993 Klamath Falls M_L 6.0 earthquake) (Wong and Bott, 1995). The majority of Oregon's larger crustal earthquakes are in the M_L 4 to 5 range (Wong and Bott, 1995).

Table 2D summarizes earthquakes with a M of 3.5 or greater that have occurred within a ±40-mile radius of Eugene in the last 180 years (Johnson et al., 1994; ANSS, 2013). Although not listed, several sources make reference to a M_L = 4+ earthquake (MM=V) with an epicenter near Corvallis. The coordinates of this earthquake (44.6 N, 123.2 W) suggest the 1946 or 1947 event was most likely located on the Corvallis fault (Bela, 1979; Yeats et al., 1996). Yeats et al. (1996) and Geomatrix Consultants (1995) also indicate that two other earthquakes have been felt near the Corvallis fault. One occurred in 1957 (MM= III) and the other in 1961 (MM= III-IV).

Table 2D. Historic Earthquakes within ± 40-mile Radius of Eugene

Year	Month	Day	Hour	Minute	Latitude	Longitude	Depth (miles)	Magnitude
1961	08	19	04	56	44.7	122.5	unknown	M = 4.5
1962	09	05	05	37	44.5	122.9	unknown	M = 3.5

Note: M = unspecified magnitude, M_b = compressional body wave magnitude, M_c = primary coda magnitude, and M_L = local Richter magnitude

It should be noted that earthquakes in Oregon were not comprehensively documented until the 1840's (Wong and Bott, 1995). According to Wong and Bott (1995), seismograph stations sensitive to smaller earthquakes ($M_L \leq 4$ to 5) were not implemented in Northwestern Oregon until 1979 when the University of Washington expanded their seismograph network to Oregon. Prior to 1979, few seismograph stations were installed in Oregon. Oregon State University (Corvallis) likely had the first station installed in 1946 (Wong and Bott, 1995). The local Richter magnitude (M_L) of events occurring prior to the establishment of seismograph stations have been estimated based on correlations between magnitude and Modified Mercalli (MM) intensities. Some discrepancy exists in the correlations.

Distant strong earthquakes felt in the Eugene area are summarized in Table 3D (Noson et al., 1988; Bott and Wong, 1993; Stover and Coffman, 1993; Wiley et al., 1993; Wong and Bott, 1995; Black, 1996; USGS, 2001). None of these events caused significant reportable damage in the Eugene metropolitan area.

Table 3D. Distant Earthquakes Felt in the Eugene Area

Earthquake	Modified Mercalli Intensities (MM)
2001 Nisqually, Washington	II-III
1993 Klamath Falls, Oregon	IV
1993 Scotts Mills, Oregon	IV
1965 Seattle-Tacoma, Washington	I-IV
1962 Portland, Oregon	I-IV
1961 Lebanon/Albany, Oregon	IV
1949 Olympia, Washington	IV
1873 Crescent City, California	V

SEISMIC HAZARDS

The OSSC (2010) Section 1803.7 requires the evaluation of risks from a range of seismic hazards. A seismic hazard study by DOGAMI has been completed for the Eugene-Springfield area and part of this study included obtaining shear-wave velocity data (Wang et al., 1998; Black et al., 2000). More recent investigations have been completed by DOGAMI to identify geologic and seismic hazards (Burns et al., 2008). We have also developed conclusions regarding seismic hazards based on previous geotechnical and seismic studies performed within the project vicinity, our knowledge of the site geology, and the soil profile encountered in the explorations.

The relative earthquake hazard is based on the combined effects of ground shaking amplification and earthquake-induced landslides with a range in hazard from Zone A (highest hazard) to Zone D (lowest hazard). Based on the DOGAMI mapping, the site is within Zone D (lowest hazard) for the overall, relative earthquake hazard (Black et al., 2000).

Ground Motion Amplification. The influence of a soil deposit on the earthquake motion is routinely evaluated in terms of Site Effects, in which an estimate of the amplification or de-amplification of the underlying bedrock/firm soil seismic motions is made. As seismic energy propagates up through the soil strata, the energy is typically increased (i.e., amplified) or decreased (i.e., attenuated) to some extent. The site is underlain by fan-delta alluvial deposits consisting of a thin mantle of stiff clayey silt followed by medium dense to dense sandy gravel. Therefore, it is our opinion that the amplification hazard at the site is low. This conclusion is consistent with DOGAMI's amplification hazard map, Hazard Zone 1 (low hazard, amplification ≤1) (Black et al., 2000). The relative ground-shaking amplification susceptibility map for Lane County also indicates that there is a low susceptibility to amplification (NEHRP Site Class B) (Burns et al., 2008).

Ground Rupture. We anticipate the risk of ground rupture is low due to lack of known faulting beneath the site. However, hidden and/or deep-seated active faults could remain undetected. Additionally, recent crustal seismic activity cannot always be tied to observable faults. In the event of a catastrophic earthquake with a large seismic moment, inactive faults could potentially be reactivated.

Landslides and Earthquake-Induced Landslides. The site is located on a relatively flat ground. DOGAMI's hazard map indicates there is no hazard for instability in the immediate vicinity of the school site (Black et al., 2000). Burns et al. (2008) mapped the site as being within an area of primarily low landslide susceptibility, with no identified landslides.

Based on our site and subsurface observations, we believe the risk of slope instability (earthquake-induced or otherwise) that could affect the school structures is low. Such conditions typically have little or no landslide risk.

Liquefaction and Lateral Spread. Liquefiable soils typically consist of loose, fine-grained sand and non-plastic or low plasticity silt below the ground water table. The explorations indicate the school site is underlain by predominantly stiff, medium plasticity clayey silt, followed by medium dense to dense sandy gravel. Therefore, it is our opinion that the risk of cyclically-induced liquefaction, ground subsidence or a bearing capacity failure beneath the tank foundations due to liquefaction is very low to negligible. The risk of seismically-induced lateral spread is also considered low because of the low liquefaction risk and the low risk of slope instability (discussed above).

The relative liquefaction hazard susceptibility map indicates the site is within a low to moderate liquefaction susceptibility zone (Burns et al., 2008). According to Black et al., (2000), gravel will only liquefy under exceptional circumstances and the best indicator of gravel liquefaction is determining the shear-wave velocity. Typically, very strong shaking in addition to shear-wave velocities less than 705 feet/second can liquefy clean sand and gravel deposits. Shear-wave velocities of Pleistocene gravels are consistently greater than 984 ft/sec; therefore, not liquefying (Black et al., 2000).

Tsunami/Seiche. Tsunami inundation is not applicable to this site since Eugene is not on the Oregon Coast. Seiche (the back and forth oscillations of a water body during a seismic event) is also not a concern due to the absence of large bodies of water near the site.

SITE CLASS, DESIGN EARTHQUAKES AND SITE RESPONSE SPECTRUM

The site is underlain by a thin mantle of fine-grained soil followed by a deep deposit of medium dense to dense gravels and gravels interbedded with clay or silt. Based on the available information, we recommend an OSSC/IBC Site Class D for analysis and design.

The OSSC (2010), Section 1803.3.2.1, requires the design of structures classified as essential or hazardous facilities, and major and special-occupancy structures address, at a minimum, the following earthquakes:

Crustal: A shallow crustal earthquake on a real or assumed fault near the site with a minimum moment magnitude (M_W) of 6.0 or the design earthquake ground motion acceleration determined in accordance with the 2010 OSSC Section 1613.

Intraplate: A deep subduction earthquake (Benioff Zone earthquake) with a moment magnitude (M_W) of 7.0 or greater on the seismogenic part of the subducting plate (Juan de Fuca) of the CSZ.

Interface: A subduction earthquake with a minimum moment magnitude (M_W) of 8.5 on the seismogenic part of the interface between the Juan de Fuca and the North American Plates on the CSZ.

The design maximum considered earthquake ground motion maps provided in OSSC 2010 are based on the 2002 maps prepared by USGS for an earthquake with a 2% probability of exceedence in 50 years (i.e., a ±2,475-year return period). USGS released updated maps in 2008. These maps are used in the 2012 IBC and will presumably be adopted into the next edition of the OSSC.

The 2002 and 2008 USGS maps were established based on probabilistic studies and include aggregate hazards from a variety of seismic sources. Information obtained from the USGS National Earthquake Hazard Mapping website indicates the following earthquake magnitudes and source-to-site distances were included in the 2002 USGS maps (USGS, 2002):

Crustal: M_W 6.4 to 6.95 earthquake located ±4 to 16 miles from the site.

Subduction: M_W 8.3 earthquake located ±35 to 70 miles from the site.

Subduction: M_W 9.0 earthquake located ±35 to 69 miles from the site.

The following earthquake magnitudes and source-to-site distances were included in the 2008 USGS maps (USGS, 2008):

Crustal: M_W 6.2 to 6.8 earthquake located ±4 to 61 miles from the site.

Subduction: M_W 8.0 to 8.7 earthquake located ±35 to 82 miles from the site.

Subduction: M_W 9.0 to 9.2 earthquake located ±35 to 81 miles from the site.

The earthquake magnitudes and source-to-site distances used to generate the 2002 and 2008 USGS maps satisfy the requirements of OSSC 2010. Refer to the Seismic Design section of the main report for a discussion of the peak bedrock acceleration and parameters for constructing the site response spectrum (Figure 3A, Appendix A).

FOUNDATION TYPE AND RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

Conventional shallow foundations (spread footings and continuous wall footings) are planned. Their analysis is discussed in the Engineering Analysis section of the main Geotechnical Report (pp. 7 and 8, and 10 and 11). Recommendations for the design and construction of foundations are found in the Recommendations section of the main Geotechnical Report (pp.12 through 17).

CONCLUSION

Based on the findings presented herein, it is our opinion there are no geologic or seismic hazards that require mitigation as part of the seismic upgrades to the school. The site response spectrum (Figure 3A, Appendix A) should be used to establish potential seismic acceleration forces on the structures.

This site-specific seismic hazard investigation for the Howard Elementary School in Eugene, Oregon, was prepared by Brooke Running, R.G., C.E.G.

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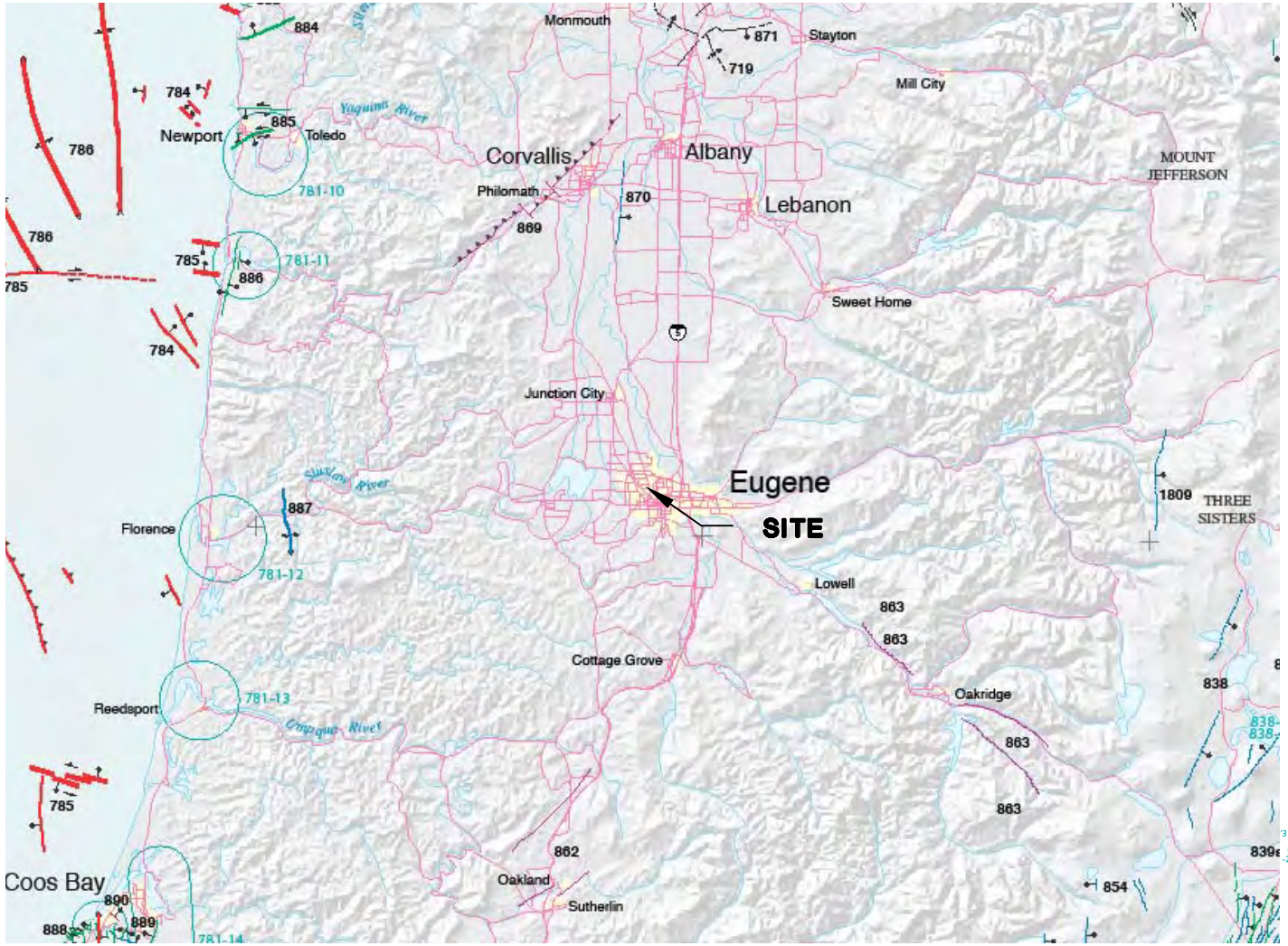


NOT TO SCALE

LEGEND

TIME OF MOST RECENT SURFACE RUPTURE
- Holocene (<10,000 years) or post last glaciation (<15,000 years; 15 ka); no historic ruptures in Oregon to date
- Late Quaternary (<130,000; post penultimate glaciation)
- Late and middle Quaternary (<750,000 years; 750 ka)
- Quaternary, undifferentiated (<1,600,000 years; <1.6 Ma)
- Class B structure (age or origin uncertain)

SLIP RATE
- >5 mm/year
- 1.0-5.0 mm/year
- 0.2-1.0 mm/year
- <0.2 mm/year

TRACE
- Mostly continuous at map scale
- Mostly discontinuous at map scale
- Inferred or concealed

STRUCTURE TYPE AND RELATED FEATURES
- Normal or high-angle reverse fault
- Strike-slip fault
- Thrust fault
- Anticlinal fold
- Synclinal fold
- Monoclinal fold
- Plunge direction of fold
- Fault section marker

DETAILED STUDY SITES
- Trench site
- Subduction zone study site

CULTURAL AND GEOGRAPHIC FEATURES
- Divided highway
- Primary or secondary road
- Permanent river or stream
- Intermittent river or stream
- Permanent or intermittent lake

NOTES:
1. PORTION OF MAP BASED ON MAP OF QUATERNARY FAULTS AND FOLDS IN OREGON (PERSONIUS ET AL., 2003).
2. SEE SITE SPECIFIC HAZARD STUDY FOR A DISCUSSION OF LOCAL FAULTING.
3. FAULTS: #862= UNNAMED FAULTS NEAR SUTHERLIN; #863= UPPER WILLAMETTE RIVER; #869= CORVALLIS; AND #870= OWL CREEK.

FOUNDATION ENGINEERING INC.
PROFESSIONAL GEOTECHNICAL SERVICES
820 NW CORNELL AVENUE
CORVALLIS, OR 97330-4517
BUS. (541) 757-7645 FAX (541) 757-7650

DATE NOV. 2013
DWN. BKR
APPR.
REVIS.
PROJECT NO. 2131078

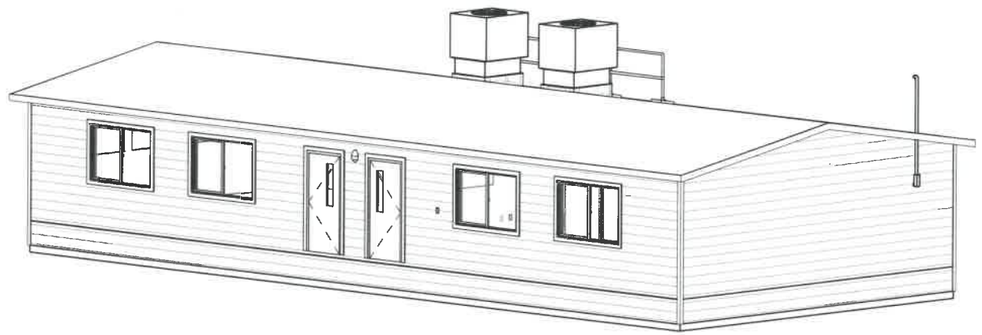
QUATERNARY CRUSTAL FAULT MAP
SOUTHERN WILLAMETTE VALLEY
HOWARD ELEMENTARY SCHOOL
EUGENE, OREGON

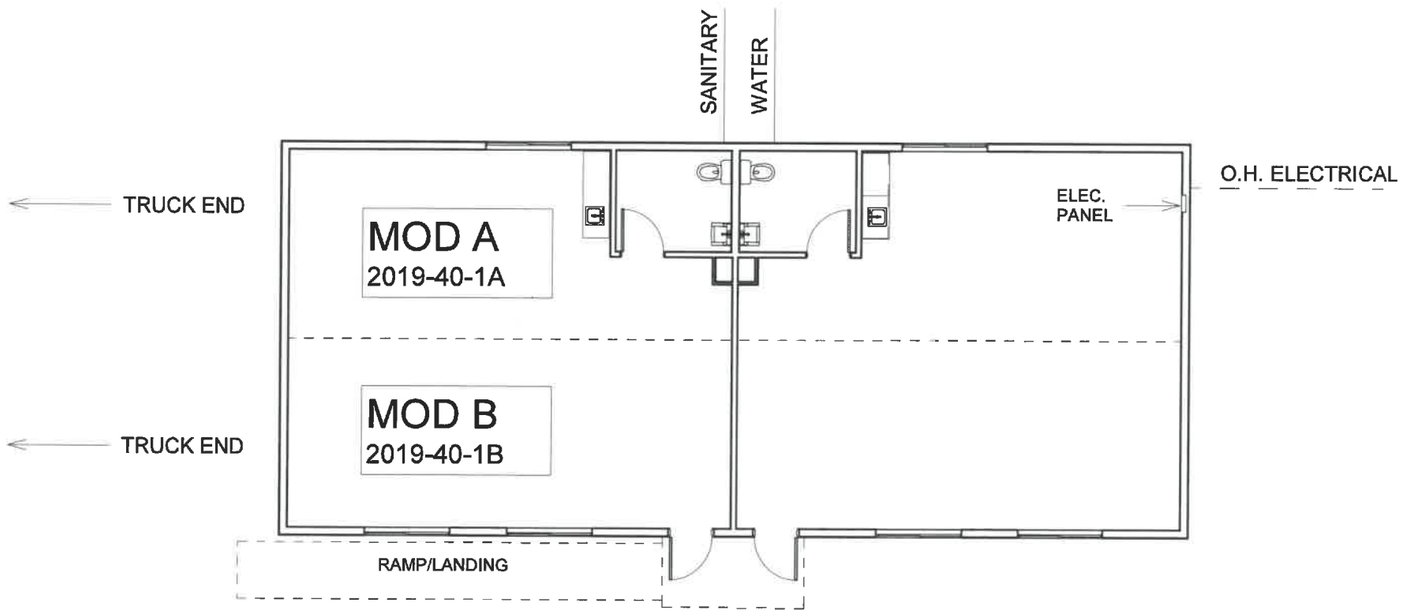
FIGURE NO.
1D

FILE NAME:FIGURE 1D

EUGENE SD V

EUGENE 4J - CREST DRIVE ELEMENTARY
28' x 64' MODULAR CLASSROOM





SHEET INDEX			
Sht. No.	*Sheet Name*	*Current Rev.*	*Rev Issued By*
A 0.0	COVER SHEET		
A 0.1	GENERAL NOTES		
A 0.2	SYMBOLS & ABBREVIATIONS		
A 1.0	FLOOR PLAN		
A 1.1	REFLECTED CEILING PLAN		
A 2.0	EXTERIOR ELEVATIONS		
A 2.1	EXTERIOR ELEVATIONS		
A 3.0	FINISH PLAN (NOT USED)		
A 3.1	FINISH NOTES		
A 3.2	SCHEDULES		
A 3.3	DATA SCHEDULES		
A 4.0	INTERIOR ELEVATIONS		
A 5.0	DETAILS		
A 5.1	DETAILS		
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S 1.0	FOUNDATION PLAN		
S 2.0	ROOF FRAMING PLAN		
S 3.0	BUILDING SECTIONS		
S 4.0	FOUNDATION NOTES & DETAILS		
S 4.1	FOUNDATION DETAILS		
S 4.2	FOUNDATION DETAILS		
S 4.3	DETAILS		
S 4.4	DETAILS		
S 4.5	DETAILS		
E 0.1	ELECTRICAL LEGEND & NOTES		
E 1.0	ELECTRICAL PLAN		
E 2.0	LIGHTING PLAN		
E 3.0	ELEC. PANELS & LOAD CALCS.		
M 0.1	HVAC NOTES & LEGEND		
M 1.0	HVAC PLAN		
P 1.0	PLUMBING NOTES & SCHEDULE		
P 1.1	PLUMBING SCHEMATICS		

5/1/2019

REGISTERED PROFESSIONAL ENGINEER
77584
OREGON
MAY 22, 2015
MICHAEL C LEWIS

EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

MODERN BUILDING SYSTEMS

MODERN BUILDING SYSTEMS, INC.
TELEPHONE: (503) 749-4949 FAX: (503) 749-4950
P.O. BOX 110, 9493 PORTER ROAD, AUMSVILLE, OR 97325
CHECK OUT OUR WEB PAGE: www.modernbuildingsystems.com

SHEET COVER SHEET

PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V

ADDRESS 1155 CREST DR. EUGENE, OR. 97405

DRW VF

JOB# 2019-AR-40

SHEET # A 0.0

DATE 5/1/19

GENERAL NOTES

1. THE TERM IBC SHALL APPLY TO THE CURRENT EDITION OF THE INTERNATIONAL BUILDING CODE (IBC) AS AMENDED BY THE STATE OF OREGON. FOR PROJECTS IN ALL OTHER STATES IT SHALL APPLY TO THE CURRENT EDITION OF THE UBC OR IBC AS ADOPTED BY THAT STATE.
2. ALL CONTROLS AND HARDWARE SHALL BE ACCESSIBLE TO PERSONS WITH DISABILITIES.
3. LOCAL JURISDICTION TO DETERMINE COMPLIANCE WITH IBC CHAPTER 29 (WITH REGARD TO ADJACENT FACILITIES) IN ACCORDANCE WITH THEIR CURRENTLY ADOPTED EDITION OF THE IBC.
4. WHERE REQUIRED, PORTABLE FIRE EXTINGUISHERS SHALL BE INSTALLED IN ACCORDANCE WITH 2015 IFC SECTION 906
5. TOILET FACILITIES LOCATED IN AN ADJACENT FACILITY TO BE NOTED ON THE PLAN SUBMITTAL AND THAT THE REQUIREMENTS OF IBC CHAPTER 29, SECTION 2902, TABLE 2902.1 OF THE STATE BUILDING CODE MUST BE VERIFIED BY THE LOCAL JURISDICTION BUILDING OFFICIAL AND SHOWN ON THE NLEA.
6. IF APPLICABLE, FIRE ALARM SYSTEM TO BE FIELD INSTALLED (BY OTHERS) PER 2015 IBC SECTION 907.2.3, GROUP E. SEE ELECTRICAL PLAN FOR DEVICE LOCATIONS. FIRE ALARM INSPECTION AND APPROVAL PER LOCAL AUTHORITY HAVING JURISDICTION.
7. IF APPLICABLE, FIRE SAFETY AND EVACUATION PLANS SHALL BE PROVIDED BY OWNER PRIOR TO CERTIFICATE OF OCCUPANCY PER 2015 IFC SECTION 403
8. AN ACCESSIBLE ROUTE SHALL BE PROVIDED TO THE BUILDING AREA AS REQUIRED IN 2015 IBC SECTION 1104

ENERGY CODE NOTES

1. ALL BUILDING THERMAL ENVELOPE INSULATION SHALL BE MARKED IN ACCORDANCE WITH OEESC 303.1.1 AND INSTALLED PER OEESC 303.1.2
2. BLOWN-IN INSULATION SHALL BE INSTALLED AND CERTIFIED PER OEESC 303.1.1.1
3. ALL AIR BARRIER MATERIALS SHALL BE ASTM E2178 RATED OR AS LISTED IN OEESC 502.4.1.2.1
4. AIR BARRIER COMPLIANCE: CONTINUOUS AIR BARRIER FOR THE OPAQUE BUILDING ENVELOPE SHALL COMPLY WITH OEESC 502.4.1.2.1
5. PENETRATIONS OF THE AIR BARRIER SHALL BE CAULKED, GASKETED OR SEALED PER OEESC 502.4.2
6. ALL FENESTRATION ASSEMBLIES SHALL BE LABELED BY THE MANUFACTURER PER OEESC 303.1.3 AND 502.4.1
7. AIR ECONOMIZER SHALL BE CAPABLE OF PROVIDING 100% OUTSIDE AIR PER OEESC 503.3.1
8. ECONOMIZER HIGH-LIMIT SHUTOFF CONTROL IS ELECTRONIC ENTHALPY PER MANUFACTURER'S SPECIFICATIONS
9. MECHANICAL VENTILATION SYSTEM SHALL HAVE THE CAPABILITY TO REDUCE THE OUTSIDE AIR SUPPLY TO THE MINIMUM REQUIRED PER OEESC 503.2.5
10. OUTSIDE AIR AND EXHAUST AIR DAMPERS SHALL BE RATED PER OEESC 502.4.4 AND 503.2.4.5

DESIGN CRITERIA

GENERAL:	
CONSTRUCTION TYPE	VB (NON-SPRINKLERED)
OCCUPANCY GROUP	E
OCCUPANCY LOAD	76
DISTANCE TO PROPERTY LINE OR ASSUMED PROPERTY LINE	FRONT: 10' MIN. REAR: 10' MIN. LEFT: 10' MIN. RIGHT: 10' MIN.
EXTERIOR WALL RATING	FIRE SEPARATION DISTANCE 10' OR GREATER, NO RATING REQUIRED, PER IBC TABLE 602
ELECTRICAL:	
ELECTRICAL SERVICE LOAD	225A / 120/208V / 1 PH. 40.3 kVA
MECHANICAL:	
VENTILATION OCCUPANCY LOAD	56
CLIMATE ZONE	4C/5B
HEATING	SPV/HP
AIR-CONDITIONING	YES
PLUMBING:	
PLUMBING OCCUPANCY LOAD	38 MALE/38 FEMALE
QTY OF PLUMBING FIXTURES	7
STRUCTURAL:	
REQUIRED SPECIAL INSPECTIONS	STEEL COLUMN WELDING, SUSPENDED CEILING W/ BERC CLIPS
ROOF SNOW LOAD	30 PSF
FLOOR LIVE LOAD	50 PSF
WIND LOAD	Lambda = 1.0 Vult = 140 MPH (Vasd = 108 MPH) 3 SECOND GUST - EXP. B
SEISMIC	BEARING WALL SYSTEM: S_S = 1.500, F_a = 1.000 S_{DS} = 1.000, RISK CATEGORY II I_e = 1.0, SEISMIC DESIGN CATEGORY D, SITE CLASS D

THIS SET OF PLANS PREPARED AND SUBMITTED FOR APPROVAL UNDER THE FOLLOWING CODES:

BUILDING	2015 IBC
MECHANICAL	2015 IMC
FIRE	2015 IFC
PLUMBING	2017 OPSC
ENERGY	2014 OEESC
ELECTRICAL	2017 OESC

REGISTERED PROFESSIONAL ENGINEER 77584 EG MICHAEL C. LEWIS MAY 22, 2015

EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

MODERN BUILDING SYSTEMS

MODERN BUILDING SYSTEMS, INC.
TELEPHONE: (503) 749-4949 FAX: (503) 749-4950
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SHEET GENERAL NOTES

JOB# 2019-AR-40

PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V

SHEET # A 0.1

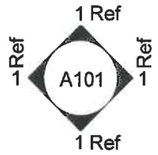
ADDRESS 1155 CREST DR. EUGENE, OR. 97405

DRW VF

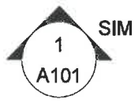
DATE 5/1/19

TYPICAL SYMBOLS LEGEND

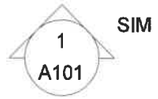
NORTH ARROW



ELEVATION BUBBLE



SECTION BUBBLE



DETAIL BUBBLE

DETAIL CALLOUT

GRID BUBBLE

ELEVATION LEVEL

MODULE TAG

WALL TAG

DOOR TAG

WINDOW TAG

REVISION TAG


CENTERLINE

KEYNOTE

ABBREVIATIONS

A.B.	ANCHOR BOLT
ADJ.	ADJUSTABLE
A.F.F.	ABOVE FINISH FLOOR
AL	ALUMINUM
BA	BRONZE ANODIZED
BD.	BOARD
BLK.	BLOCK
B.O.	BOTTOM OF
BOT.	BOTTOM
BRCH	BIRCH
BV.	BOTTOM VENT
CDR.	CEDAR
CJ	CONTROL JOINT
CL	CENTERLINE
CLG.	CEILING
CLR.	CLEAR
CMU	CONCRETE MASONRY UNIT
C.O.	CLEAN OUT
CONC.	CONCRETE
CONT.	CONTINUOUS
CPT	CARPET
DBL.	DOUBLE
DF	DRINKING FOUNTAIN
DIA.	DIAMETER
DIM.	DIMENSION
DS	DOWNSPOUT
DTL	DETAIL
DW	DISHWASHER
EA.	EACH
ELEC.	ELECTRICAL
ELEV.	ELEVATIONS
EQUIP.	EQUIPMENT
EXIST.	EXISTING
EXT.	EXTERIOR
E.W.	EACH WAY
FD	FLOOR DRAIN
FDN	FOUNDATION
F.E.	FIRE EXTINGUISHER
F.E.C.	FIRE EXTINGUISHER CABINET
FGL	FIBERGLASS
FLR.	FLOOR
FIN.	FINISH
F.O.FIN.	FACE OF FINISH
F.O.FRM.	FACE OF FRAMING
FS	FLOOR SINK
GA.	GAUGE
GALV.	GALVANIZED
GLB	GLULAM BEAM
GYP.	GYPSUM
HB	HOSE BIB
HC	HOLLOW CORE
HF	HEM FIR
HM	HOLLOW METAL
HSS	HOLLOW STRUCTURAL SECTION
INFO.	INFORMATION
INSUL.	INSULATION
INT.	INTERIOR
KD	KNOCK DOWN
L.	LONG
LAV	LAVATORY
LH	LEFT HAND
LHOS	LEFT HAND OUT SWING
LVL	LAMINATED VENEER LUMBER
MAX.	MAXIMUM
MECH.	MECHANICAL
MFR.	MANUFACTURER
MIN.	MINIMUM
MISC.	MISCELLANEOUS
MOD	MODULE
MPL	MAPLE
MTL.	METAL
MV	MIXING VALVE
N.I.C.	NOT IN CONTRACT
NOM.	NOMINAL
NRW	NARROW (LITE)
NTS	NOT TO SCALE
OBS	OBSCURE
O.C.	ON CENTER
OFCI	OWNER FURNISHED CONTRATOR INSTALLED
OFOI	OWNER FURNISHED OWNER INSTALLED
OPP.	OPPOSITE
O.S.B.	ORIENTED STRAND BOARD
PD	PUNCH & DIMPLE
PF	PREFINISHED
PLAM	PLASTIC LAMINATE
PLCS	PLACES
PLYWD	PLYWOOD
PNT	PAINT
P.T.	PRESSURE TREATED
REFRIG.	REFRIGERATOR
REQ'D	REQUIRED
RH	RIGHT HAND
RHOS	RIGHT HAND OUT SWING
R.O.	ROUGH OPENING
SC	SOLID CORE
SF	STOREFRONT
SH	SINGLE HUNG
SHT.	SHEET
SHTG.	SHEATHING
SIM.	SIMILAR
SIMP.	SIMPSON
SQ.	SQUARE
S.S.	STAINLESS STEEL
STN.	STAIN
STRUCT.	STRUCTURAL
TIM.	TIMELY
TMP	TEMPERED SAFETY GLAZING
T.O.	TOP OF
TTP	TAPE, TEXTURE & PAINT
TYP.	TYPICAL
U.N.O.	UNLESS NOTED OTHERWISE
UR	URINAL
VCT	VINYL COMPOSITION TILE
V.C.	VINYL COATED
VWS	VINYL WRAP SURROUND
W/	WITH
WC	WATER CLOSET
WD.	WOOD
WH	WATER HEATER

EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

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SHEET SYMBOLS & ABBREVIATIONS

JOB# 2019-AR-40

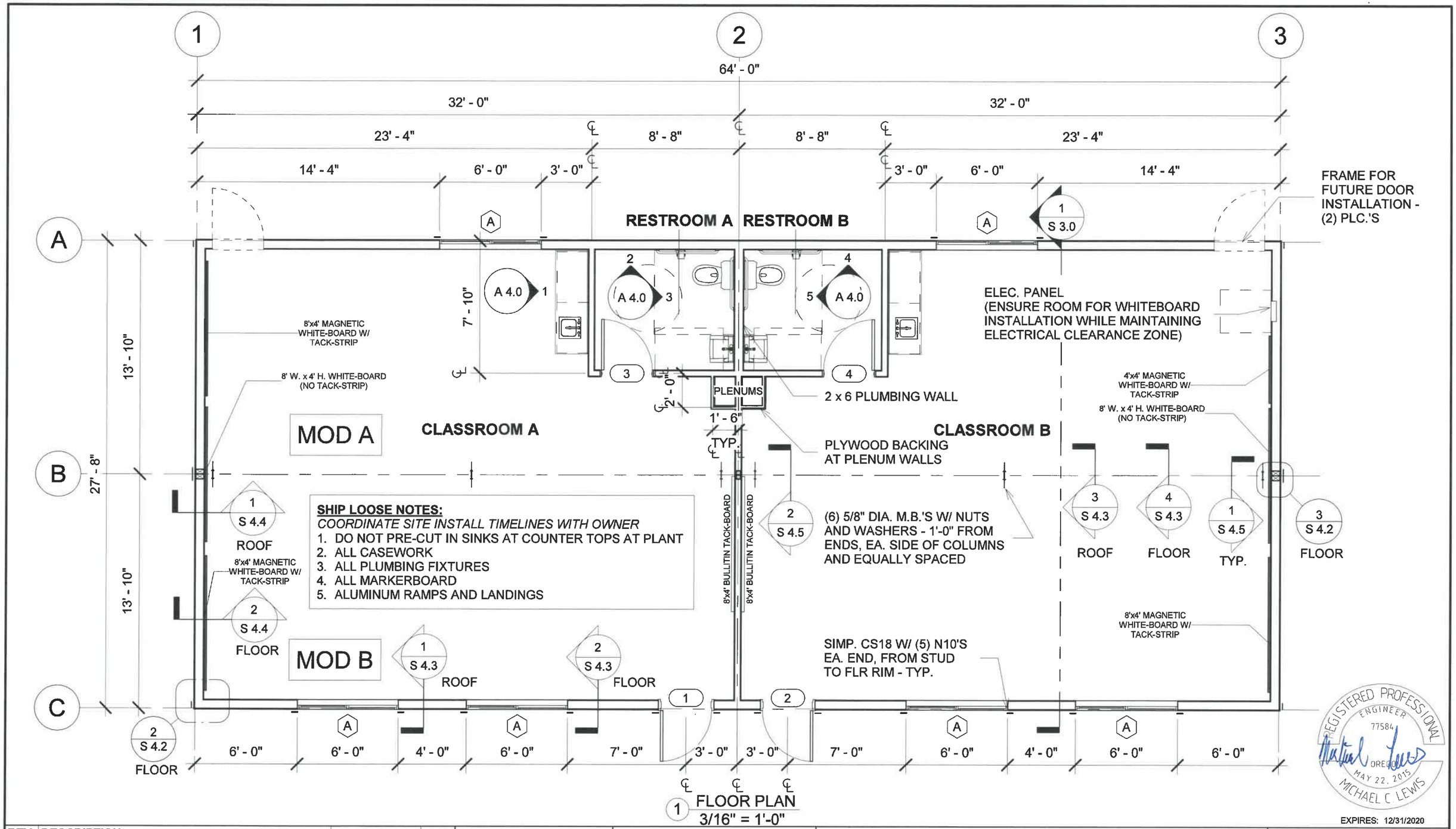
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V

SHEET # A 0.2

ADDRESS 1155 CREST DR. EUGENE, OR. 97405

DRW VF

DATE 5/1/19



1 FLOOR PLAN
3/16" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER 77584 OREGON MAY 22, 2015 MICHAEL C LEWIS

EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

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SHEET FLOOR PLAN

JOB# 2019-AR-40

PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V

SHEET # A 1.0

ADDRESS 1155 CREST DR. EUGENE, OR. 97405

DRW VF

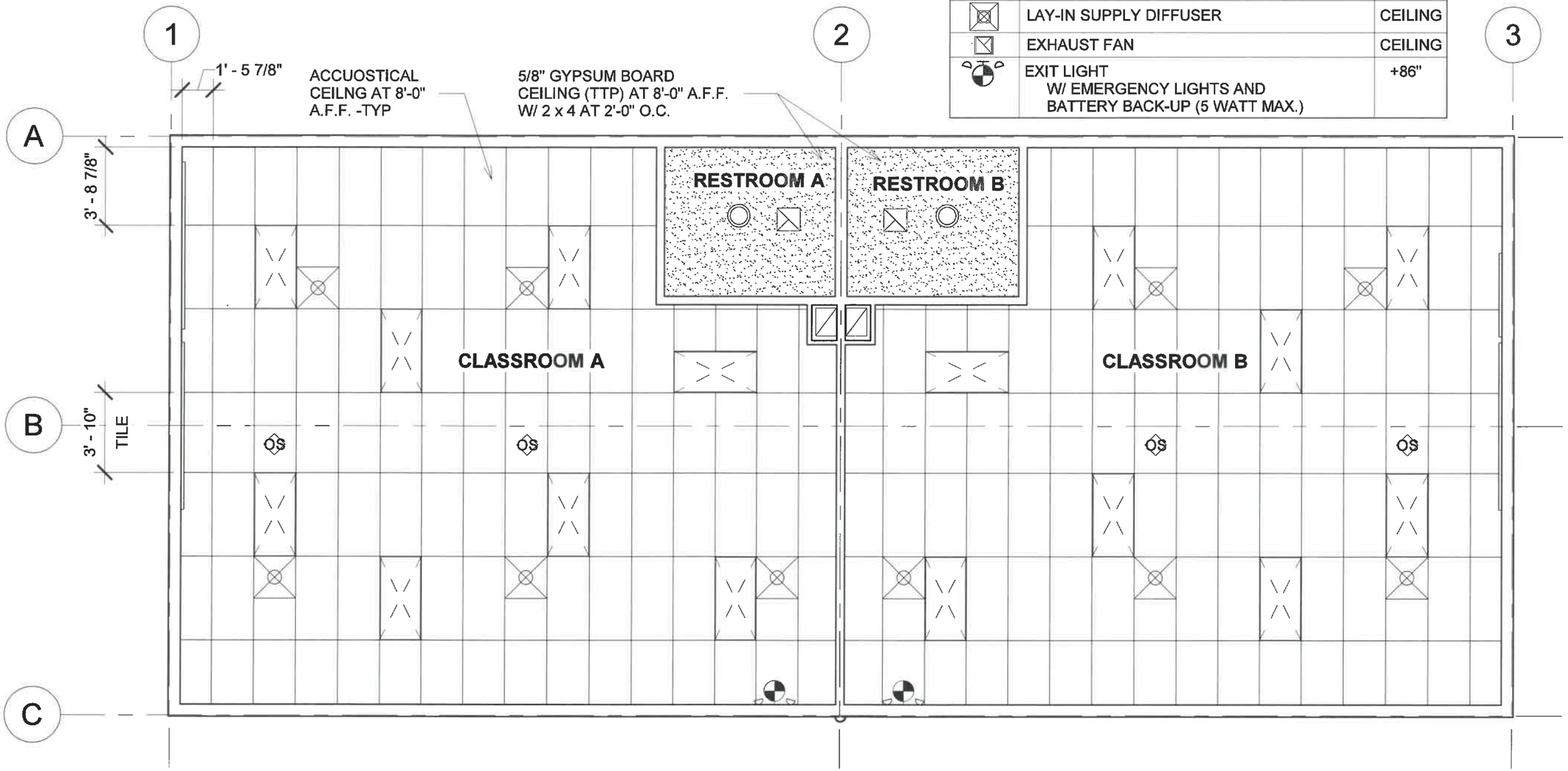
DATE 5/1/19

REFLECTED CEILING PLAN NOTES

1. DIMENSIONS TO FLOOR, WALLS AND CEILING ARE TO FACE OF FINISH (U.N.O.)

REFLECTED CEILING SYMBOLS LEGEND

SYMBOL	DESCRIPTION	HEIGHT ℄ (U.N.O)
	LAY-IN FIXTURE	CEILING
	SURFACE MOUNT FIXTURE	CEILING
	EXTERIOR WALL MOUNTED LIGHT FIXTURE	+86"
OS	OCCUPANCY SENSOR	CEILING
	LAY-IN SUPPLY DIFFUSER	CEILING
	EXHAUST FAN	CEILING
	EXIT LIGHT W/ EMERGENCY LIGHTS AND BATTERY BACK-UP (5 WATT MAX.)	+86"



1 REFLECTED CEILING PLAN
3/16" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER 77584 OREGON MAY 22, 2015 MICHAEL C. LEWIS

EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

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SHEET REFLECTED CEILING PLAN

JOB# 2019-AR-40

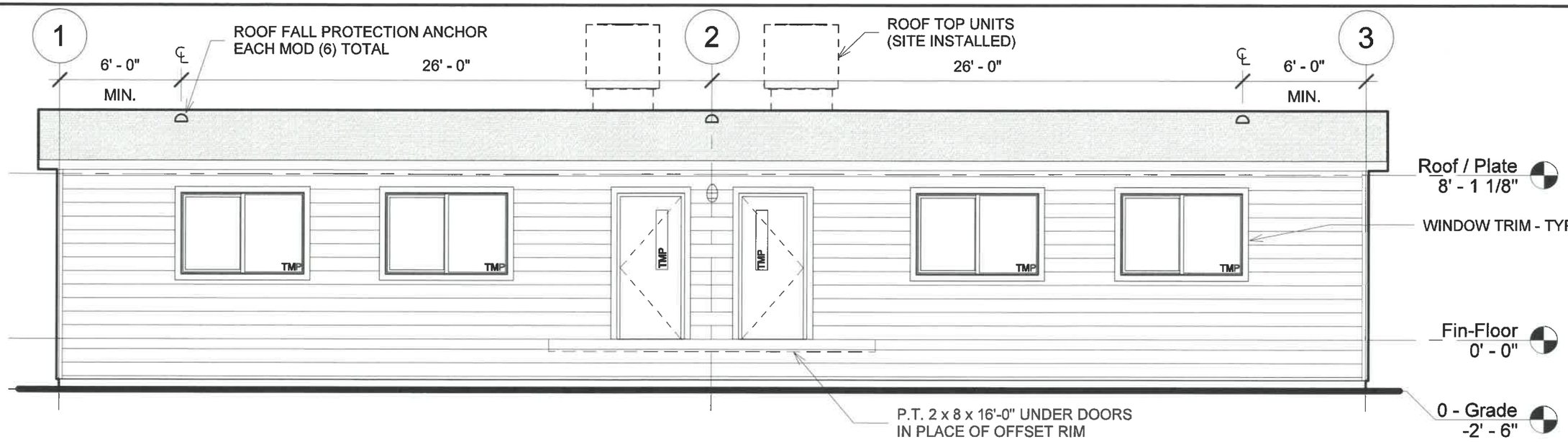
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V

SHEET # A 1.1

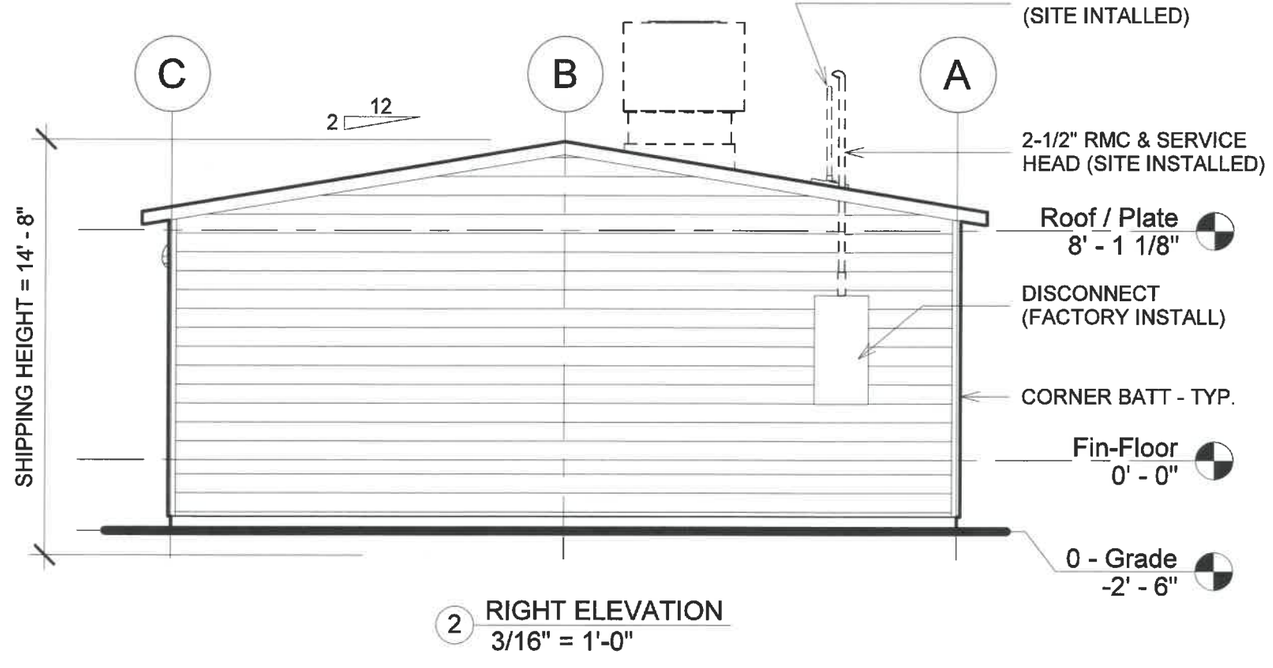
ADDRESS 1155 CREST DR. EUGENE, OR. 97405

DRW VF

DATE 5/1/19



1 FRONT ELEVATION
3/16" = 1'-0"



2 RIGHT ELEVATION
3/16" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
77584
OREGON
MAY 22, 2015
MICHAEL C. LEWIS

EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

MODERN BUILDING SYSTEMS
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SHEET EXTERIOR ELEVATIONS

PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V

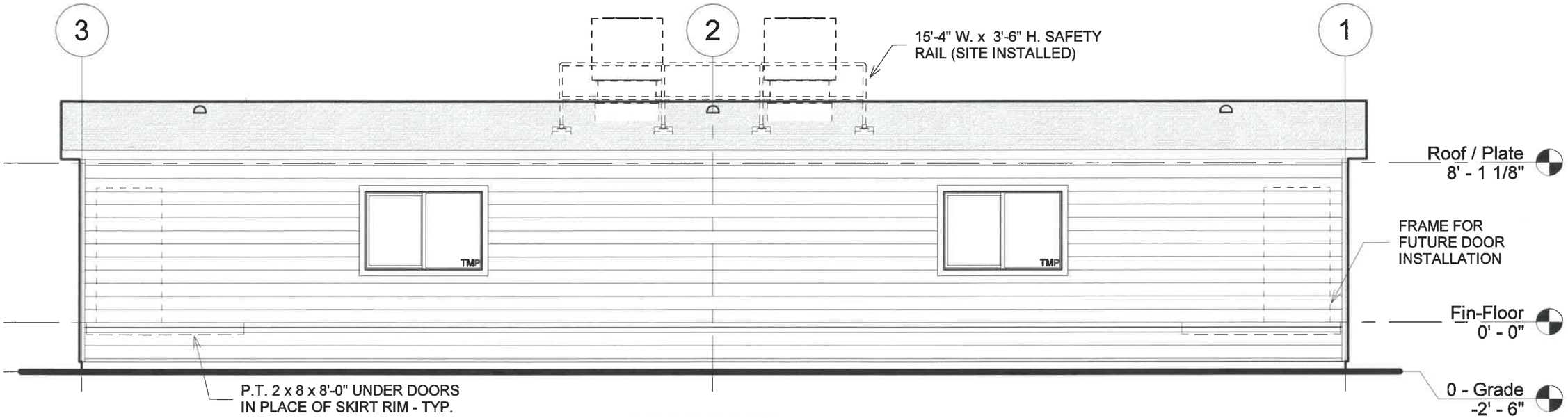
ADDRESS 1155 CREST DR. EUGENE, OR. 97405

DRW VF

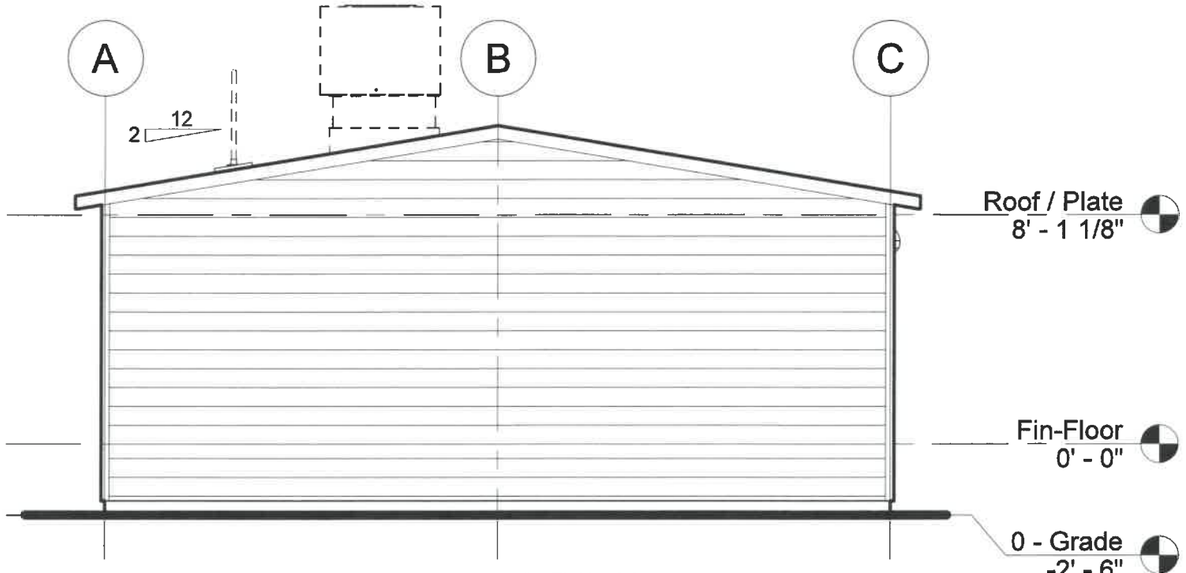
JOB# 2019-AR-40

SHEET # A 2.0

DATE 5/1/19



1 REAR ELEVATION
3/16" = 1'-0"



2 LEFT ELEVATION
3/16" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
77584
OREGON
MAY 22, 2015
MICHAEL C. LEWIS
EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

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SHEET EXTERIOR ELEVATIONS

PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V

ADDRESS 1155 CREST DR. EUGENE, OR. 97405

DRW VF

JOB# 2019-AR-40

SHEET # A 2.1

DATE 5/1/19

FLOOR CONSTRUCTION

FINISH: SHEET VINYL AT RESTROOM, L.V.T. AT BALANCE

BASE: 6" VINYL AT RESTROOM, 4" VINYL AT BALANCE

UNDERLAYMENT: 11/32" CCP AT SHEET VINYL

SUBFLOOR: 23/32" APA RATED SHEATHING (24)
(ACTS AS 1 PERM MAX. VAPOR BARRIER)
(ACTS AS AIR BARRIER)

JOISTS: 2 x 8 DF #2 AT 16" O.C., DBL. 2 x 8 AT ENDS

RIM JOISTS: MURPHY LVL 3100 Fb - 2.0E, 1-1/2" W x 7-1/4" D
(ESR-1387 AND ESR-2913)

OFFSET RIMS: 2 x 4 DF (U.N.O)

INSULATION: R-30 U (FIBERGLASS BATTS)

BOTTOM CLOSURE: FS-25

EXTERIOR WALL CONSTRUCTION

PLATE HEIGHT: 8'-1 1/8"

SIDING: FIBER CEMENT (F.C.) LAP SIDING W/ 8" EXPOSURE
OVER BUILDING WRAP
(ACTS AS A WATER RESISTIVE BARRIER)

SHEATHING: 7/16" O.S.B. (24/16)

STUDS: 2 x 6 DF STUD GRADE AT 16" O.C.

INSULATION: R-21 U (FIBERGLASS BATTS)
HEADERS TO BE (2) 2x W/ MIN. R-10 INSULATION BETWEEN.
SEE DOOR AND WINDOW SCHEDULE FOR SIZE.

INTERIOR FINISH: 5/8" V.C. GYPSUM BOARD
(ACTS AS 1 PERM MAX. VAPOR BARRIER)
(ACTS AS AIR BARRIER)
F.R.P. OVER WATER RESISTANT GYPSUM BOARD
AT RESTROOMS

SKIRT: MATCH SIDING

INTERIOR WALL CONSTRUCTION

PLATE HEIGHT: 8'-1 1/8"

STUDS: 2 x 4 HF STUD GRADE AT 16" O.C. (U.N.O.)

INTERIOR FINISH: 5/8" V.C. GYPSUM BOARD; 5/8 V.C.
GYPSUM BOARD OVER 7/16 O.S.B. AT PLENUM WALLS;
F.R.P. OVER WATER RESISTANT GYPSUM BOARD
AT RESTROOMS

CEILING NOTES

CEILING HEIGHT: NOMINAL 8'-0" (U.N.O.)

CEILING: 5/8 GYPSUM BOARD W/ TTP AT RESTROOMS,
SUSPENDED T-GRID W/ ACOUSTIC TILE AT BALANCE
(REF: ESR-1308)

INSTALL ARMSTRONG 7301 HEAVY DUTY MAIN W/ 7/8" ANGLE &
BERC CLIPS

SPECIAL INSPECTION REQUIRED IN SEISMIC DESIGN
CATEGORIES C, D, E & F

ROOF CONSTRUCTION

ROOFING: FIBERGLASS COMP. SHINGLES OVER (2) LAYERS
SYNTHETIC FELT (MIN. CLASS B), (6) STAPLES

SHEATHING: 7/16" O.S.B. (24/16) AND CEDAR TEXTURE PANEL
(NO GROOVES) FACE DOWN AT EXPOSED OVERHANGS
(ACTS AS AIR BARRIER)

FRAMING: 2 x 10 DF #2 AT 24" O.C.

BEAMS: (2) MURPHY LVL 3100 Fb 2.0E, 1-1/2" W x 24" D
(ESR-1387 AND ESR-2913)

INSULATION: R-38 (CELLULOSE) W/ FS-25
(ACTS AS 1 PERM MAX. VAPOR BARRIER)

OVERHANG: 12"

ROOF PITCH: 2 IN 12

EXTERIOR NOTES

CORNER BATTS: F.C. 5/4 x 4

FASCIA: F.C. 5/4 x 6

BARGE: F.C. 5/4 x 6

WINDOW/DOOR TRIM: F.C. 5/4 x 4

GUTTERS: 4" K-LINE (PREFINISHED)

DOWNSPOUTS: 2" x 3" RECT. (PREFINISHED)

FASTENING/SCHEDULE

MINIMUM NUMBER OF NAILS FOR WOOD MEMBERS
(EXCEPT AS NOTED ON DRAWINGS)

	CONNECTION	NO. / SPACING
FLOOR	RIM JOIST TO FLOOR JOIST	3 PER JOIST
	JOIST TO JOIST	2 ROWS AT 12" O.C.
	BLOCKING	2 EACH END
WALL	STUDS TO PLATES - END NAIL	2 EACH END AT 2 x 4
	STUDS TO PLATES - END NAIL	3 EACH END AT 2 x 6
	BLOCKING	2 EACH END
	JAMB STUD TO 4x HEADER	MIN. 4 EACH END
	JAMB STUD TO 2x HEADER	MIN. 2 EACH END
	STUD TO STUD (CRIPPLE, ETC.)	8" O.C.
	UPPER TOP PLATE TO LOWER TOP PLATE	2 EACH SIDE OF STUD
	BOTTOM PLATE TO FLOOR	2 EACH SIDE OF STUD
ROOF	RIM JOIST TO RAFTER	3 PER RAFTER
	RIM JOIST TO TRUSS	MIN. 2 PER TRUSS
	RAFTER TO RAFTER	2 ROWS AT 12" O.C.
	BLOCKING	2 EACH END
	2 x 4 LEDGER	2 ROWS AT 6" O.C.
	2x BRACE TO RAFTER	4 AT RAFTER

NOTES:
1. ALL FASTENERS ARE 12d (.131), USE HDG FASTENERS OR EQUAL AT P.T. MEMBERS
2. SUBSTITUTION OF CONNECTORS SPECIFIED IN THIS DRAWING SET IS ALLOWED FOR EQUAL OR BETTER CONNECTOR PRODUCTS

STANDARD SHEATHING FASTENING - U.N.O.

FROM ESR-1539 JULY 2018

	SPACING	TYPE	MIN. LENGTH
FLOOR SHEATHING (UNBLOCKED)			
23/32" CDX OR O.S.B. OR STURDI - FLOOR T&G	6" EDGE 8" FIELD	8d (.113) RING-SHANK	2-3/8"
FLOOR UNDERLAYMENT (GLUE AND STAGGER JOINTS)			
11/32" CCP	8" EDGE 8" FIELD	#7 SCREWS	1-5/8"
SHEATHING (ALL EDGES SUPPORTED)			
7/16" O.S.B.	6" EDGE 12" FIELD	15 GA. STAPLE MIN. 7/16" CROWN	2"
ROOF SHEATHING (UNBLOCKED)			
7/16" O.S.B.	6" EDGE 8" FIELD	15 GA. STAPLE MIN. 7/16" CROWN	2"

REGISTERED PROFESSIONAL ENGINEER 77584 OREGON MAY 22, 2015 MICHAEL C. LEWIS

EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

MODERN BUILDING SYSTEMS

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SHEET FINISH NOTES

JOB# 2019-AR-40

PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V

SHEET # A 3.1

ADDRESS 1155 CREST DR. EUGENE, OR. 97405

DRW VF

DATE 5/1/19

DOOR SCHEDULE

Mark	Width	Height	Thickness	Door Swing	Core	Lite Size	Lite Glass	Face	Door Finish	Frame Type	Frame Finish	Throat	R.O. Type	Hdw Group	Door Header	U-Value	Remarks
1	3' - 0"	7' - 0"	1 3/4"	RHOS	HM	NRW	-	MTL	PT	HM	PT	6 3/4"	G	1	(2) 2 x 8 DF #2	.22	
2	3' - 0"	7' - 0"	1 3/4"	LHOS	HM	NRW	-	MTL	PT	HM	PT	6 3/4"	G	1	(2) 2 x 8 DF #2	.22	
3	3' - 0"	7' - 0"	1 3/4"	LH	HC	-	-	WD	MPL	WD	MPL	4 3/4"	1	2			
4	3' - 0"	7' - 0"	1 3/4"	RH	HC	-	-	WD	MPL	WD	MPL	4 3/4"	1	2			

NOTES:

1. CAULK AND SEAL ALL EXTERIOR DOORS
2. ALL EXIT DOORS SHALL BE OPENABLE FROM THE INSIDE WITHOUT THE USE OF A KEY OR SPECIAL KNOWLEDGE OR EFFORT (U.N.O.)
3. ALL DOOR LEADS 4-1/2" (U.N.O.)
4. ALL DOORS TO HAVE A OPENING FORCE NOT EXCEED 5 POUNDS
5. DOOR SURFACES WITHIN 10" OF THE FLOOR MEASURED VERTICALLY, SHALL BE SMOOTH SURFACE ON THE PUSH SIDE EXTENDING THE FULL WIDTH OF THE DOOR PER SECTION 2009 A117.1 404.2.9

WINDOW SCHEDULE

Mark	Count	Width	Height	Type	Frame	Glass	SHGC	U-VAL	Air Leakage	Ext. Trim	Int. Trim	Window Header	Comments
A	6	6' - 0"	4' - 0"	XO	VINYL	DUAL / LOW E / TMP	0.30	0.34	.18 CFM/SF	1x4	VWS	(2) 2 x 8 DF #2	HORIZONTAL MINI-BLINDS

NOTES:

1. CAULK AND SEAL ALL EXTERIOR WINDOWS

HARDWARE SCHEDULE

GROUP #1	GROUP #2	GROUP #3	GROUP #4	GROUP #5	GROUP #6	GROUP #7
1-1/2 PAIR BUTTS PANIC / LEVER W/ LOCK (VON DUPRIN 22NL) CLOSER (LCN 4041) WEATHER-STRIP DOOR SWEEP 1/2" MAX. ACCESSIBLE THRESHOLD	1-1/2 PAIR BUTTS LEVER/LEVER (PRIVACY) (SCHLAGE L9456) w/ EMERGENCY KEY NO CLOSER WALL STOP					

NOTES:

1. COORDINATE KEY MATRIX WITH OWNER AS EARLY AS POSSIBLE.
2. EXTERIOR FRAMES MIN. 14 GA
3. EXTERIOR DOORS 16 GA THERMAL INSULATED
4. RECESSED MAGNETS FOR ALARM INSTALLED AT ALL EXTERIOR DOORS TO BE INACCESSIBLE WHEN DOOR IS CLOSED
5. HINGES - McKENNEY 5-1/2 x 4, 26 DRP, 6 GA.
6. FLUSH BOLTS TO BE "IVES"
7. ALL DOORS HAVE BACKERS FOR HARDWARE AND CLOSERS (REGARDLESS)
8. IC CORES, MODERN PROVIDE CONSTRUCTION CORES
9. 1/4" SHIM PLATES BEHIND ALL STRIKES
10. EXTERIOR CORES "PRIMUS CORE"
11. RHODES STYLE LEVERS
12. BACKING AT ALL WALL STOPS
13. ALL EXIT DEVICES VON DUPRIN
14. INTERIOR HARDWARE FINISH 626 (26D)
15. ALL INTERIOR DOORS 1-3/4" AWI PREMIUM, SOLID CORE.

REGISTERED PROFESSIONAL ENGINEER 77584 MICHAEL C LEWIS MAY 22, 2015

EXPIRES: 12/31/2020

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SHEET SCHEDULES

PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V

ADDRESS 1155 CREST DR. EUGENE, OR. 97405

DRW VF

JOB# 2019-AR-40

SHEET # A 3.2

DATE 5/1/19

DOOR ROUGH OPENING SCHEDULE

EXTERIOR DOORS	
A	METAL DOORS W/ HOLLOW METAL FRAME (WELDED) R.O. WIDTH CALL SIZE + 4-1/2" R.O. HEIGHT CALL SIZE + 2-1/8"
B	DBL. METAL DOORS W/ HOLLOW METAL FRAME (WELDED) R.O. WIDTH CALL SIZE + 4-1/2" R.O. HEIGHT CALL SIZE + 2-1/8"
C	STOREFRONT DOOR R.O. WIDTH CALL SIZE + 4-1/2" R.O. HEIGHT CALL SIZE + 2-1/8"
D	TIMELY SPLIT MEDIA DOOR R.O. WIDTH CALL SIZE + 1-1/4" R.O. HEIGHT CALL SIZE + 1"
E1	METAL DOOR W/ WOOD FRAME (PEASE AND STANLEY) (INSWING) R.O. WIDTH CALL SIZE + 2" R.O. HEIGHT CALL SIZE + 2"
E2	METAL DOOR W/ WOOD FRAME (PEASE AND STANLEY) (OUTSWING) R.O. WIDTH CALL SIZE + 2" R.O. HEIGHT CALL SIZE + 1-9/16"
F	METAL DOOR W/ METAL FRAME (FAST-FRAME) R.O. WIDTH CALL SIZE + 1-1/4" R.O. HEIGHT CALL SIZE + 1"
G	METAL DOOR W/ HOLLOW METAL FRAME (KNOCK-DOWN) R.O. WIDTH CALL SIZE + 2" R.O. HEIGHT CALL SIZE + 1"
INTERIOR DOORS	
1	HOLLOW / SOLID WOOD DOOR W/ WOOD FRAME R.O. WIDTH CALL SIZE + 2" R.O. HEIGHT CALL SIZE + 2-1/8"
2	TIMELY FRAME R.O. WIDTH CALL SIZE + 1-1/4" R.O. HEIGHT CALL SIZE + 1"
3	POCKET DOOR R.O. WIDTH 2x CALL SIZE + 2" R.O. HEIGHT CALL SIZE + 4"
4	BI-PASS DOOR R.O. WIDTH CALL SIZE R.O. HEIGHT CALL SIZE + 2-1/8"
5	BI-FOLD DOOR R.O. WIDTH CALL SIZE R.O. HEIGHT CALL SIZE + 5/8"

NOTE: ALL TRIMMER HEIGHTS = R.O. CALL SIZE MINUS 1-1/2"

AREA SCHEDULE (Gross Building)

AREA TYPE	NO. MODS	AREA
Gross Building Area	2	1771 SF

ROOF SCHEDULE

DESCRIPTION	AREA
ROOFING	1985 SF

WALL SCHEDULE

DESCRIPTION	LENGTH
EXTERIOR 2x6	181' - 7"
EXTERIOR 2x SKIRTWALL	183' - 1"
INTERIOR 2x3	7' - 0"
INTERIOR 2x4	52' - 2"
INTERIOR 2x6	7' - 7"

OCCUPANT LOAD SCHEDULE

FUNCTION OF SPACE	Area	LOAD FACTOR	OCCUPANT LOAD
CLASSROOM A	754 SF	20	38
CLASSROOM B	754 SF	20	38
Total			76

REGISTERED PROFESSIONAL ENGINEER 77584 REGON MAY 22, 2015 MICHAEL C. LEWIS

EXPIRES: 12/31/2020

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SHEET DATA SCHEDULES

JOB# 2019-AR-40

PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V

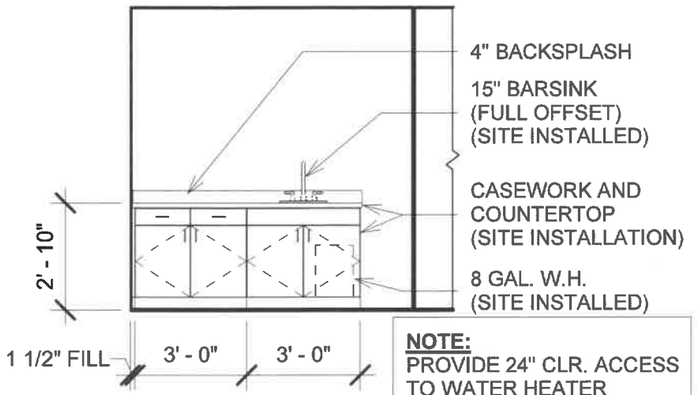
SHEET # A 3.3

ADDRESS 1155 CREST DR. EUGENE, OR. 97405

DRW VF

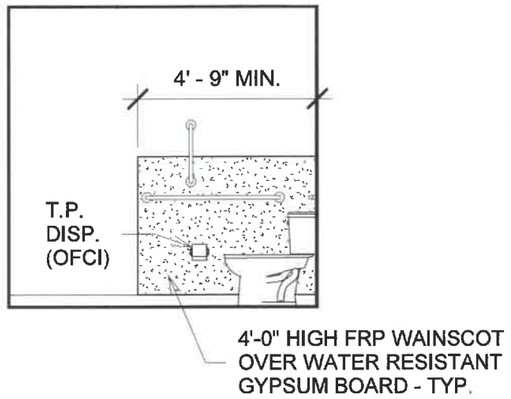
DATE 5/1/19

NOTE:
DO NOT PRECUT SINK OPENING IN COUNTERTOP

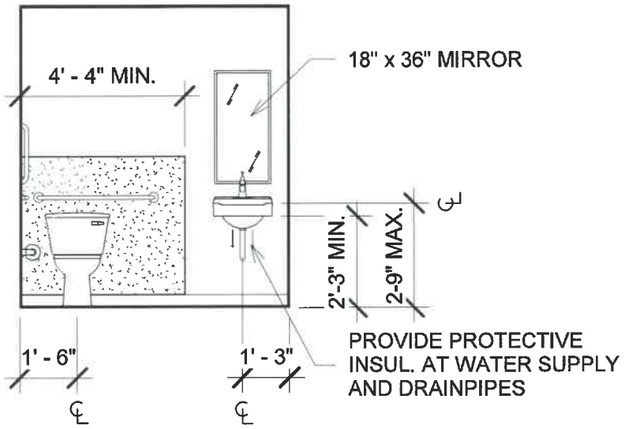


NOTE:
PROVIDE 24" CLR. ACCESS TO WATER HEATER

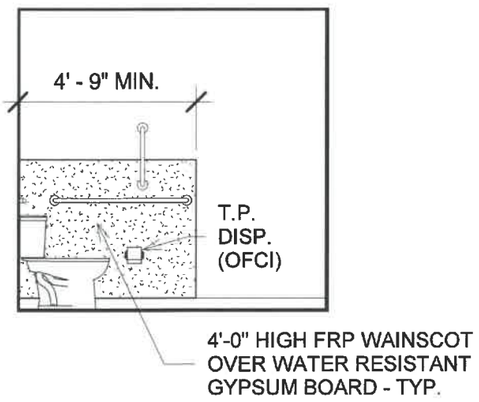
1 TYP. CLASSROOM
1/4" = 1'-0"



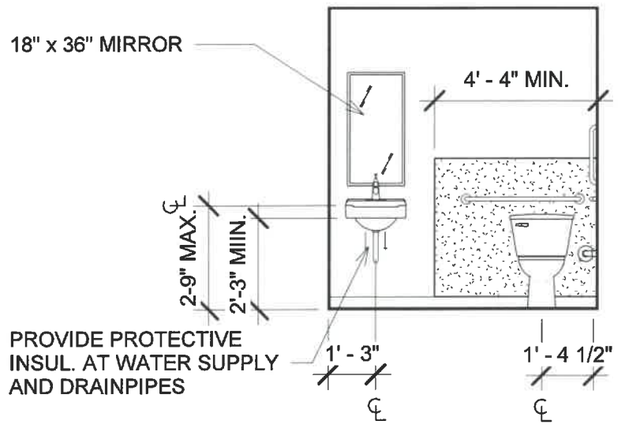
2 RESTROOM A - SIDE WALL
1/4" = 1'-0"



3 RESTROOM A - BACK WALL
1/4" = 1'-0"



4 RESTROOM B - SIDE WALL
1/4" = 1'-0"



5 RESTROOM B - BACK WALL
1/4" = 1'-0"

INTERIOR ELEVATION NOTES

1. DIMENSIONS TO FLOOR, WALLS AND CEILING ARE TO FACE OF FINISH (U.N.O.)
2. PROVIDE WOOD BLOCKING FOR ALL ACCESSORIES MOUNTED IN GYPSUM BOARD PARTITIONS. MAINTAIN INTEGRITY OF FIRE RATING WHERE ACCESSORIES ARE IN RATED WALLS.
3. SEE DETAILS ON SHEET A5.0 FOR ADA RESTROOM ACCESSORIES AND MOUNTING HEIGHTS.
4. PLUMBING FIXTURES SHIPPED LOOSE FOR SITE INSTALLATION.

REGISTERED PROFESSIONAL ENGINEER
77584
OREGON
MAY 22, 2015
MICHAEL C. LEWIS
EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

MODERN BUILDING SYSTEMS
MODERN BUILDING SYSTEMS, INC.
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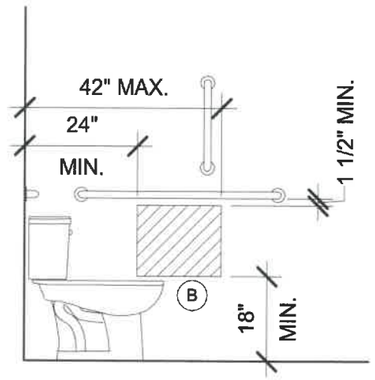
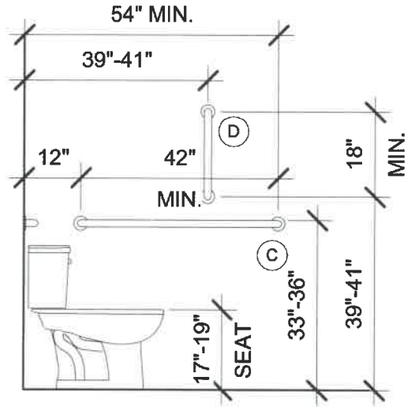
SHEET INTERIOR ELEVATIONS
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V
ADDRESS 1155 CREST DR. EUGENE, OR. 97405
DRW VF

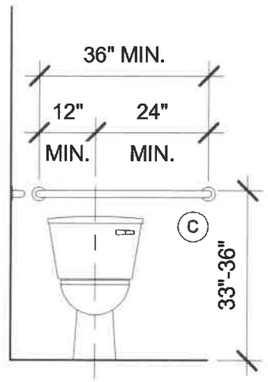
JOB# 2019-AR-40
SHEET # A 4.0
DATE 5/1/19



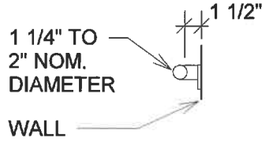
TOILET PAPER HOLDER



SIDE & VERTICAL GRAB BAR



BACK GRAB BAR

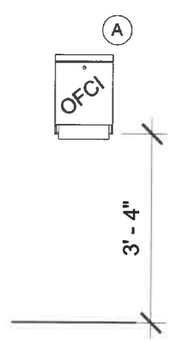


GRAB BAR SECTION

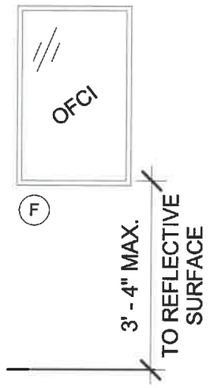
NOTE:
1. DIMENSIONS TO FLOOR AND WALLS ARE TO FACE OF FINISH (U.N.O.)
2. NOT ALL ACCESSORIES MAY BE PRESENT IN THIS PARTICULAR BUILDING.

SCHEDULE OF ACCESSORIES

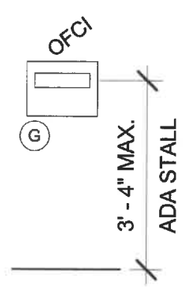
I.D.	ITEMS
A	PAPER TOWEL DISPENSER (O.F.C.I)
B	TOILET TISSUE DISPENSER (O.F.C.I)
C	HORIZONTAL GRAB BAR
D	VERTICAL GRAB BAR
E	SOAP DISPENSER (O.F.C.I)
F	MIRROR
G	TOILET SEAT COVER DISPENSER (O.F.C.I)
H	HOOK (O.F.C.I)



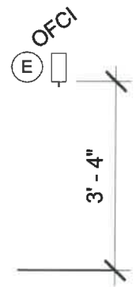
PAPER TOWEL DISPENSER SURFACE-MOUNTED



MIRROR SURFACE-MOUNTED



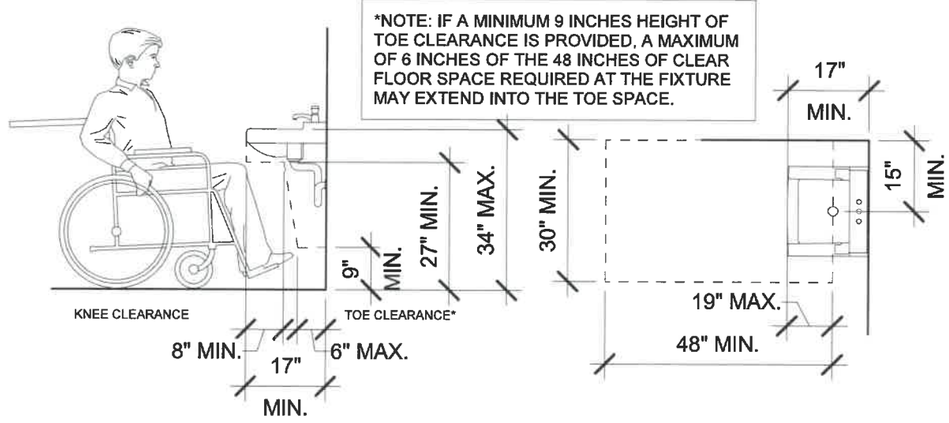
TOILET SEAT COVER DISPENSER



SURFACE MOUNTED SOAP DISPENSER

RESTROOM DOOR HOOK

*NOTE: IF A MINIMUM 9 INCHES HEIGHT OF TOE CLEARANCE IS PROVIDED, A MAXIMUM OF 6 INCHES OF THE 48 INCHES OF CLEAR FLOOR SPACE REQUIRED AT THE FIXTURE MAY EXTEND INTO THE TOE SPACE.



LAVATORY KNEE CLEARANCE

1 ADA MOUNTING HEIGHTS
3/8" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER 77584 MICHAEL C. LEWIS MAY 22, 2015

EXPIRES: 12/31/2020

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SHEET DETAILS

JOB# 2019-AR-40

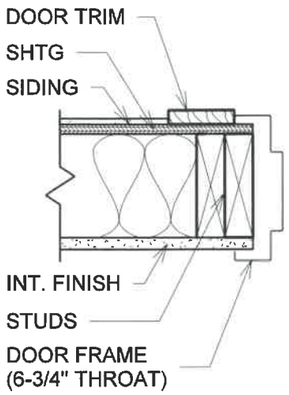
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V

SHEET # A 5.0

ADDRESS 1155 CREST DR. EUGENE, OR. 97405

DRW VF

DATE 5/1/19



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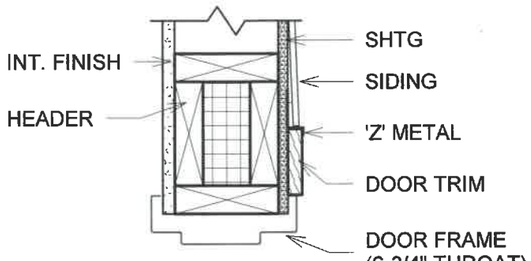

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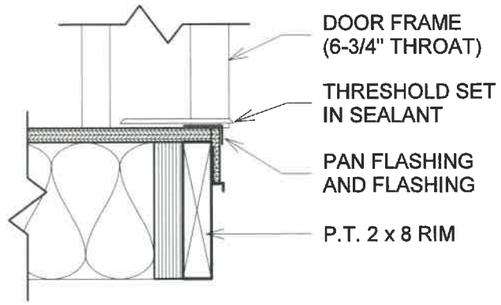
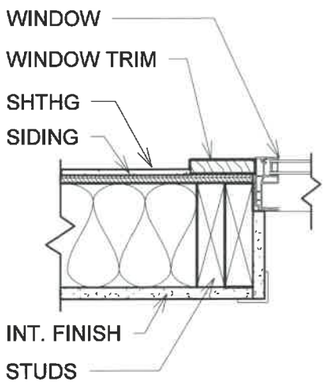


THRESHOLD

1 EXTERIOR DOOR DETAILS
1 1/2" = 1'-0"



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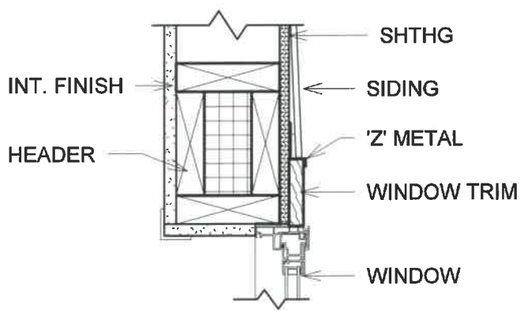

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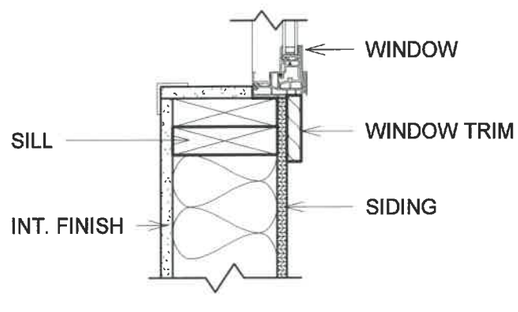
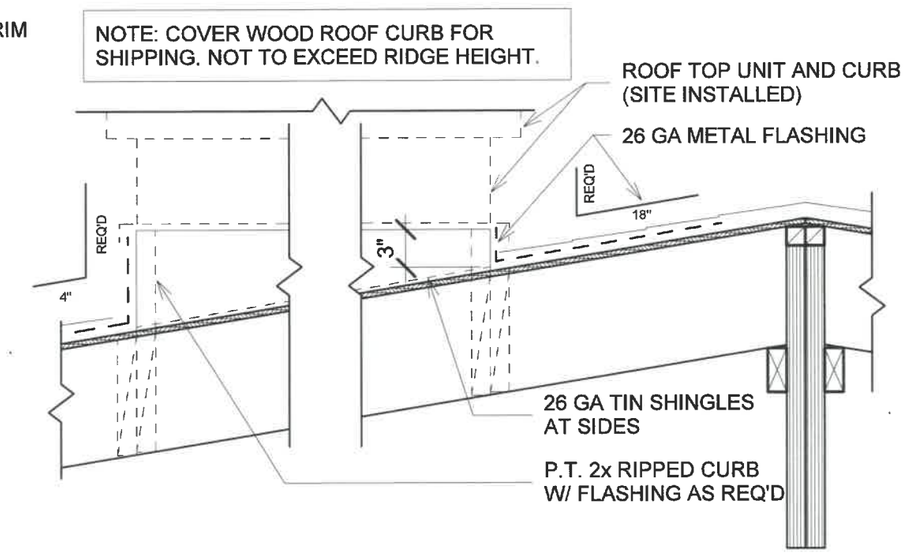


SILL

2 WINDOW DETAILS
1 1/2" = 1'-0"

NOTE: COVER WOOD ROOF CURB FOR SHIPPING. NOT TO EXCEED RIDGE HEIGHT.



3 ROOF WOOD CURB FLASHING
1" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
77584
OREGON
MAY 22, 2015
MICHAEL C. LEWIS
EXPIRES: 12/31/2020

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SHEET DETAILS

JOB# 2019-AR-40

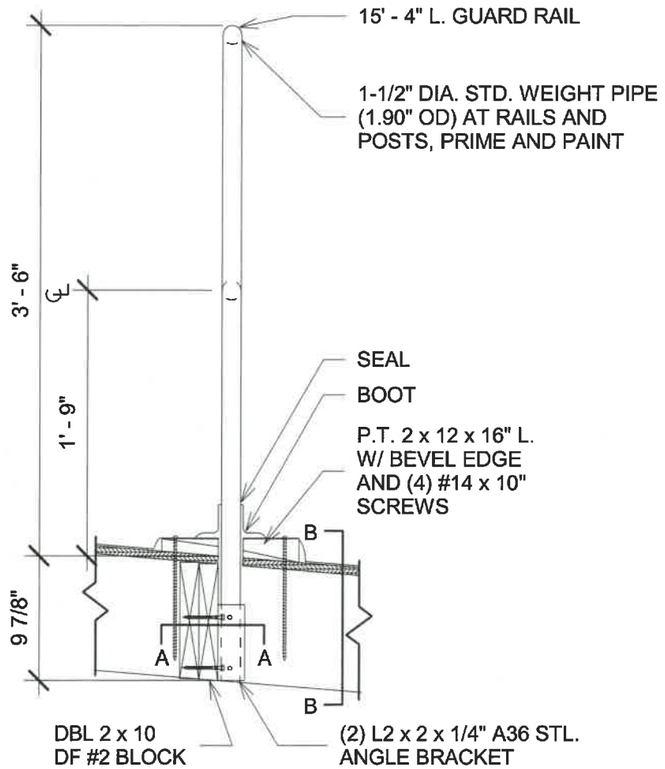
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V

SHEET # A 5.1

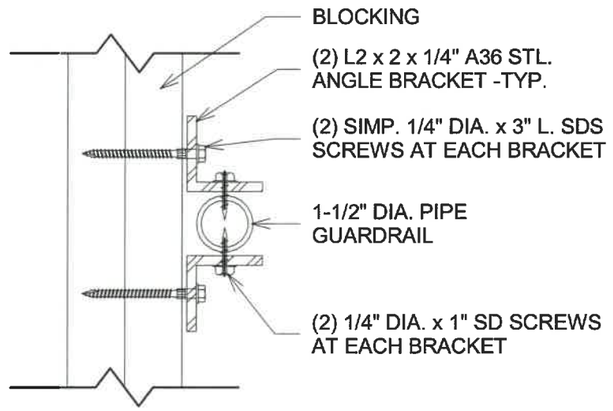
ADDRESS 1155 CREST DR. EUGENE, OR. 97405

DRW VF

DATE 5/1/19

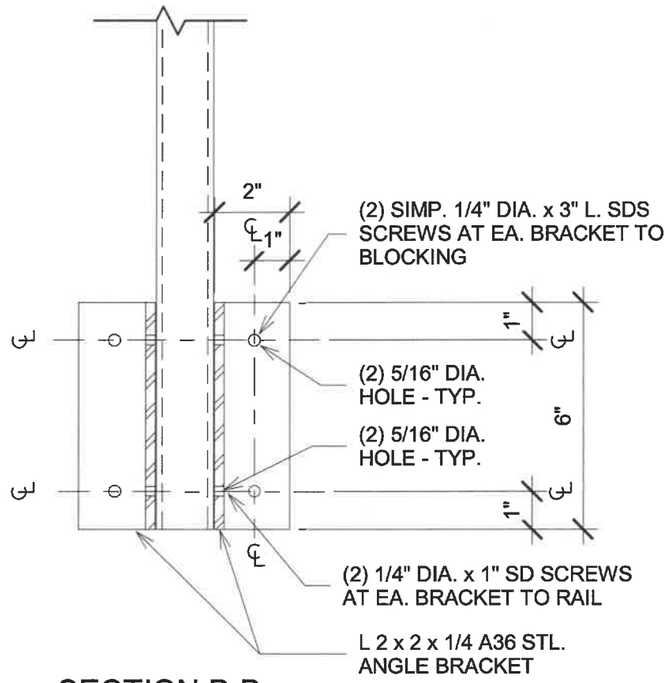


1 ROOF GUARDRAIL
1" = 1'-0"



SECTION A-A

SCALE: 3" = 1'-0"



SECTION B-B

SCALE: 1" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
77584
OREGON
MAY 22, 2015
MICHAEL C. LEWIS

EXPIRES: 12/31/2020

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P.O. BOX 110, 9493 PORTER ROAD, AUMSVILLE, OR 97325
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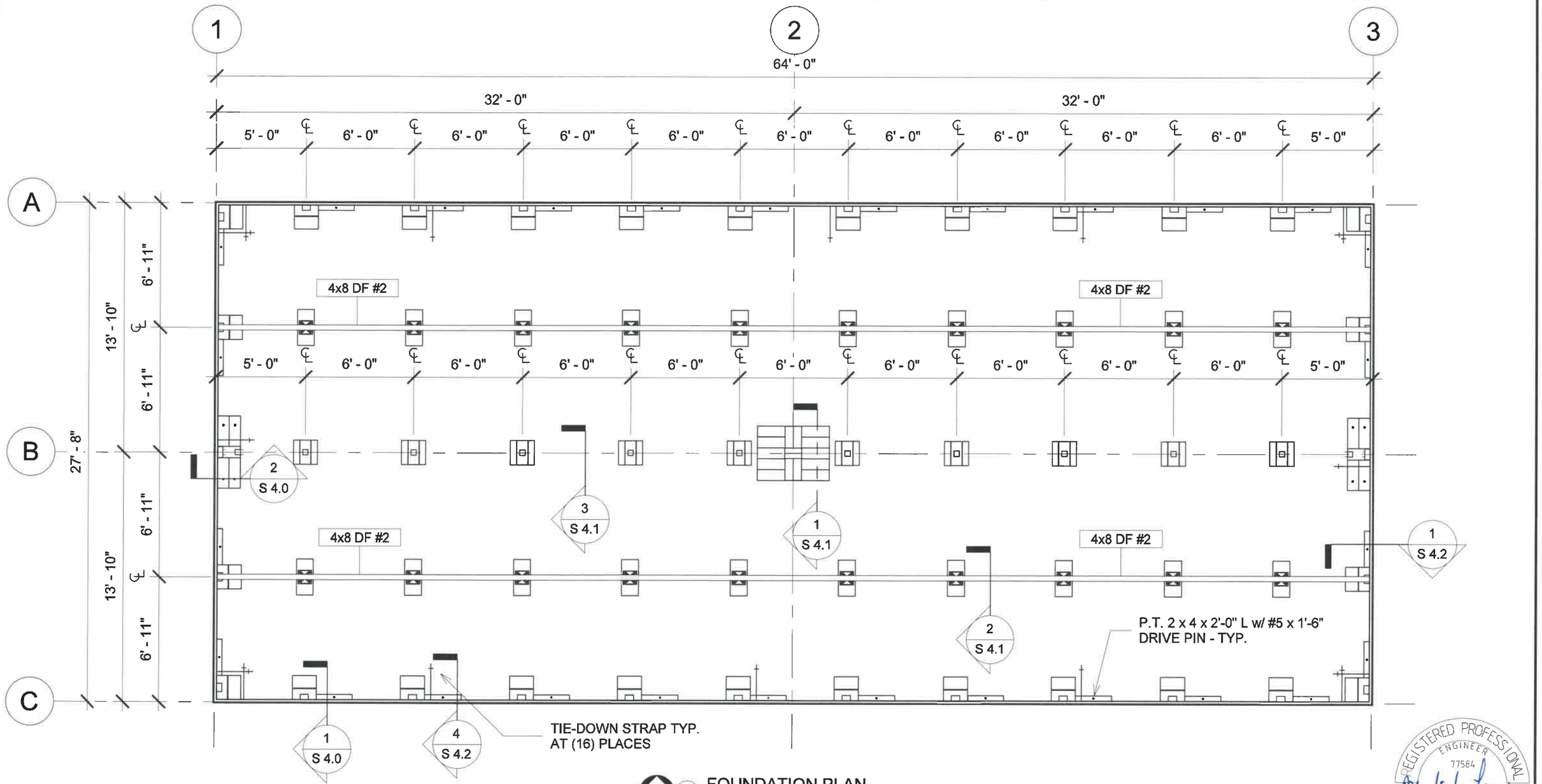
SHEET DETAILS
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V
ADDRESS 1155 CREST DR. EUGENE, OR. 97405
DRW VF

JOB# 2019-AR-40
SHEET # A 5.2
DATE 5/1/19



1 FOUNDATION PLAN
3/16" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
77584
OREGON
MAY 22, 2015
MICHAEL C. LEWIS

EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

MODERN BUILDING SYSTEMS

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SHEET FOUNDATION PLAN

JOB# 2019-AR-40

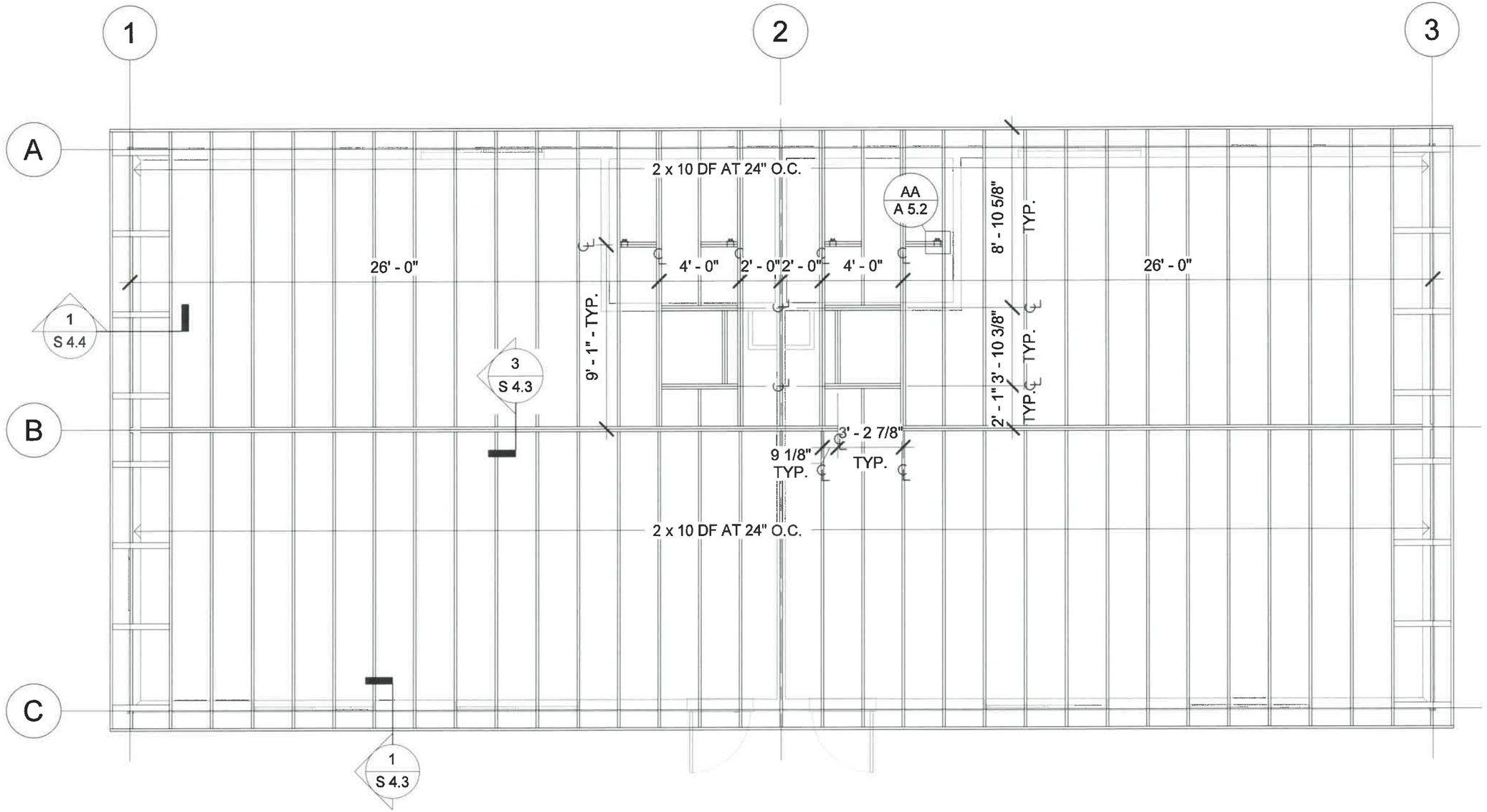
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V

SHEET # S 1.0

ADDRESS 1155 CREST DR. EUGENE, OR. 97405

DRW VF

DATE 5/1/19



1 ROOF FRAMING PLAN
3/16" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
77584
OREGON
MAY 22, 2015
MICHAEL C. LEWIS
EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

MODERN BUILDING SYSTEMS
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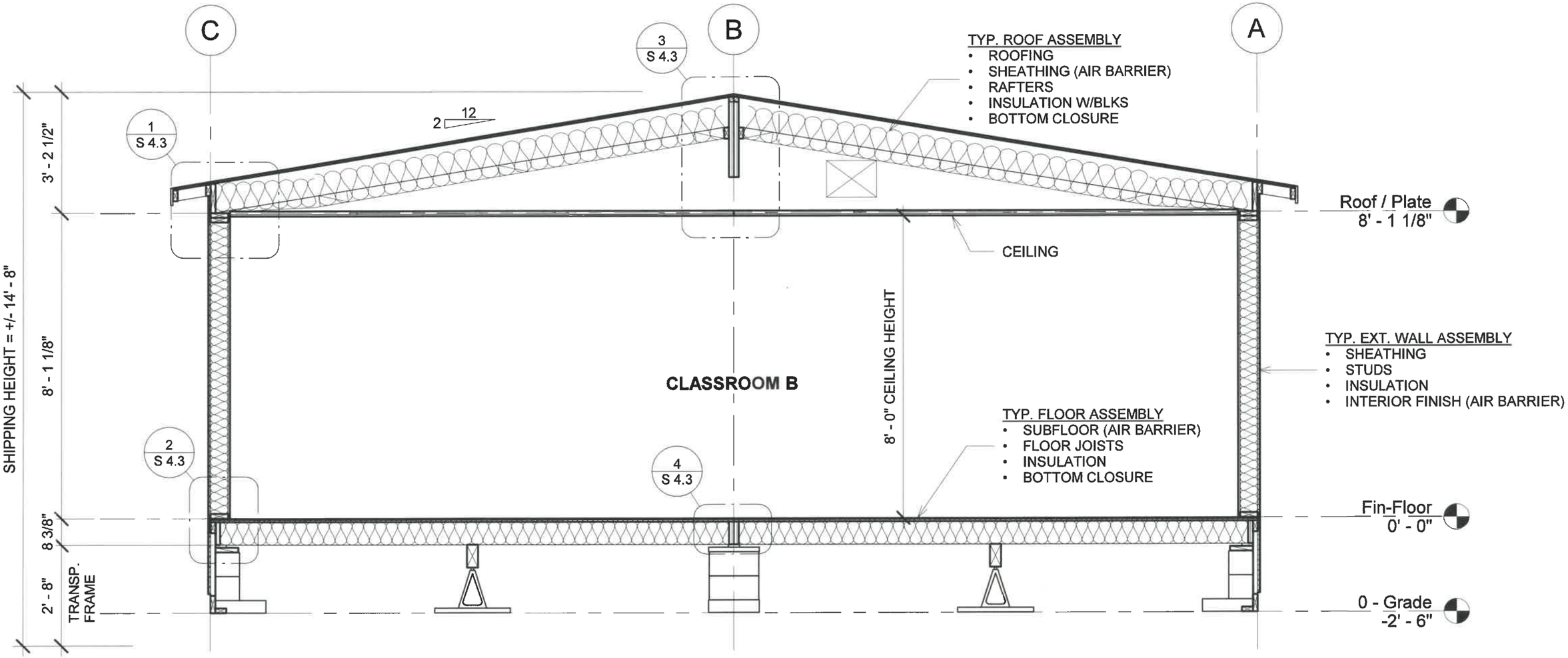
SHEET ROOF FRAMING PLAN
JOB# 2019-AR-40
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V
SHEET # S 2.0
ADDRESS 1155 CREST DR. EUGENE, OR. 97405
DRW VF
DATE 5/1/19



1 BUILDING SECTION
3/8" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
7584
REG.
MAY 22, 2015
MICHAEL C. LEWIS
EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

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SHEET BUILDING SECTIONS
JOB# 2019-AR-40
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V
SHEET # S 3.0
ADDRESS 1155 CREST DR. EUGENE, OR. 97405
DRW VF
DATE 5/1/19

FOUNDATION NOTES

1. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS. THIS STRUCTURE SHALL BE ADEQUATELY BRACED FOR WIND OR EARTHQUAKE FORCES AND TEMPORARY FORCES DURING SETTING AND ERECTION UNTIL ALL UNITS HAVE BEEN PERMANENTLY ATTACHED THERETO. REMOVE ORGANIC / SOD UNDER ALL BEARING PADS.

2. DESIGN LOADS:

ROOF DEAD LOAD	12 PSF
ROOF SNOW LOAD	25 PSF
FLOOR DEAD LOAD	10 PSF
FLOOR LIVE LOAD	50 PSF
WIND LOAD	Lambda = 1.0 Vult = 140 MPH (Vasd = 108 MPH) 3 SECOND GUST - EXP. B
SEISMIC	BEARING WALL SYSTEM: S_S = 1.500, F_a = 1.000 S_{DS} = 1.000, RISK CATEGORY II I_e = 1.0, SEISMIC DESIGN CATEGORY D, SITE CLASS D
ALLOWABLE BEARING CAPACITY	2000 PSF AT ASPHALT

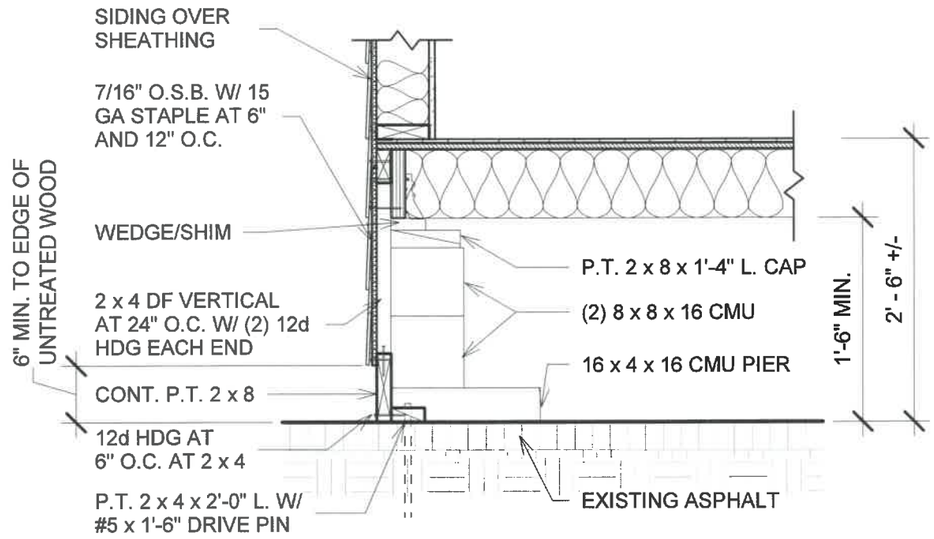
3. EXCEPT AS NOTED, DIMENSION LUMBER FOR FOUNDATION SHALL BE HEM-FIR, NO. 2 AND BETTER. TREATED LUMBER SHALL BE ACQ PRESSURE TREATED IN ACCORDANCE WITH AWPA STANDARD U1, USE CATEGORY UC4A, TO A MINIMUM RETENTION OF 0.40 PCF. AT PIECES IN CONTACT WITH GROUND, SAWN END GRAIN SHALL BE FIELD TREATED WITH 2% MIN. CONCENTRATION COPPER NAPHTHENATE. TREATED PLATE STOCK SHALL BE GOOD QUALITY AND SHALL NOT CONTAIN EXCESSIVE SPLITS, CHECKS OR WANE. 2 x 4 FRAMING SHALL BE HEM-FIR, STANDARD OR BETTER, TREATED 2 x 4 FRAMING SHALL MEET THE REQUIREMENTS SPECIFIED ABOVE.

4. ALL FASTENERS TO BE HOT DIPPED GALVANIZED (HDG) OR EQUAL AT P.T. MEMBERS.

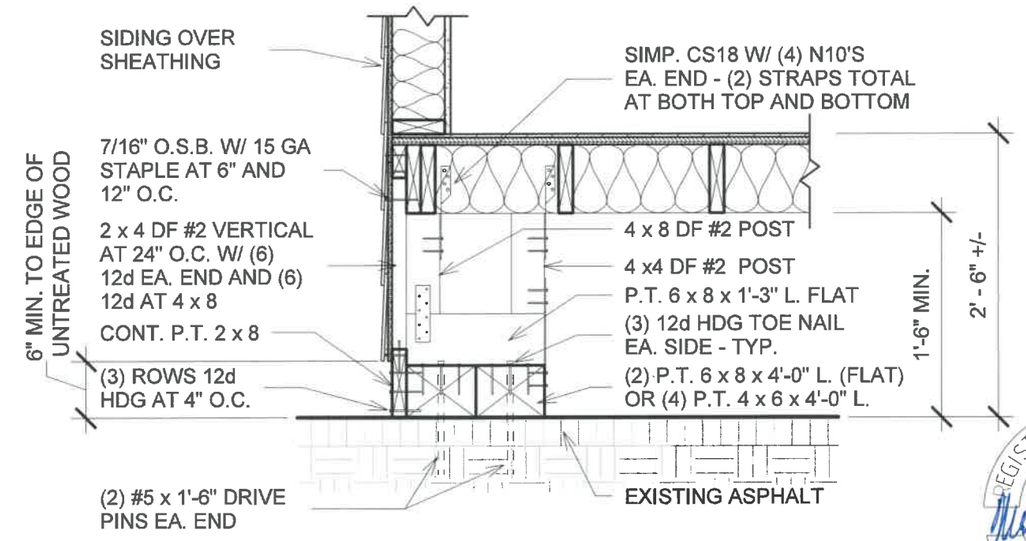
5. VENT CRAWL SPACE w/ (6) 15" SQ. METAL VENTS (MODERN STANDARD). INSTALL 6 MIL. VAPOR BARRIER ON GROUND IN ENTIRE CRAWL SPACE. LAP VAPOR BARRIER JOINTS MIN 12". (VAPOR BARRIER NOT REQUIRED AT ASPHALT OR CONCRETE IF OCCURS)

6. CONNECT STORM WATER FROM ROOF GUTTERS AND DOWNSPOUTS AND DIRECT AWAY FROM BUILDING PAD TO AN APPROVED DRAINAGE SYSTEM.

7. FOUNDATION PLANS AND DETAILS ARE NOT REVIEWED BY BCD OR L&I, EXCEPT FOR THE SUITABILITY OF THE DESIGN TO SUPPORT THE MODULAR BUILDING. APPROVAL AND INSPECTION OF THE FOUNDATION SYSTEM IS THE JURISDICTION OF THE LOCAL BUILDING OFFICIAL.



1 SIDEWALL FOOTING
3/4" = 1'-0"



2 ENDWALL COLUMN FOOTING
3/4" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
77584
RENEWS MAY 22, 2015
MICHAEL C. LEWIS
EXPIRES: 12/31/2020

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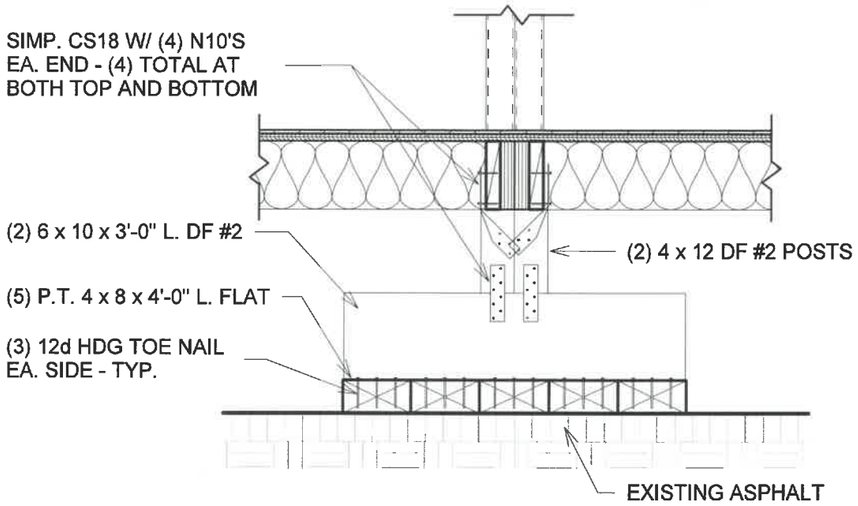
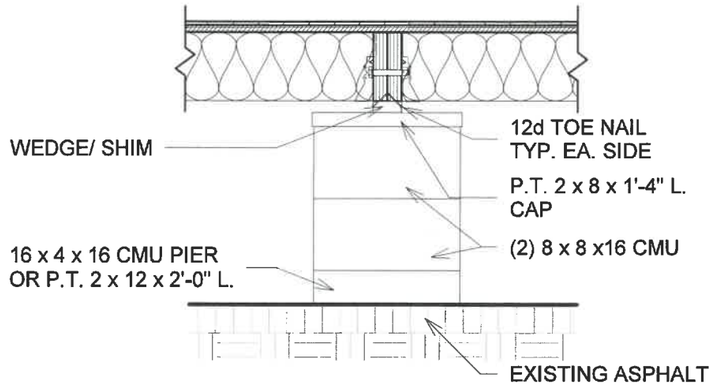
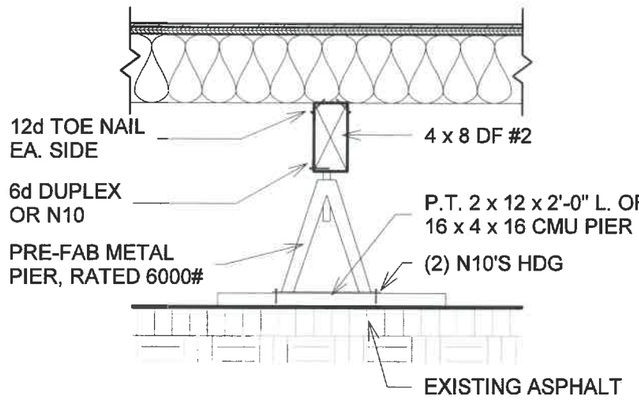
SHEET FOUNDATION NOTES & DETAILS
JOB# 2019-AR-40
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V
SHEET # S 4.0
ADDRESS 1155 CREST DR. EUGENE, OR. 97405
DRW VF
DATE 5/1/19



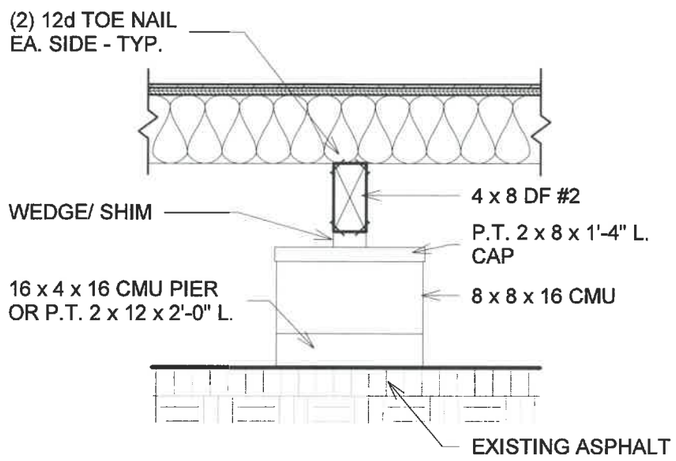
1 COLUMN FOOTING
3/4" = 1'-0"



3 MARRIAGE LINE FOOTING
3/4" = 1'-0"



2 MID-SPAN FOOTING
3/4" = 1'-0"



4 MID-SPAN FOOTING - ALTERNATE
3/4" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
77584
OREGON
MAY 22, 2015
MICHAEL C LEWIS

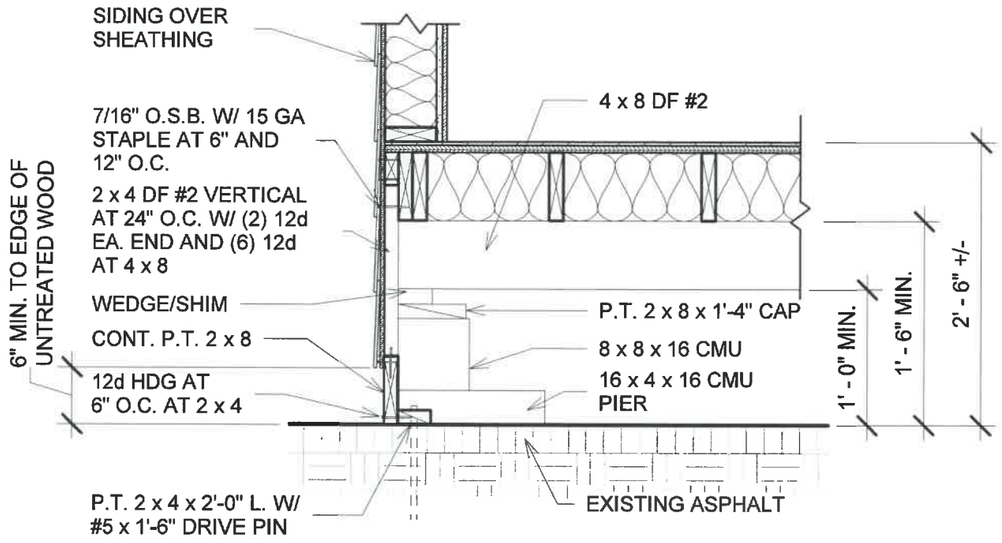
EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

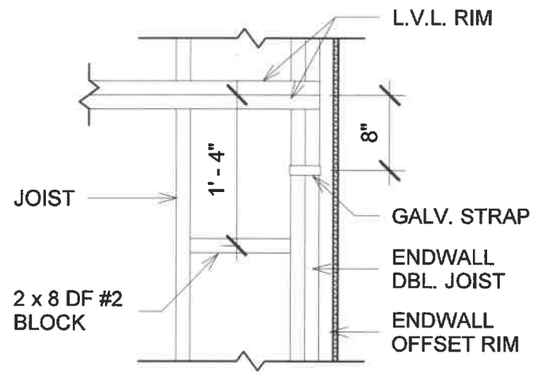
MODERN BUILDING SYSTEMS
MODERN BUILDING SYSTEMS, INC.
TELEPHONE: (503) 749-4949 FAX: (503) 749-4950
P.O. BOX 110, 9493 PORTER ROAD, AUMSVILLE, OR 97325
CHECK OUT OUR WEB PAGE: www.modernbuildingsystems.com

SHEET FOUNDATION DETAILS
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V
ADDRESS 1155 CREST DR. EUGENE, OR. 97405
DRW VF

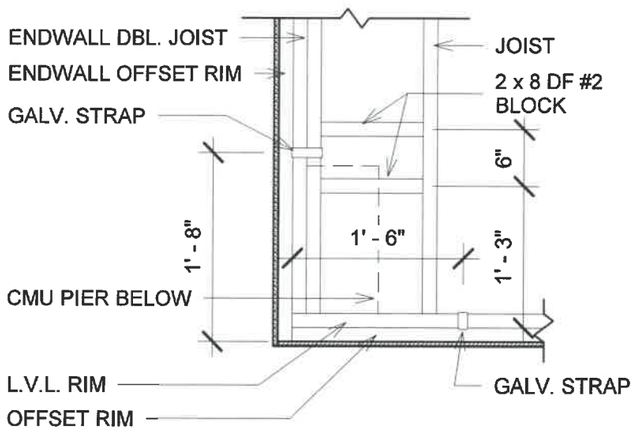
JOB# 2019-AR-40
SHEET # S 4.1
DATE 5/1/19



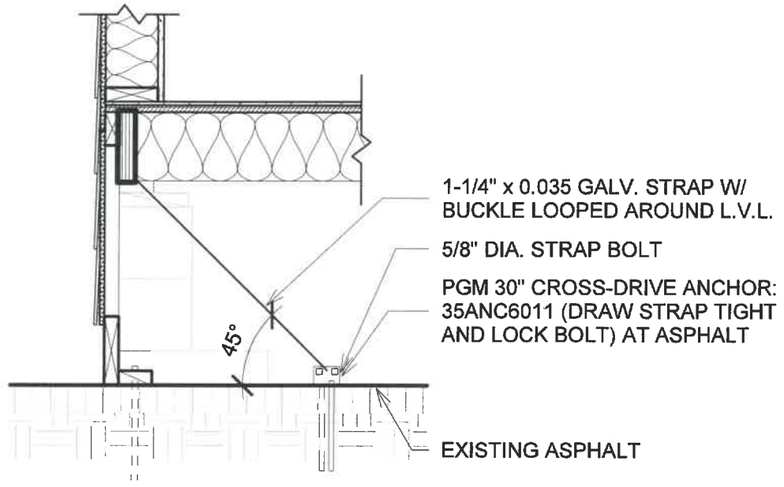
1 ENDWALL FOOTING AT BEAM
3/4" = 1'-0"



3 TIE-DOWN AT MARRIAGE
3/4" = 1'-0"



2 TIE-DOWN AT CORNER
3/4" = 1'-0"



4 TIE-DOWN STRAP
3/4" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER 77584 RENEWS MAY 22, 2015 MICHAEL C. LEWIS

EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

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SHEET FOUNDATION DETAILS

PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V

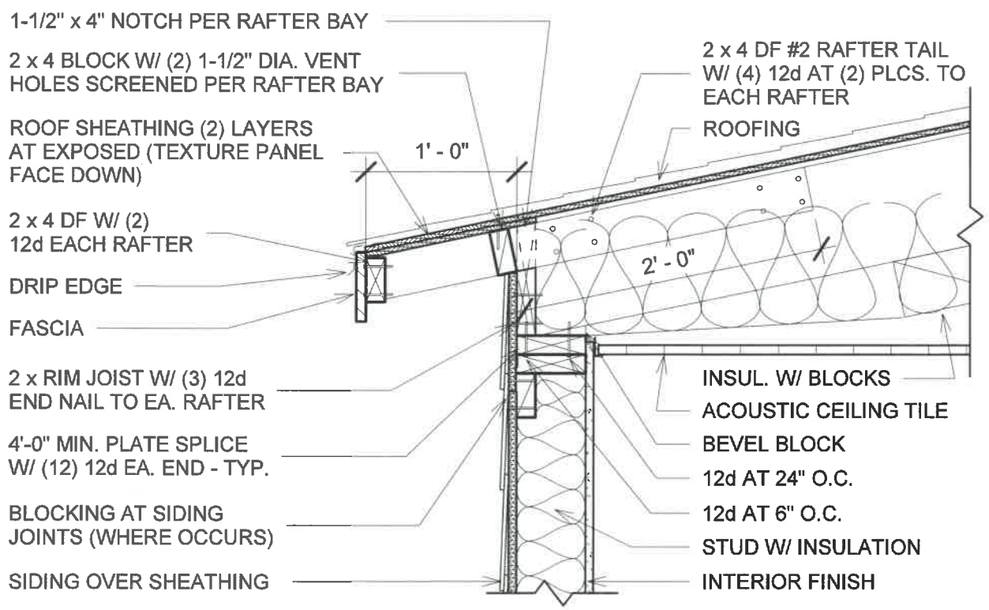
ADDRESS 1155 CREST DR. EUGENE, OR. 97405

DRW VF

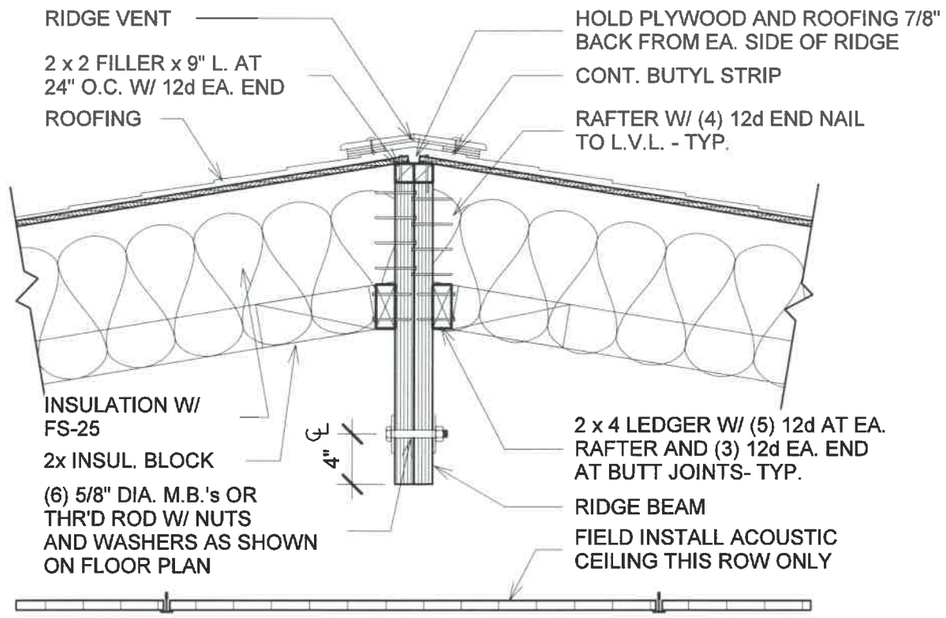
JOB# 2019-AR-40

SHEET # S 4.2

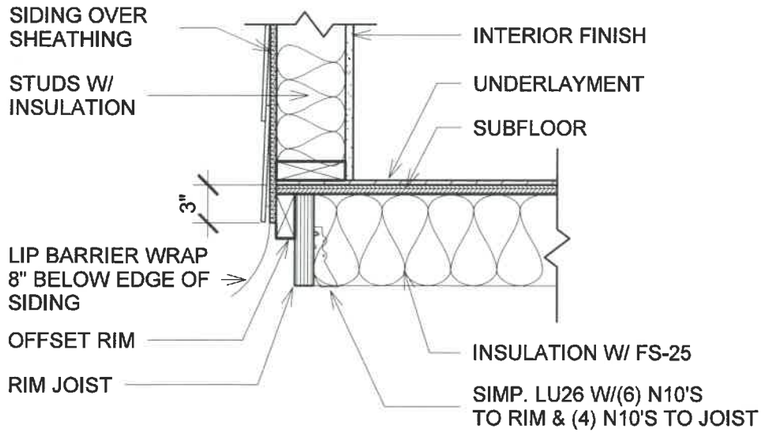
DATE 5/1/19



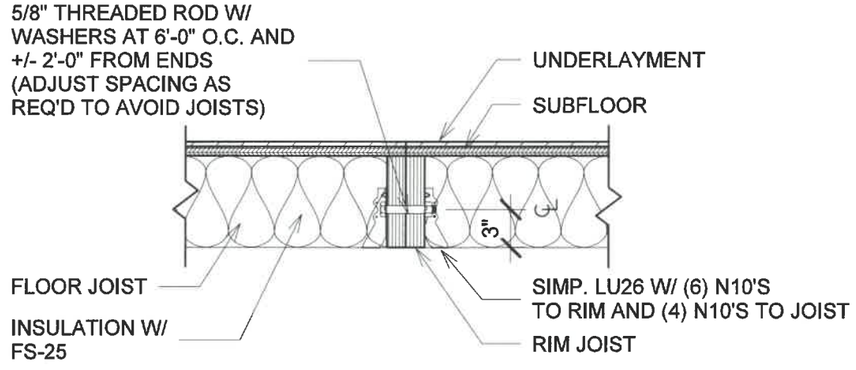
1 SIDEWALL EAVE
1" = 1'-0"



3 ROOF MARRIAGE
1" = 1'-0"



2 SIDEWALL FLOOR
1" = 1'-0"



4 FLOOR MARRIAGE
1" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER 77684 OREGON MAY 22, 2015 MICHAEL C. LEWIS
EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

MODERN BUILDING SYSTEMS
MODERN BUILDING SYSTEMS, INC.
TELEPHONE: (503) 749-4949 FAX: (503) 749-4950
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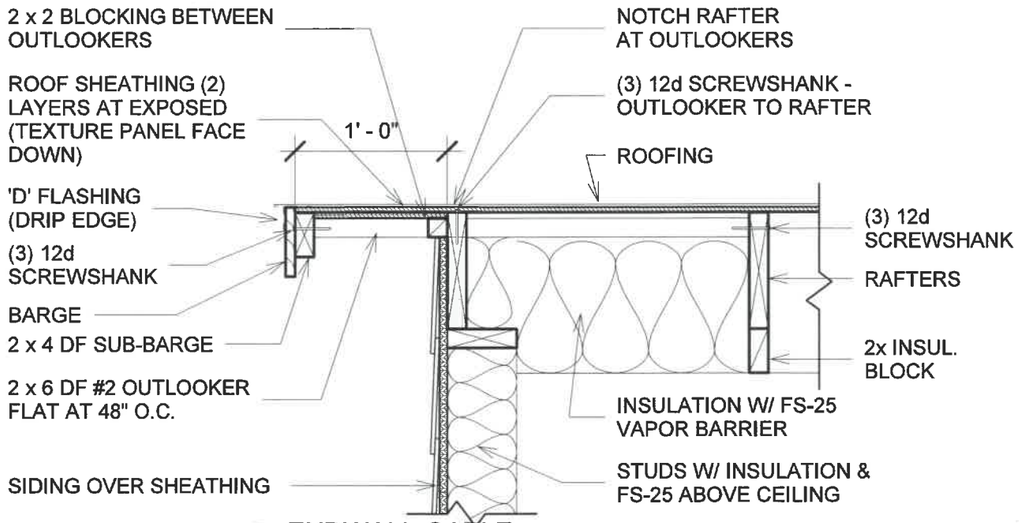
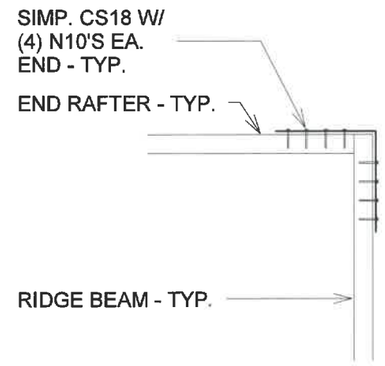
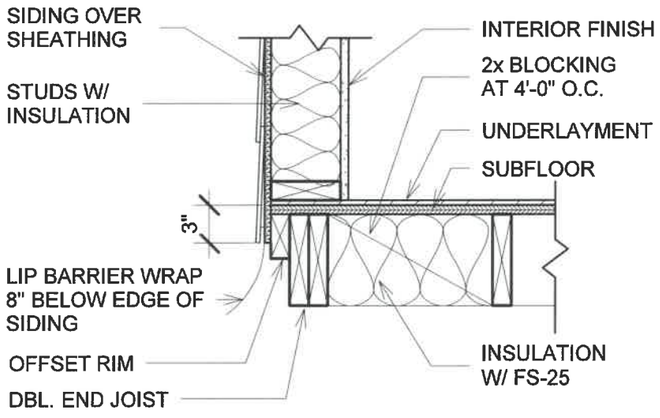
SHEET DETAILS
JOB# 2019-AR-40
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V
SHEET # S 4.3
ADDRESS 1155 CREST DR. EUGENE, OR. 97405
DRW VF
DATE 5/1/19



1 ENDWALL GABLE
1" = 1'-0"



3 PLAN VIEW AT CHORD TIE
1" = 1'-0"



2 ENDWALL FLOOR
1" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
77584
ORE
MAY 22, 2015
MICHAEL C. LEWIS
EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

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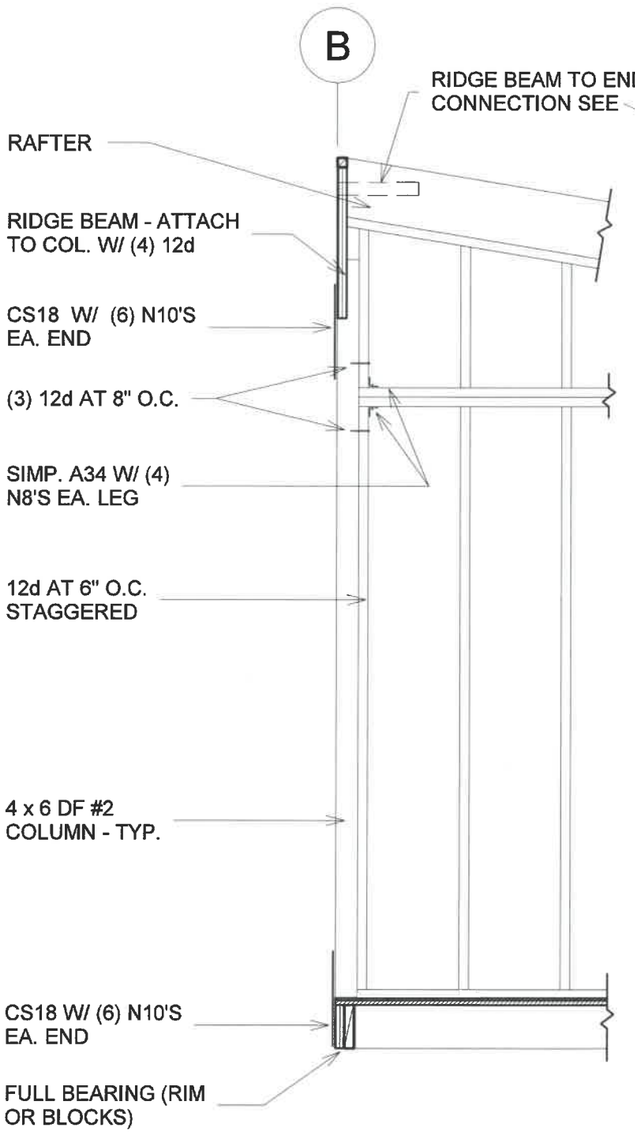
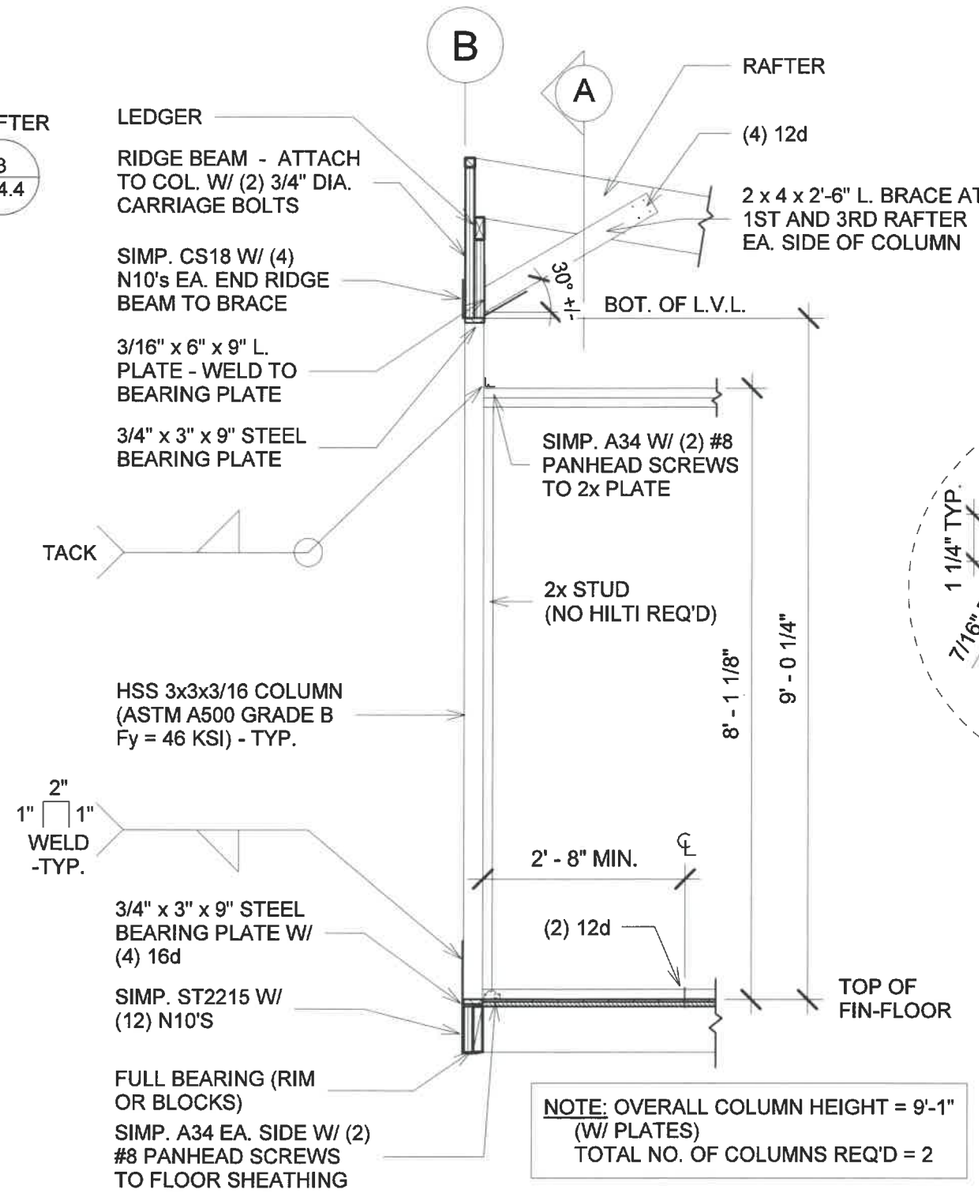
SHEET DETAILS
JOB# 2019-AR-40
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V
SHEET # S 4.4
ADDRESS 1155 CREST DR. EUGENE, OR. 97405
DRW VF
DATE 5/1/19

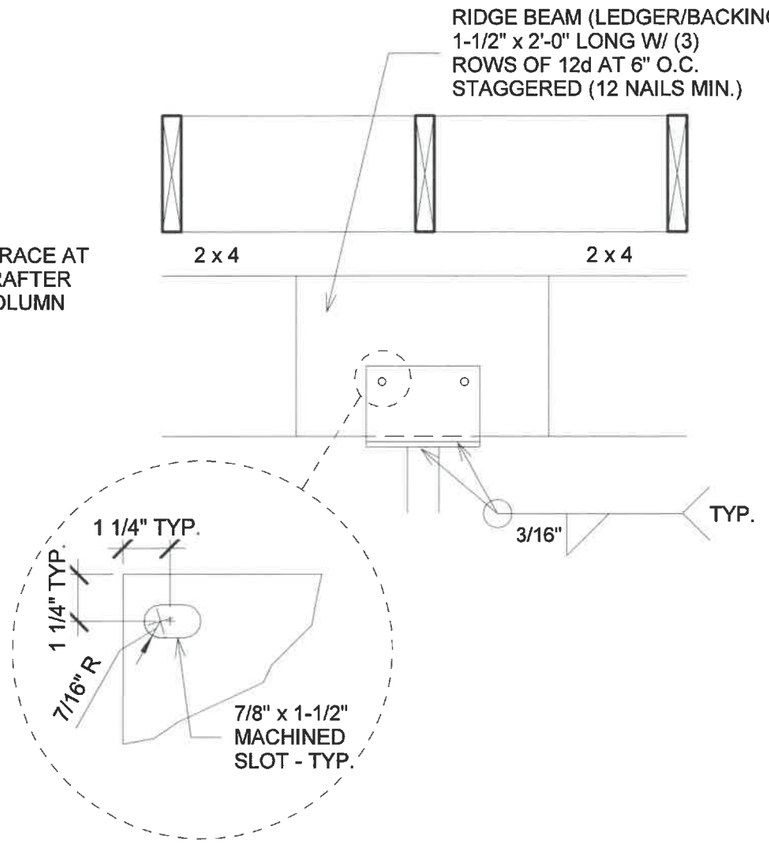


1 END WALL COLUMN
1/2" = 1'-0"

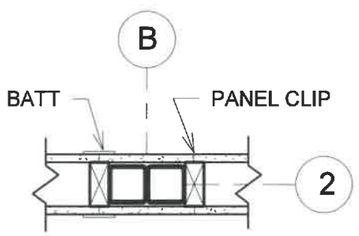


NOTE: OVERALL COLUMN HEIGHT = 9'-1" (W/ PLATES)
TOTAL NO. OF COLUMNS REQ'D = 2

2 CENTER COLUMN
1/2" = 1'-0"



SECTION A
SCALE: 1" = 1'-0"



PLAN VIEW
SCALE: 1" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
77584
OREGON
MAY 22, 2015
MICHAEL C. LEWIS
EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

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SHEET DETAILS
JOB# 2019-AR-40
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V
SHEET # S 4.5
ADDRESS 1155 CREST DR. EUGENE, OR. 97405
DRW VF
DATE 5/1/19

ELECTRICAL SYMBOLS LEGEND

SYMBOL	DESCRIPTION	HEIGHT ℄ (U.N.O)
OS	OCCUPANCY SENSOR	CEILING
	DUPLEX RECEPTACLE +17" A.F.F. (U.N.O.) GFCI = GROUND FAULT CIRCUIT INTERRUPTER WP = IN USE WEATHERPROOF COVER WR = WATER RESISTANT RECEPTACLE	+17"
T	THERMOSTAT	+48" TOP
▽	PHONE/DATA BOX - 3/4" CONDUIT UP (RACEWAY ONLY)	+17"
	DISCONNECT	
F	AUDIO / VISUAL FIRE ALARM (RACEWAY ONLY)	+86"
M	MANUAL PULL STATION (RACEWAY ONLY)	+45"
V	VISUAL ALARM (RACEWAY ONLY)	+82"

LIGHTING SYMBOLS LEGEND

SYMBOL	DESCRIPTION	HEIGHT ℄ (U.N.O)
	2' x 4' LED LAY-IN FIXTURE (O.F.C.I) (TECHBRITE 2X4 3 LAMP LED T8 TROFFER - 5000K L4243SSUBXX00P0-5K)	CEILING
	13" LED SURFACE MOUNT FIXTURE	CEILING
	EXTERIOR LED WALL MOUNT LIGHT FIXTURE PC = PHOTOCELL WP = WEATHERPROOF E = EMERGENCY LIGHT W/ BATTERY BACKUP	+86"
OS	OCCUPANCY SENSOR	CEILING
$	SINGLE POLE SWITCH	+48" TOP
$OS	OCCUPANCY SWITCH SENSOR: - W/ MANUAL ON	+48" TOP
	EXIT LIGHT W/ EMERGENCY LIGHTS AND BATTERY BACK-UP (5 WATT MAX.)	+86"

ELECTRICAL NOTES

1. CONDUIT SHALL BE ELECTRICAL METALLIC TUBING AND METAL CLAD CABLE
2. EXTERIOR RECEPTACLES SHALL BE WEATHER RESISTANT TYPE W/ IN USE WEATHERPROOF COVER
3. FLUORESCENT LUMINAIRES WITH DOUBLE ENDED LAMPS THAT CAN BE SERVICED IN PLACE AND SHALL HAVE AN INTERNAL OR EXTERNAL DISCONNECT PER NEC 410.130G
4. BUILDING SERVICE SHALL BE SERVED BY ONLY ONE SERVICE OR FEEDER PER NEC 225.30 AND 230.2
5. SERVICE OR FEEDER DISCONNECT SHALL BE INSTALLED PER NEC 230.70. FOR BUILDINGS IN THE STATE OF WASHINGTON SERVICE OR FEEDER DISCONNECT SHALL BE INSTALLED PER WAC 296-46B-230
6. PERMANENT MEANS OF LOCKING OUT DISCONNECT TO MECHANICAL UNIT(S) SHALL BE PROVIDED PER NEC 424.19
7. PERMANENT MEANS OF LOCKING OUT DISCONNECT TO WATER HEATER(S) SHALL BE PROVIDED PER NEC 422.31(B)
8. GASKET ALL EXTERIOR WALL BOX PLATE COVERS
9. PER NEC 110.26D, ILLUMINATION FOR PANEL BOARDS, SWITCH-BOARDS, AND SERVICE EQUIPMENT SHALL NOT BE CONTROLLED BY AUTOMATIC MEANS ONLY. A MANUAL MEANS TO BYPASS THE AUTOMATIC CONTROL IS REQUIRED.
10. PER NEC 406.9(B)(1) 15 AND 20 AMP RECEPTACLES INSTALLED IN WET LOCATION SHALL HAVE AN ENCLOSURE THAT WEATHER-PROOF WHETHER OR NOT THE ATTACHMENT PLUG CAP IS INSERTED. AN OUTLET BOX HOOD INSTALLED FOR THIS PURPOSE SHALL BE LISTED AND SHALL BE IDENTIFIED AS EXTRA DUTY". RECEPTACLES SHALL BE LISTED AS WEATHER-RESISTANT TYPE.
11. PER NEC 110.26, WORKING SPACE FOR EQUIPMENT OPERATING AT 600 VOLTS, NOMINAL, OR LESS TO GROUND AND LIKELY TO REQUIRE EXAMINATION, ADJUSTMENT, SERVICING, OR MAINTENANCE WHILE ENERGIZED SHALL COMPLY WITH THE DIMENSIONS OF 110.26(A)(1), (A)(2), AND (A)(3)
12. PER NFPA 72, NEC 760 AND WAC 296-46B-760 DEVICE AND JUNCTION BOXES FOR FIRE ALARM SYSTEMS OTHER THAN SURFACE RACEWAY TYPE MUST BE SUBSTANTIALLY RED IN COLOR BOTH INSIDE AND OUTSIDE. POWER LIMITED FIRE PROTECTIVE SIGNALING CIRCUIT CONDUCTORS MUST BE DURABLY AND PLAINLY MARKED IN OR ON JUNCTION BOXES OR OTHER ENCLOSURES TO INDICATE THAT IT IS POWER LIMITED FIRE PROTECTIVE SIGNALING CIRCUIT.
13. PER NEC 110.22 AND WAC 296-46B-220-032 IDENTIFICATION PLATES ON DISCONNECTING MEANS ARE TO SHOW DESIGNATION OF CIRCUIT SOURCE PANEL BOARD THAT SUPPLIES DISCONNECT AND IDENTIFY WHAT IT IS DISCONNECTING. MUST BE AN IDENTIFICATION PLATE
14. PER NEC 406.3E, ALL NONLOCKING TYPE, 125 VA, 15 AMP, AND 20 AMP RECEPTACLES THAT ARE CONTROLLED BY AN AUTOMATIC CONTROL DEVICE, OR THAT INCORPORATE CONTROL FEATURES THAT REMOVE POWER FROM THE OULET FOR THE PURPOSE OF ENERGY MANAGEMENT OR BUILDING AUTOMATION, SHALL BE MARKED WITH THE SYMBOL SHOWN IN FIGURE 406.3E AND LOCATED ON THE CONTROLLED RECEPTACLE OUTLET WHERE VISIBLE AFTER INSTALLATION

REGISTERED PROFESSIONAL ENGINEER
77584
OREGON
MAY 22, 2015
MICHAEL C. LEWIS
EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

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MODERN BUILDING SYSTEMS, INC.
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P.O. BOX 110, 9493 PORTER ROAD, AUMSVILLE, OR 97325
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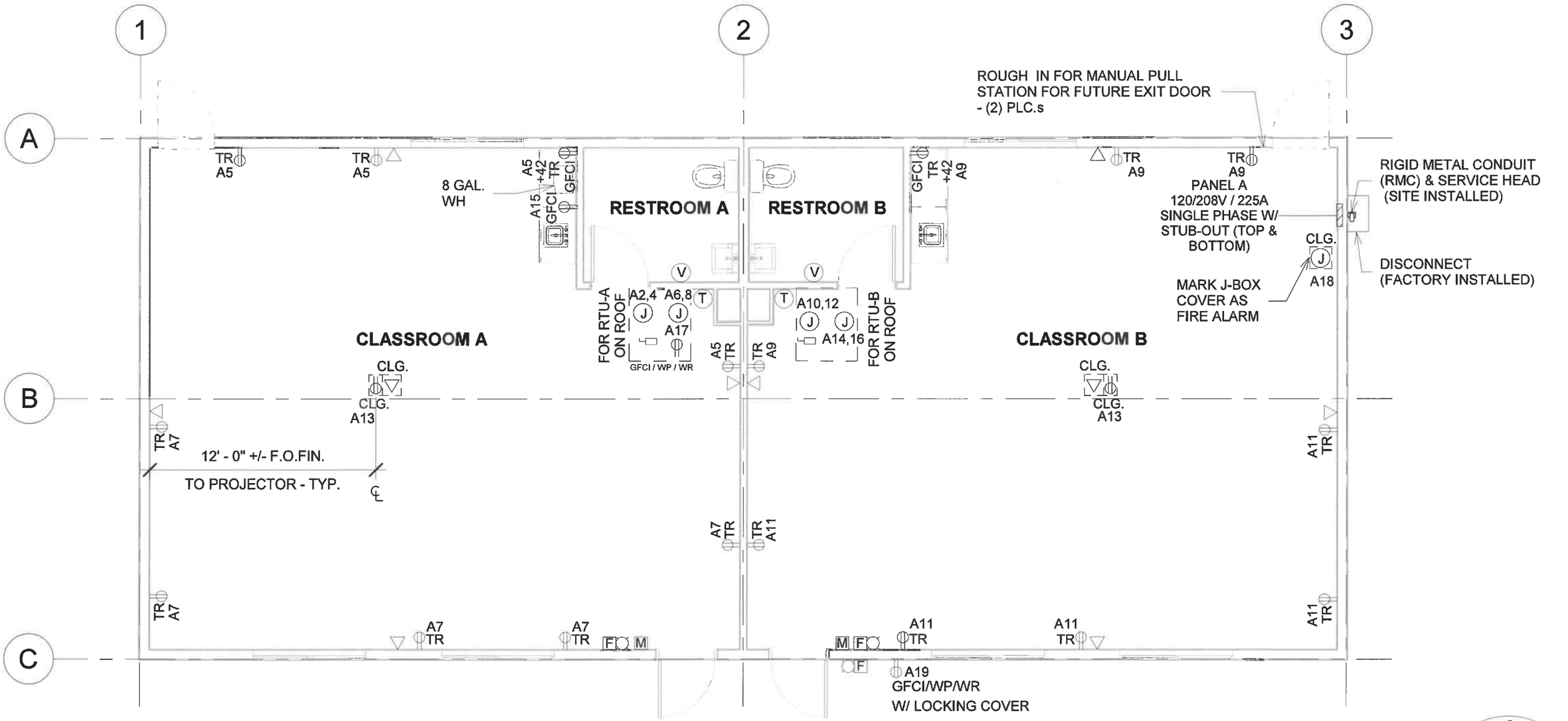
SHEET ELECTRICAL LEGEND & NOTES
JOB# 2019-AR-40
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V
SHEET # E 0.1
ADDRESS 1155 CREST DR. EUGENE, OR. 97405
DRW VF
DATE 5/1/19



1 ELECTRICAL PLAN
3/16" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
77584
OREGON
MAY 22, 2015
MICHAEL C. LEWIS
EXPIRES: 12/31/2020

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SHEET ELECTRICAL PLAN
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V
ADDRESS 1155 CREST DR. EUGENE, OR. 97405
DRW VF

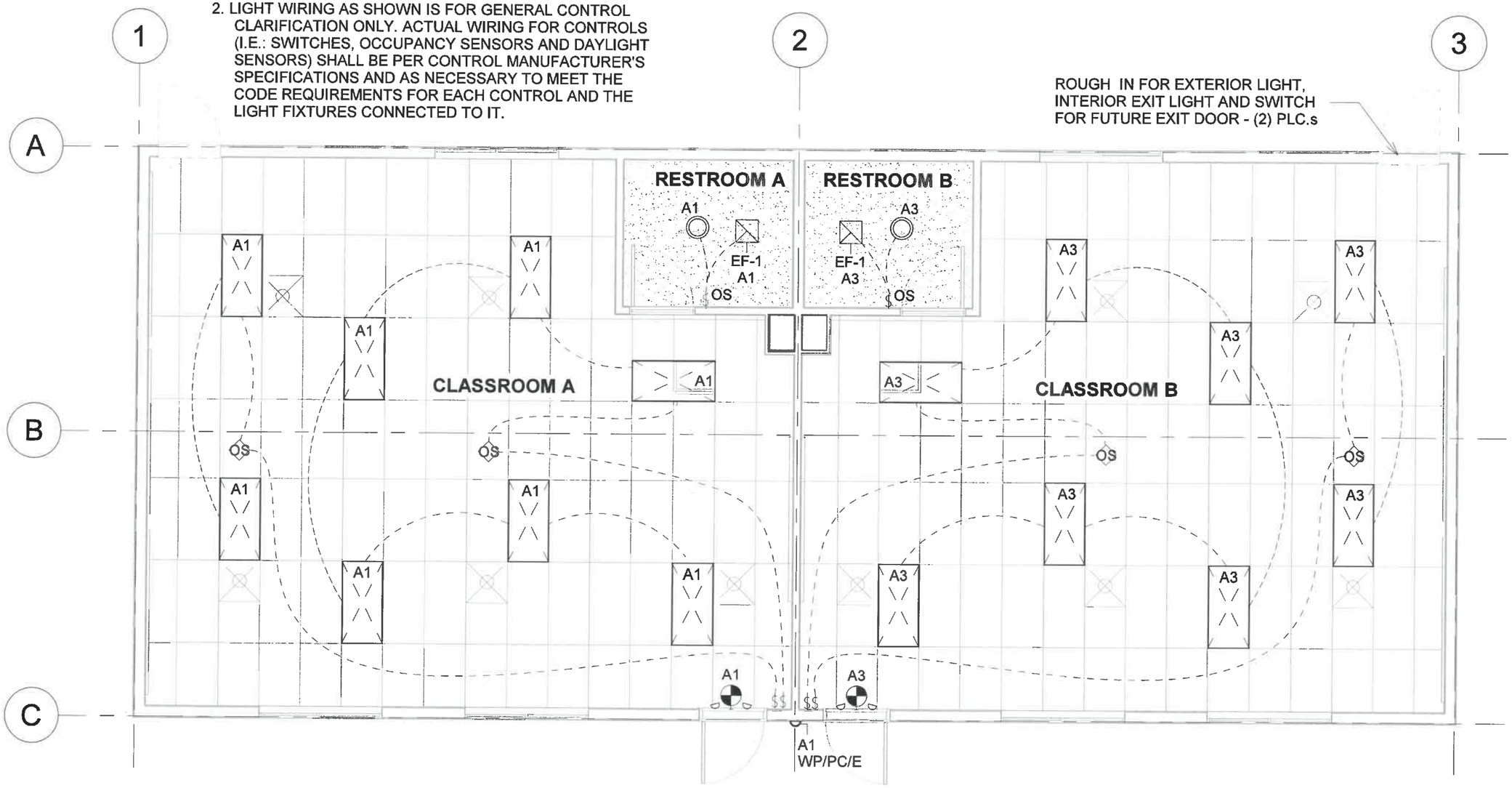
JOB# 2019-AR-40
SHEET # E 1.0
DATE 5/1/19

LIGHTING PLAN NOTES

1. OCCUPANCY SENSOR(S) IN EACH ROOM WILL BE WIRED TO CONTROL ALL LIGHT FIXTURES IN THAT ROOM.

2. LIGHT WIRING AS SHOWN IS FOR GENERAL CONTROL CLARIFICATION ONLY. ACTUAL WIRING FOR CONTROLS (I.E.: SWITCHES, OCCUPANCY SENSORS AND DAYLIGHT SENSORS) SHALL BE PER CONTROL MANUFACTURER'S SPECIFICATIONS AND AS NECESSARY TO MEET THE CODE REQUIREMENTS FOR EACH CONTROL AND THE LIGHT FIXTURES CONNECTED TO IT.

NOTE:
SEE SHEET E 0.1 FOR LIGHTING SYMBOLS



1 LIGHTING PLAN
3/16" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
584
OREGON
MAY 22, 2015
MICHAEL C. LEWIS

EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

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SHEET LIGHTING PLAN
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V
ADDRESS 1155 CREST DR. EUGENE, OR. 97405
DRW VF
JOB# 2019-AR-40
SHEET # E 2.0
DATE 5/1/19

MAIN DISTRIBUTION PANEL PANEL A

MOUNTING Recessed

PROJECT NO: 2019-AR-40

DATE: 5/1/19

Load Name	Rating	Circuit Number	Number of Poles	A		B		Number of Poles	Circuit Number	Rating	Load Name
Lighting/Fan Classroom A	20 A	A1	1	512 VA	4680 VA			2	A2	45 A	RTU-A
Lighting/Fan Classroom B	20 A	A3	1			501 VA	4680 VA	--	A4	--	--
Receptacles Classroom A	20 A	A5	1	720 VA	2372 VA			2	A6	35 A	RTU-A
Receptacles Classroom A	20 A	A7	1			900 VA	2372 VA	--	A8	--	--
Receptacle Classroom B	20 A	A9	1	720 VA	4680 VA			2	A10	45 A	RTU-B
Receptacle Classroom B	20 A	A11	1			900 VA	4680 VA	--	A12	--	--
Receptacle	20 A	A13	1	360 VA	2372 VA			2	A14	35 A	RTU-B
Water Heater	20 A	A15	1			1500 VA	2372 VA	--	A16	--	--
Exterior Receptacles	20 A	A17	1	180 VA	1000 VA			1	A18	20 A	Fire Alarm
Receptacle	20 A	A19	1			180 VA			A20		
		A21							A22		
		A23							A24		
				17596 VA		18085 VA					

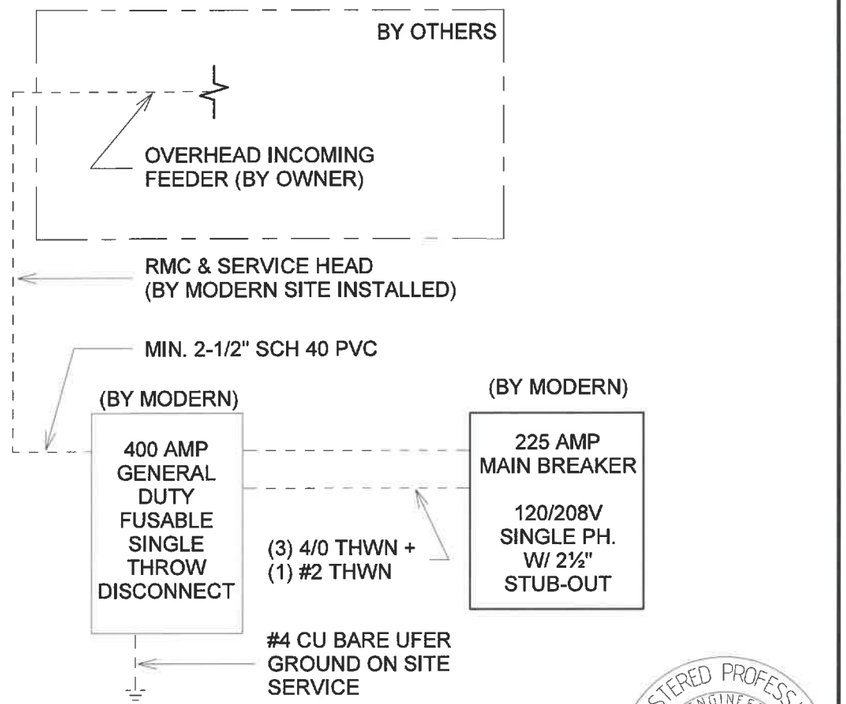
	TOTAL PANEL VA=	35680 VA	172 A	=TOTAL PANEL AMPS
BUSS SIZE	225 A		VOLTAGE	120/208
MAIN BREAKER	225 A		PHASE	1

ITEM	CONNECTED LOAD	DEMAND FACTOR	CALCULATED LOAD
LIGHTS	5310 VA	125.00%	6638 W
SIGN CIRCUIT			0 W
RECEPTACLE	3960 VA	100.00%	3960 W
DED. RECEPTACLE			0 W
MOTORS & COMPRESSORS			
EXHAUST FAN	16 VA	100.00%	16 W
LARGEST MOTOR	8 VA	25.00%	2 VA
HEATING & A/C (Per Mfg's Specs)			
TOTAL HEAT & A/C LOAD			
	28208 VA	100.00%	28208 W
MISCELLANEOUS			
WATER HEATER	1500 VA	100.00%	1500 W
CONNECTED LOAD		**CALCULATED LOAD**	
TOTAL VA =	39002 VA	TOTAL VA =	40324 VA
TOTAL AMPS =	188 A	TOTAL AMPS =	194 A

NOTE: CONNECTED LOAD FOR LIGHTS IS FROM NEC TABLE 220.12

ONE-LINE DIAGRAM NOTES

1. EMT CONDUIT SHALL NOT BE USED WITH UNFUSED CONDUCTORS INSIDE BUILDING LINES
2. FIELD VERIFY AIC RATING REQUIREMENTS
3. N/A
4. GROUNDING TO BE IN ACCORDANCE TO NEC 250
5. SITE INSTALLED PORTION OF ELECTRICAL DISTRIBUTION SYSTEM. SHALL BE INSTALLED IN ACCORDANCE WITH THESE APPROVED PLANS



ONE-LINE DIAGRAM

NO SCALE

REGISTERED PROFESSIONAL ENGINEER 7584 OREGON MAY 22, 2015 MICHAEL C. LEWIS

EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

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SHEET ELEC. PANELS & LOAD CALCS.

JOB# 2019-AR-40

PROJ. 28' x 64' MODULAR CLASSROOM EUGENE SD V

SHEET # E 3.0

ADDRESS 1155 CREST DR. EUGENE, OR. 97405

DRW VF

DATE 5/1/19

HVAC EQUIPMENT SCHEDULE

Mark	Count	Description	Manufacturer	Model	Supplementary Elec Heat	Economizer	Heating Efficiency	Cooling Efficiency	Weight (LBS)	Heating Capacity (Btu/h)	Cooling Capacity (Btu/h)	CFM	MCA	MOP	Volts	Phase	Notes
RTU-A	1	2.5 TON CONV. HP PKG-UNITS	TRANE	4WY5030A1000A	BAYHTRV110	BAYECON101A	HSPF=8.2	SEER=15	650	28,000	30,000	985	23/45	35/45	208	1	W/ FILTER RACK AND HINGED KIT
RTU-B	1	2.5 TON CONV. HP PKG-UNITS	TRANE	4WY5030A1000A	BAYHTRV110	BAYECON101A	HSPF=8.2	SEER=15	650	28,000	30,000	985	23/45	35/45	208	1	W/ FILTER RACK AND HINGED KIT
RC-1	1	FULL PERIMETER ROOF CURB	TRANE	BAYCURB050A													(WEIGHT INCLUDED IN PACKAGE UNIT)
RC-1	1	FULL PERIMETER ROOF CURB	TRANE	BAYCURB050A													(WEIGHT INCLUDED IN PACKAGE UNIT)
EF-1	1	EXHAUST FAN	PANASONIC	FV-0510VS1			-	-	8.82	-	-	80	.39	20	120	1	MOTORIZED DAMPER: FAMCO ADC4120
EF-1	1	EXHAUST FAN	PANASONIC	FV-0510VS1			-	-	8.82	-	-	80	.39	20	120	1	MOTORIZED DAMPER: FAMCO ADC4120

MECHANICAL NOTES

1. **CONTROLS**:
   THERMOSTAT:
   HONEYWELL TH8321R1001/U

2. **DUCTWORK**:
   MATERIAL:
   1" FIBERGLASS (R-4.3) OR 24 GA. SHEET METAL W/ 26 GA. SHEET METAL ROUNDS AND FLEX DUCT ROUNDS AT DIFFUSERS
   INSULATING AND SEALING:
   DUCTWORK TO BE INSULATED AND SEALED PER OEESC 503.2.7
   CONSTRUCTION:
   DUCTWORK TO BE CONSTRUCTED AS LOW PRESSURE DUCT SYSTEM PER OEESC 503.2.7.1.1

3. **VOLUME DAMPERS**:
   PROVIDE VOLUME DAMPERS TO CONTROL AIRFLOW AT EACH TAKE-OFF

OUTSIDE AIR CALCULATION - UNIT A

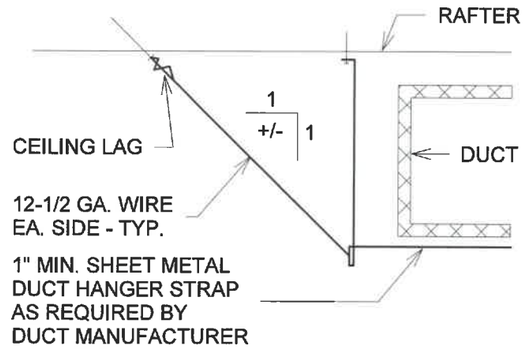
Name	Area	Occ. Density (#/1000 FT2)	People Airflow Rate (CFM/Person)	Area Outdoor Airflow Rate (CFM/FT2)	Exhaust Airflow Rate (CFM/FT2)	Qty. Flush Fixt.	Occ. Load	Occ. Airflow (CFM)	Area Airflow (CFM)	Exhaust Airflow (CFM)
CLASSROOM A	795 SF	35	10	0.12	0	0	28	280	95	0
RESTROOM A	66 SF	0	0	0	70	1	0	0	0	70
							28	280	95	70

OUTSIDE AIR CALCULATION - UNIT B

Name	Area	Occ. Density (#/1000 FT2)	People Airflow Rate (CFM/Person)	Area Outdoor Airflow Rate (CFM/FT2)	Exhaust Airflow Rate (CFM/FT2)	Qty. Flush Fixt.	Occ. Load	Occ. Airflow (CFM)	Area Airflow (CFM)	Exhaust Airflow (CFM)
CLASSROOM B	796 SF	35	10	0.12	0	0	28	280	95	0
RESTROOM B	66 SF	0	0	0	70	1	0	0	0	70
							28	280	95	70

HVAC SYMBOLS LEGEND

SYMBOL	DESCRIPTION	HEIGHT ℄ (U.N.O)
	2' x 2' LAY-IN SUPPLY DIFFUSER	CEILING
	EXHAUST FAN	CEILING
	FLEX DUCT (5' MAX LENGTHS)	ATTIC
T	THERMOSTAT	+48" TOP



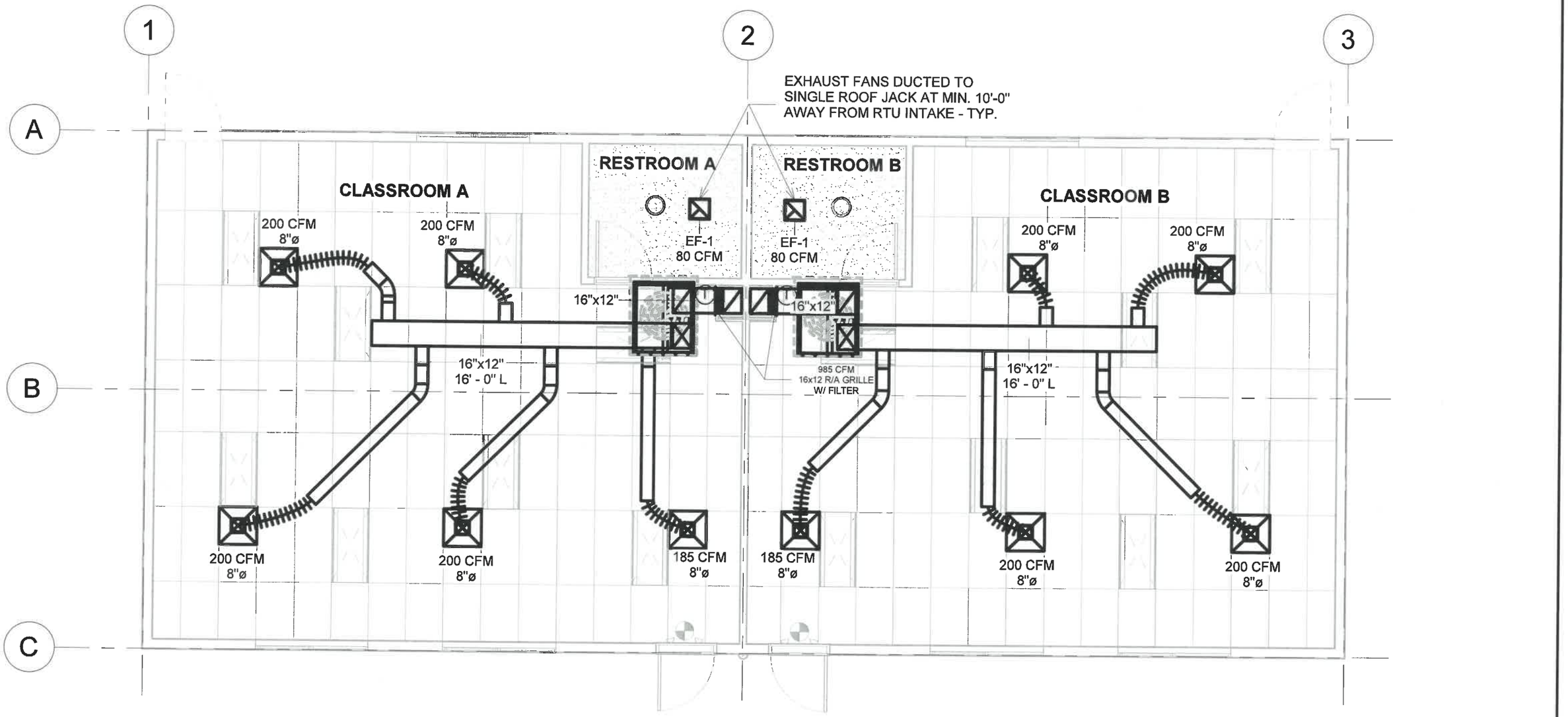
1 DUCT SUPPORT
1" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
77584
OREGON
MAY 22, 2015
MICHAEL C LEWIS
EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

MODERN BUILDING SYSTEMS
MODERN BUILDING SYSTEMS, INC.
TELEPHONE: (503) 749-4949 FAX: (503) 749-4950
P.O. BOX 110, 9493 PORTER ROAD, AUMSVILLE, OR 97325
CHECK OUT OUR WEB PAGE: www.modernbuildingsystems.com

SHEET HVAC NOTES & LEGEND
JOB# 2019-AR-40
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V
SHEET # M 0.1
ADDRESS 1155 CREST DR. EUGENE, OR. 97405
DRW VF
DATE 5/1/19



1 HVAC PLAN
3/16" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
77584
REG.
MAY 22, 2015
MICHAEL C. LEWIS
EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

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MODERN BUILDING SYSTEMS, INC.
TELEPHONE: (503) 749-4949 FAX: (503) 749-4950
P.O. BOX 110, 9493 PORTER ROAD, AUMSVILLE, OR 97325
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SHEET HVAC PLAN
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V
ADDRESS 1155 CREST DR. EUGENE, OR. 97405
DRW VF
JOB# 2019-AR-40
SHEET # M 1.0
DATE 5/1/19

PLUMBING NOTES

1. SUPPLY PIPING AND FITTINGS:
   - TYPE 'L' CU
   - CHLORINATED POLYVINYL CHLORIDE (CPVC) PLASTIC SCHED 40
   - CROSSLINKED POLYETHYLENE (PEX) PLASTIC

2. SUPPLY PIPE SIZES BASED ON:
   - 100 FT. DEVELOPED LENGTH
   - 46 - 60 PSI

3. WASTE PIPING:
   - ABS - DWV

4. WASTE PIPE SIZES BASED ON:
   - 1/4" PER FOOT SLOPE

5. FLOOR DRAINS:
   - FLOOR SHALL BE SLOPED TO FLOOR DRAINS PER OPSC/UPC 418.5
   - PROVIDE TRAP SEAL PROTECTION PER OPSC/UPC 1007

6. TRAP PRIMERS TO BE MIN. 12" ABOVE FLOOR RIM PER OPSC 1007.4

7. WATER HEATING:
   - SERVICE WATER HEATING EQUIPMENT SHALL BE PROVIDED WITH TEMPERATURE CONTROLS PER OEESC 504.3
   - HOT WATER FROM PUBLIC-USE LAVATORIES SHALL ALSO BE CONTROLLED PER OPSC/UPC 407.3
   - WATER HEATING EQUIPMENT SHALL BE SUPPLIED WITH HEAT TRAPS PER OEESC 504.4
   - STRAP WATER HEATER TO WALL W/ 26 GA. x 1" SEISMIC STRAP W/ (1) #6 SMST TO TANK AND (1) #3 x 2" BUGLE HEAD SCREW TO WALL EACH END
   - HOT WATER PIPES TO BE INSULATED PER OEESC 504.5
   - NO PEX PIPING WITHIN 18" OF WATER HEATER PER OPSC /UPC 604.13
   - WATER HEATING EQUIPMENT SHALL HAVE NO LESS THAN THE ENERGY FACTOR EFFICIENCY PER OEESC TABLE 504.2
   - WATER HEATING EQUIPMENT SHALL BE SUPPLIED WITH DRAINAGE PER OPSC 507.4 AND UPC 507.5

8. WATER HAMMER ARRESTER(S):
   INSTALL AT FLUSHOMETERS OR QUICK-ACTING VALVES PER OPSC/UPC 609.10

9. SHOWERS: WHEN PRESENT SHALL BE PROVIDED WITH A THERMOSTATIC BALANCE VALVE PER OPSC/UPC 408.3

10. DISHWASHER: WHEN PRESENT SHALL BE PROVIDED WITH AIR GAP FITTING PER OPSC/UPC 807.3

11. CLOTHES WASHER: WHEN PRESENT SHALL BE PROVIDED WITH A STANDPIPE PER OPSC/UPC 804

12. EXPOSED PIPES AND SURFACES:
   - PER 2009 ANSI A117.1, WATER SUPPLY AND DRAINPIPES UNDER LAVATORIES AND SINKS SHALL BE INSULATED OR OTHERWISE CONFIGURED TO PROTECT AGAINST CONTACT. THERE SHALL BE NO SHARP OR ABRASIVE SURFACES UNDER LAVATORIES AND SINKS

13. WATER CLOSET SEATS:
   - PER OPSC/UPC 411.3, ADA COMPLIANT TOILET SEATS SHALL BE OF THE ELONGATED TYPE AND EITHER OF THE OPEN FRONT TYPE OR HAVE AN AUTOMATIC SEAT COVER DISPENSER. PLASTIC SEATS SHALL COMPLY WITH IAPMO Z124.5

14. WATER CLOSETS:
   - PER OPSC/UPC 411.1, WATER CLOSET BOWLS FOR PUBLIC USE SHALL BE OF THE ELONGATED TYPE.

15. FLUSH CONTROLS:
   - PER 2009 ANSI 604.6, FLUSH CONTROLS SHALL BE HAND OPERATED OR AUTOMATIC. HAND OPERATED FLUSH CONTROLS SHALL COMPLY WITH SECTION 309. FLUSH CONTROLS SHALL BE LOCATED ON THE OPEN SIDE OF THE WATER CLOSET.

16. URINALS:
   - PER 2009 ANSI 605.2, URINALS SHALL BE OF THE STALL TYPE OR SHALL BE OF THE WALL HUNG TYPE WITH THE RIM AT 17 INCHES MAXIMUM ABOVE THE FLOOR. WALL HUNG URINALS SHALL BE 13-1/2 INCHES MINIMUM IN DEPTH MEASURED FROM THE OUTER FACE OF THE URINAL RIM TO THE WALL

PLUMBING FIXTURE SCHEDULE

Mark	Count	Description	Style	GPM/GPF	Comments
LAV-1	2	WALL HUNG LAVATORY	VITR. CHINA	0.5	
S-1	2	HAND / BAR SINK	S.S.	2.5	
WC-1	2	ACCESSIBLE W.C.	TANK	1.6	
WH-8	1	WATER HEATER - 8 GAL. TANK	ELEC.		1500

REGISTERED PROFESSIONAL ENGINEER 77584 OREGON MAY 22, 2015 MICHAEL C. LEWIS

EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

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MODERN BUILDING SYSTEMS, INC.
TELEPHONE: (503) 749-4949 FAX: (503) 749-4950
P.O. BOX 110, 9493 PORTER ROAD, AUMSVILLE, OR 97325
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SHEET PLUMBING NOTES & SCHEDULE

PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V

ADDRESS 1155 CREST DR. EUGENE, OR. 97405

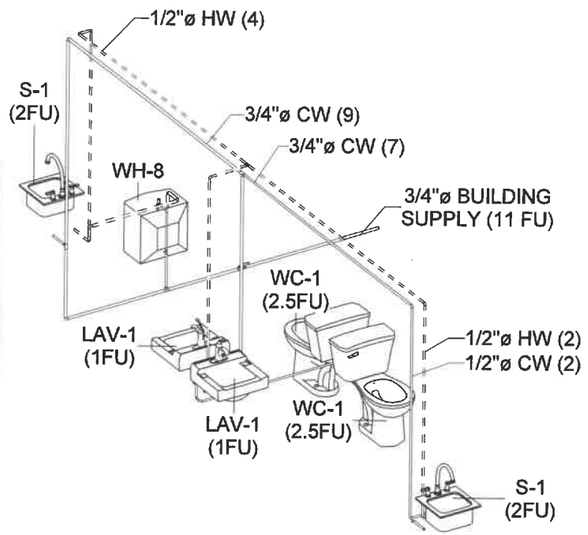
DRW VF

JOB# 2019-AR-40

SHEET # P 1.0

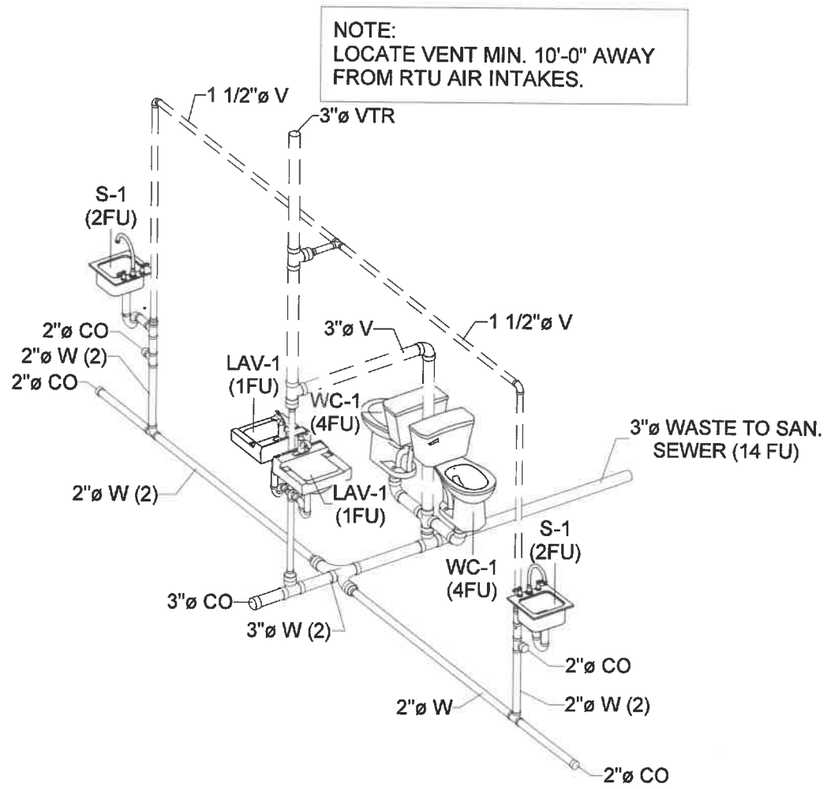
DATE 5/1/19

NOTE:
PROVIDE AT WATER HEATER
- CAPPED 'T' FOR FUTURE EXP. TANK
- 3/4" PRESSURE AND TEMPERATURE RELIEF VALVE DISCHARGE TO EXTERIOR



1 PLUMBING SCHEMATIC - SUPPLY

NOTE:
LOCATE VENT MIN. 10'-0" AWAY FROM RTU AIR INTAKES.



2 PLUMBING SCHEMATIC - DWV

NOTE: BELOW THE FLOOR PLUMBING TREE, BY OTHERS ON SITE. BOTH WASTE AND VENT WILL REQUIRE HOOK-UP OF THE BELOW THE FLOOR TREE TO THE STUB-DOWNS, TO ACCOMMODATE INDIVIDUAL SITE CONDITIONS AND SLOPE AND JOIST DEPTH. IT IS THE SITE PLUMBERS RESPONSIBILITY TO MAKE SURE THAT ALL PLUMBING DROPS ARE CONNECTED.

REGISTERED PROFESSIONAL ENGINEER
77784
OREGON
MAY 22, 2015
MICHAEL C. LEWIS
EXPIRES: 12/31/2020

REV.	DESCRIPTION	DATE	BY

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MODERN BUILDING SYSTEMS, INC.
TELEPHONE: (503) 749-4949 FAX: (503) 749-4950
P.O. BOX 110, 9493 PORTER ROAD, AUMSVILLE, OR 97325
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SHEET PLUMBING SCHEMATICS
JOB# 2019-AR-40
PROJ. 28' x 64' MODULAR CLASSROOM
EUGENE SD V
SHEET # P 1.1
ADDRESS 1155 CREST DR. EUGENE, OR. 97405
DRW VF
DATE 5/1/19

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JOB #2019-40 Eugene SD V

SHEET NO 1	OF	
CALCULATED BY MCL	DATE	4/12/2019
CHECKED BY	DATE	
SCALE		

STRUCTURAL CALCULATIONS (PER 2015 IBC) FOR 28' X 64' MODULAR

MATERIAL SUMMARY	MS-1 --> MS-3
BENDING STRESS	BS-1 --> BS-2
ROOF FRAMING ANALYSIS	RF-1 --> RF-6
EXTERIOR WALL STUD	STUD-1
FLOOR FRAMING ANALYSIS	FLR-1 --> FLR-7
LATERAL FORCE ANALYSIS	LFA-1 --> LFA-4
FOUNDATION ANALYSIS	FDN-1 --> FDN-7
LOADING ANALYSIS	L-1 --> L-5

5/1/2019

REGISTERED PROFESSIONAL ENGINEER
77584
OREGON
MAY 22, 2015
MICHAEL C. LEWIS

EXPIRES: 12/31/2020

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JOB #2019-40 Eugene SD V		
SHEET NO MS-1	OF MS-3	
CALCULATED BY MCL	DATE	4/12/2019
CHECKED BY	DATE	
SCALE		

MATERIAL SUMMARY FOR
28' X 64' MODULAR

ROOF FRAMING:

TYP RF RAFTER	USE	2x10 DF #2 @ 24" O.C.	SEE RF-1
RF RAFTER @ MECH UNITS	USE	(2) 2x10 DF #2	SEE RF-2
TYP 6'-0" OR LESS OPENING HDR	USE	(2) 2 x 8 DF #2	SEE RF-3
RIDGE BEAM	USE	(2) MURPHY LVL 3100 Fb - 2.0E, 1.5" W (EA) x 24" D	SEE RF-4

COLUMNS:

ENDWALL COLUMNS	USE	(2) 4X6 DF #2	SEE RF-5
MIDSPAN COLUMNS	USE	(2) 3"X3"X3/16" HSS ASTM 500 GRADE B, Fy=46ksi	SEE RF-6
EXTERIOR WALL STUD	USE	2X6 DF STUD GRADE @ 16" O.C.	STUD-1

FLOOR FRAMING:

TYP FLR JOIST	USE	2X8 DF #2 @ 16" O.C.	SEE FLR-1-5
TYP FLR JOIST SUPPORT BEAM	USE	4X8 DF #2	SEE FLR-6-7

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JOB #2019-40 Eugene SD V

SHEET NO MS-2	OF MS-3	
CALCULATED BY MCL	DATE	4/12/2019
CHECKED BY	DATE	
SCALE		

SHEATHING:

ROOF	USE	USE MIN 7/16" SHTG w/ 15 GA STAPLES AT 6" EDGE & 12" FIELD (UNBLOCKED) (ESR-1539, TABLE 6) UPGRADE TO 6" & 8". AT ROOF	SEE LFA-1,2
EXT ENDWALLS	USE	USE MIN 7/16" SHTG w/ 15 GA STAPLES AT 6" EDGE & 12" FIELD (BLOCKED) (ESR-1539, TABLE 8)	SEE LFA-1
EXT SIDEWALLS	USE	USE MIN 7/16" SHTG w/ 15 GA STAPLES AT 6" EDGE & 12" FIELD (BLOCKED) (ESR-1539, TABLE 8)	SEE LFA-2
FLOOR	USE	USE MIN 19/32" SHTG w/ 8d (.113) AT 6" EDGE & 12" FIELD (UNBLOCKED) (ESR-1539, TABLE 6) UPGRADE TO 23/32" SHTG AT 6" & 8". AT FLOOR	SEE LFA-1,2

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SHEET NO MS-3	OF MS-3		
CALCULATED BY MCL	DATE	4/12/2019	
CHECKED BY	DATE		
SCALE			

SHEAR WALL HOLD DOWNS	USE	USE MIN SIMP CS-18 w/ (5) N-10's EA END	SEE LFA-3
SIDEWALL TOP PLATE SPLICE	USE	USE MIN 4 ft SPLICE w/ (12) 12d's (.131) EA END	SEE LFA-4
ENDWALL TOP PLATE SPLICE	USE	USE MIN SIMP CS-18 w/ (4) N-10's EA END	SEE LFA-4
RIDGE BEAM TO RIDGE BEAM CONNECTIONS	USE	USE MIN (6) - 5/8 in DIA M.B.'s AT RIDGE BEAM	SEE LFA-4

FOUNDATION:

TYP EXT FTG	USE	USE +/- 16 in. SQ. PADS OR 2 x 12 x 24 in. P.T. PADS AT 6' O.C.	SEE FDN-1
TYP INTERIOR FTG	USE	USE +/- 16 in. SQ. PADS OR 2 x 12 x 24 in P.T. PADS AT 6' O.C.	SEE FDN-1
ENDWALL COLUMN FTG	USE	(2) (FLAT) P.T. HF #2, 6 x 8 x 4 ' L	SEE FDN-3,5
CNTR COLUMN FTG	USE	(5) (FLAT) P.T. HF #2, 4 x 8 x 4 ' L	SEE FDN-3,6
CNTR COLUMN FTG POST	USE	(2) DF #2, 6 x 10 x 3 ' L	SEE FDN-3,7
MOD TRANSVERSE ANCHORS	USE	USE MIN (5) HOLD DOWNS AT EA SIDEWALL	SEE FDN-4
MOD LONGITUDINAL ANCHORS	USE	USE MIN (3) HOLD DOWNS AT EA ENDWALL	SEE FDN-4

MODERN BUILDING SYSTEMS, INC.
9493 Porter Road SE * PO Box 110
AUMSVILLE, OREGON 97325
503-749-4949
Fax 503-749-4950

BENDING STRESSES

SHEET NO BS-1	OF	BS-2
CALCULATED BY MCL		DATE 05/16/2016
CHECKED BY		DATE
SCALE		

ALLOWABLE BENDING STRESS $F'_b = F_b (C_D C_M C_t C_L C_F C_{fu} C_i C_r)$

F_b - BENDING STRESS DESIGN VALUE
C_D - LOAD DURATION FACTOR
C_F - SIZE FACTOR
C_r - REPETITIVE MEMBER FACTOR

BASED ON 2015 NDS

SIZE	SPECIES	M.O.E. (x10^6)	Fb (psi)	C_F	Cr	FLOORS OR ROOFS F'_b w/o DURATION (psi)	C_D (Snow)	ROOFS F'_b w/ DURATION (psi)
JOISTS AND RAFTERS								
2 x 8	DF #1 & Btr	1.8	1200	1.2	1.15	1656	1.15	1904
	DF #1	1.7	1000	1.2	1.15	1380	1.15	1587
	DF #2	1.6	900	1.2	1.15	1242	1.15	1428
	SPF #1 /#2	1.4	875	1.2	1.15	1208	1.15	1389
	HF #2	1.3	850	1.2	1.15	1173	1.15	1349
2 x 10	DF Sel Struct	1.9	1500	1.1	1.15	1898	1.15	2182
	DF #1 & Btr	1.8	1200	1.1	1.15	1518	1.15	1746
	DF #1	1.7	1000	1.1	1.15	1265	1.15	1455
	HF #1	1.5	975	1.1	1.15	1233	1.15	1418
	DF #2	1.6	900	1.1	1.15	1139	1.15	1309
	SPF #1 /#2	1.4	875	1.1	1.15	1107	1.15	1273
	HF #2	1.3	850	1.1	1.15	1075	1.15	1237
HEADERS								
4 x 4	DF #2	1.6	900	1.5	N/A	1350	1.15	1553
4 x 6	DF #2	1.6	900	1.3	N/A	1170	1.15	1346
4 x 8	DF #2	1.6	900	1.3	N/A	1170	1.15	1346
4 x 10	DF #2	1.6	900	1.2	N/A	1080	1.15	1242

5.1 Calculations and drawings demonstrating compliance with this report must be submitted to the code official. The calculations and drawings must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.2 The material is limited to conditions in which the average equilibrium moisture content of solid-sawn lumber will be less than 16 percent.

5.3 Connections other than the nailed and bolted connections described in this report are outside of the scope of this report.

5.4 Evaluation of the effect of fire-retardant or preservative treatment on LVL is outside the scope of this report.

5.5 Installation, fabrication, identification and connection details must be in accordance with this report, the manufacturer's published installation instructions and the applicable code. This report must govern if there are conflicts between the manufacturer's published installation instructions and this report.

5.6 Murphy LVL is produced in Sutherlin, Oregon, under a quality control program with inspections by APA—The Engineered Wood Association (AA-649).

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Structural Wood-based Products (AC47), dated February 2013.

7.0 IDENTIFICATION

7.1 The Murphy LVL must be identified with stamps bearing the Murphy Engineered Wood Division name (or the name of one of the listees noted at the beginning of this report, except as noted in Section 7.2 for Anthony Forest Products); grade; evaluation report number (ESR-2913); the mill number (1089), production shift and date of manufacture; and the name of the inspection agency [APA—The Engineered Wood Association (AA-649)].

7.2 The Murphy LVL, marketed and distributed by Anthony Forest Products, must be identified with stamps bearing the Murphy Engineered Wood Division name; grade; evaluation report number (ESR-2913); the mill number (1089), production shift and date of manufacture; and the name of the inspection agency [APA—The Engineered Wood Association (AA-649)]. Additionally, the LVL must be packaged with wraps bearing the Anthony Forest Products name.

TABLE 1—DESIGN PROPERTIES (ALLOWABLE STRESS DESIGN) FOR MURPHY LVL[1, 2, 3]

PROPERTY		DESIGN STRESS (psi)				
		2,250F_b-1.5E	2,750 F_b-1.8E	2,850 F_b-1.9E	2,950 F_b-2.0E	3,100 F_b-2.0E
Bending (F_b)	Joist[4]	2,250	2,750	2,850	2,950	3,100
	Plank	2,200	2,750	2,800	2,950	3,100
Tension parallel to grain (F_t) [5]		1,350	1,950	1,950	2,100	2,100
Longitudinal shear (F_v)	Joist	285	285	285	290	290
	Plank	150	150	150	150	150
Compression parallel ($F_{c\|\|}$)		2,350	2,350	2,350	3,200	3,200
Compression perpendicular ($F_{c\perp}$)	Joist	750	750	750	750	750
	Plank	450	450	550	550	550
Modulus of Elasticity, E	Joist	1.5×10^6	1.8×10^6	1.9×10^6	2.0×10^6	2.0×10^6
	Plank	1.4×10^6	1.8×10^6	1.9×10^6	2.0×10^6	2.0×10^6

For **SI:** 1 psi = 6.9 kPa.

[1]The tabulated values are design values for normal duration of load. All values, except for E and $F_{c\perp}$, may be adjusted for other load durations as permitted by the code. The design stresses are limited to conditions in which the average equilibrium moisture content of solid-sawn lumber is less than 16 percent.

[2]Reference design values must be adjusted, as applicable, in accordance with Section 8.3 of the NDS.

[3]Joist = load parallel to glueline. Plank = load perpendicular to glueline.

[4]The tabulated values are based on a reference depth of 12 inches. For other depths, when loaded edgewise, the allowable bending stress (F_b) shall be modified by $(12/d)^{0.18}$ where d = depth in inches. For depths less than $2^1/_2$ inches, the factor for the $2^1/_2$-inch depth must be used.

[5]The values published in Table 1 are based on a reference length of 3 feet. For other lengths, the allowable tensile stress must be modified by $(3/\ell)^{0.11}$, where ℓ = length in feet. For lengths less than 3 feet, the unadjusted allowable tension stresses in Table 1 are used.

TABLE 2—FASTENER DESIGN FOR MURPHY LVL: EQUIVALENT SPECIFIC GRAVITY[1]

NAILS				BOLTS	
Withdrawal Load		Lateral Load		Lateral Load	
Installed in Edge	Installed in Face	Installed in Edge	Installed in Face	Installed in Face	
				Parallel to Grain	Perpendicular to Grain
0.49	0.50	0.50	0.50	0.50	0.50

[1]Fastener values based on the equivalent specific gravities in the above table are for normal load duration and may be adjusted using the load duration factors in accordance with the code.

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Project Title: EUGENE SD V
Engineer: MCL
Project ID: 2019-40
Project Descr: 28 x 64 Modular Classroom

RF-1 OF RF-6

Printed: 11 APR 2019, 3:22PM

Wood Beam

Lic. # : KW-06009251

Description : TYP ROOF RAFTER - 2019-40

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2015

Wood Species : Douglas Fir - Larch
Wood Grade : No.2

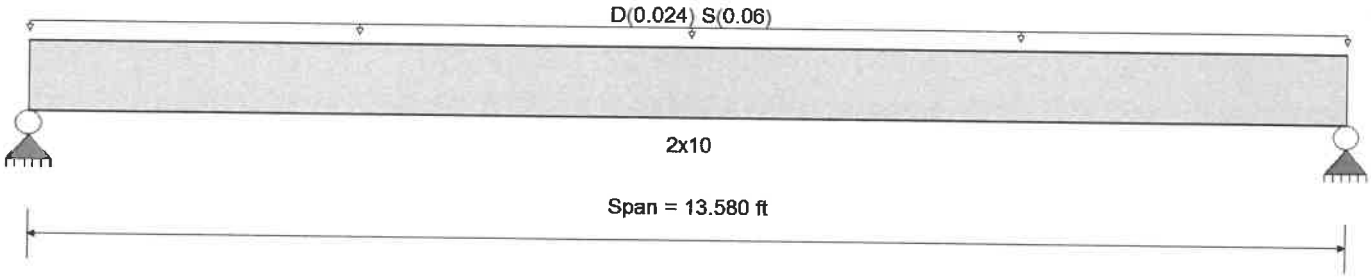
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	900.0 psi
Fb -	900.0 psi
Fc - Prll	1,350.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	575.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf

Repetitive Member Stress Increase



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0120, S = 0.030 ksf, Tributary Width = 2.0 ft, (Roof Dead Load and Snow Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.859 : 1	Maximum Shear Stress Ratio	=	0.275 : 1
Section used for this span		2x10	Section used for this span		2x10
fb : Actual	=	1,125.18 psi	fv : Actual	=	56.88 psi
FB : Allowable	=	1,309.28 psi	Fv : Allowable	=	207.00 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.790 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.292 in	Ratio =	558 >=360.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360.0
Max Downward Total Deflection	0.423 in	Ratio =	385 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.591	0.591
Overall MINimum	0.407	0.407
D Only	0.183	0.183
+D+S	0.591	0.591
+D+0.750S	0.489	0.489
+0.60D	0.110	0.110
S Only	0.407	0.407

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Project Descr: 28 x 64 Modular Classroom

RF-2 of RF-6

Printed: 12 APR 2019, 10:24AM

Wood Beam

Description : DBL ROOF RAFTER @ MECH UNITS- 2019-40

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2015

Wood Species : Douglas Fir - Larch
Wood Grade : No.2

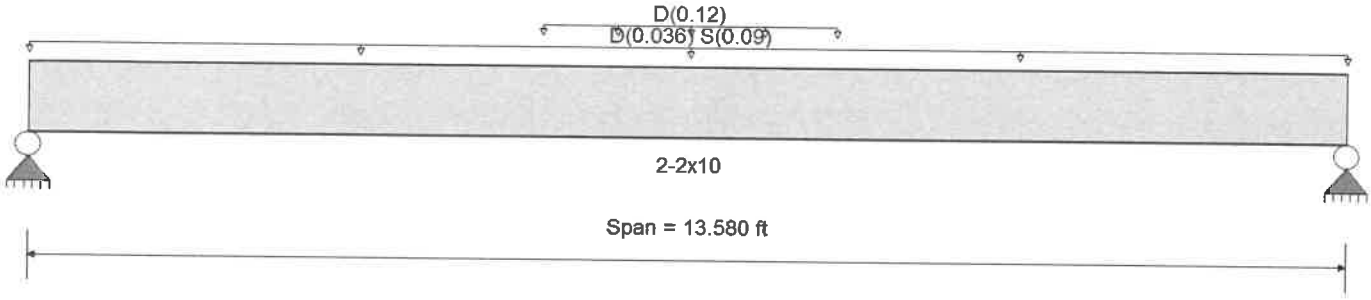
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	900.0 psi
Fb -	900.0 psi
Fc - Prll	1,350.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	575.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf

Repetitive Member Stress Increase



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0120, S = 0.030 ksf, Tributary Width = 3.0 ft, (Roof Dead Load and Snow Load)
Uniform Load : D = 0.120 k/ft, Extent = 5.290 –>> 8.290 ft, Tributary Width = 1.0 ft, (MECH UNIT)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.885 : 1	Maximum Shear Stress Ratio	=	0.255 : 1
Section used for this span		2-2x10	Section used for this span		2-2x10
fb : Actual	=	1,158.56 psi	fv : Actual	=	52.88 psi
FB : Allowable	=	1,309.28 psi	Fv : Allowable	=	207.00 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.790 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.219 in	Ratio =	744 >=360.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360.0
Max Downward Total Deflection	0.422 in	Ratio =	386 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.076	1.076
Overall MINimum	0.611	0.611
D Only	0.465	0.465
+D+S	1.076	1.076
+D+0.750S	0.924	0.924
+0.60D	0.279	0.279
S Only	0.611	0.611

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RF-3 OF RF-6

Printed: 11 APR 2019, 3:23PM

Wood Beam

Description : UP TO 6'-0" OPENING HDR - 2019-40

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2015

Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Fb +	900.0 psi
Fb -	900.0 psi
Fc - Prll	1,350.0 psi
Fc - Perp	625.0 psi
Fv	95.0 psi
Ft	575.0 psi

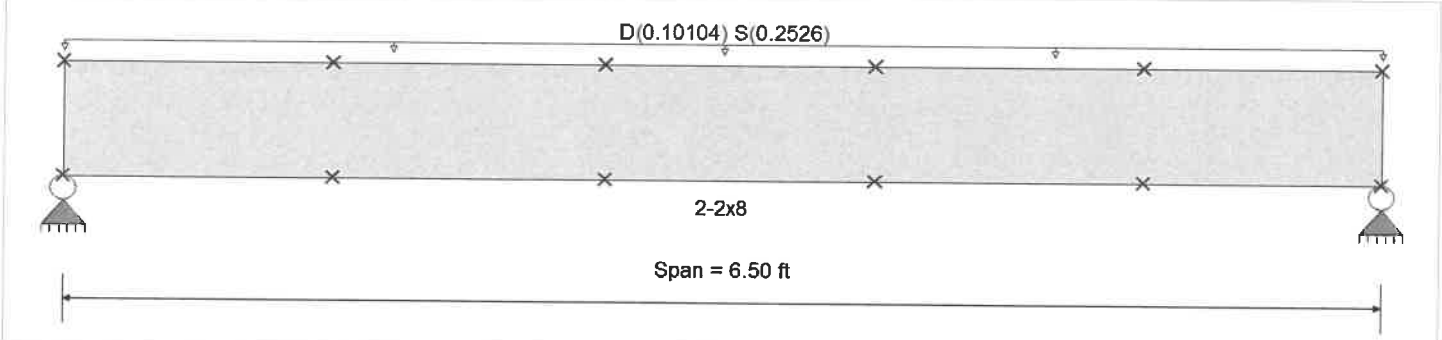
E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	32.210 pcf

Beam Bracing : Beam bracing is defined as a set spacing over all spans

Unbraced Lengths

First Brace starts at ft from Left-Most support
Regular spacing of lateral supports on length of beam = 1.330 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Uniform Load : D = 0.0120, S = 0.030 ksf, Tributary Width = 8.420 ft, (1/2 Roof span and up to 18" overhang)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.698 : 1	Maximum Shear Stress Ratio	=	0.601 : 1
Section used for this span		2-2x8	Section used for this span		2-2x8
fb : Actual	=	864.50 psi	fv : Actual	=	65.69 psi
FB : Allowable	=	1,238.94 psi	Fv : Allowable	=	109.25 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	3.250 ft	Location of maximum on span	=	5.907 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.067 in	Ratio =	1165 >=360.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360.0
Max Downward Total Deflection	0.095 in	Ratio =	820 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.165	1.165
Overall MINimum	0.821	0.821
D Only	0.344	0.344
+D+S	1.165	1.165
+D+0.750S	0.960	0.960
+0.60D	0.207	0.207
S Only	0.821	0.821

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RF-4 OF RF-6

Printed: 11 APR 2019, 3:22PM

Wood Beam

Description : (2) LVL RIDGE BEAM - 2019-40

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2015

Wood Species : Murphy LVL 3100Fb-2.0E x 24" Deep
Wood Grade : Manufactured

Fb +	2,736.0 psi
Fb -	2,736.0 psi
Fc - Prll	3,200.0 psi
Fc - Perp	750.0 psi
Fv	290.0 psi
Ft	2,100.0 psi

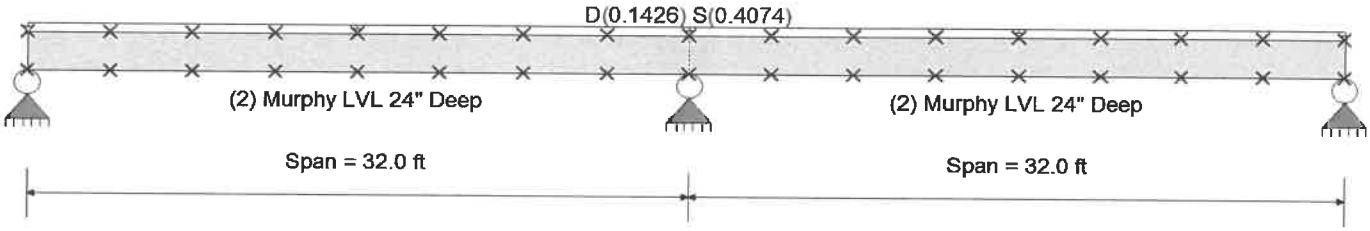
E : Modulus of Elasticity

Ebend- xx	2,000.0 ksi
Eminbend - xx	1,800.0 ksi
Density	35.0 pcf

Beam Bracing : Beam bracing is defined as a set spacing over all spans

Unbraced Lengths

First Brace starts at ft from Left-Most support
Regular spacing of lateral supports on length of beam = 4.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Loads on all spans...
Uniform Load on ALL spans : D = 0.01050, S = 0.030 ksf, Tributary Width = 13.580 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.992 : 1	Maximum Shear Stress Ratio	=	0.639 : 1
Section used for this span		(2) Murphy LVL 24" D	Section used for this span		(2) Murphy LVL 24" D
fb : Actual	=	3,026.61 psi	fv : Actual	=	213.21 psi
FB : Allowable	=	3,051.71 psi	Fv : Allowable	=	333.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	32.000 ft	Location of maximum on span	=	30.034 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.585 in	Ratio =	656 >=360.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360.0
Max Downward Total Deflection	0.814 in	Ratio =	471 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	6.810	22.700	6.810
Overall MINimum	4.889	16.296	4.889
D Only	1.921	6.404	1.921
+D+S	6.810	22.700	6.810
+D+0.750S	5.588	18.626	5.588
+0.60D	1.153	3.842	1.153
S Only	4.889	16.296	4.889

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RF-5 of RF-6

Printed: 11 APR 2019, 3:24PM

Wood Column

Description : END COLUMN FOR RIDGE BEAM 1 OF 2 REQ'D EA END - 2019-40

Code References

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combinations Used : IBC 2015

General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 10.170 ft
(Used for non-slender calculations)

Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Fb +	900.0 psi	Fv	95.0 psi
Fb -	900.0 psi	Ft	575.0 psi
Fc - Prll	1,350.0 psi	Density	32.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Wood Section Name : **4x6**
Wood Grading/Manuf. : Graded Lumber
Wood Member Type : Sawn

Exact Width	**3.50**	in
Exact Depth	**5.50**	in
Area	19.250	in^2
Ix	48.526	in^4
Iy	19.651	in^4

Allow Stress Modification Factors

Cf or Cv for Bending	1.30
Cf or Cv for Compression	1.10
Cf or Cv for Tension	1.30
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 1 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 10.170 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 43.791 lbs * Dead Load Factor
AXIAL LOADS . . .
1/2 of Ridge Beam Rxt @ end: Axial Load at 10.170 ft, Xecc = 1.0 in, D = 0.960, S = 2.444 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.2727 : 1**
Load Combination : +D+S
Governing NDS Forumla : Comp + Myy, NDS Eq. 3.9-3
Location of max.above base : 10.102 ft
At maximum location values are . . .
Applied Axial : 3.448 k
Applied Mx : 0.0 k-ft
Applied My : -0.2818 k-ft
Fc : Allowable : 817.95 psi

PASS Maximum Shear Stress Ratio = **0.01989 : 1**
Load Combination : +D+S
Location of max.above base : 10.170 ft
Applied Design Shear : 2.173 psi
Allowable Shear : 109.250 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.02789 k	Bottom along X-X	0.02789 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y : 0.0 in at 0.0 ft above base
for load combination : n/a

Along X-X : -0.1043 in at 5.938 ft above base
for load combination : +D+S

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

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RF-6 OF RF-6

Printed: 11 APR 2019, 3:25PM

Steel Column

Description : CNTR COLUMN FOR RIDGE BEAM 1 0F 2 REQ'D - 2019-40

Code References

Calculations per AISC 360-10, IBC 2015, CBC 2016, ASCE 7-10
Load Combinations Used : IBC 2015

General Information

Steel Section Name :	**HSS3X3X3/16**
Analysis Method :	Allowable Strength
Steel Stress Grade	
Fy : Steel Yield	46.0 ksi
E : Elastic Bending Modulus	29,000.0 ksi

Overall Column Height	10.170 ft
Top & Bottom Fixity	Top & Bottom Pinned

Brace condition for deflection (buckling) along columns :
X-X (width) axis :
Unbraced Length for X-X Axis buckling = 10.170 ft, K = 1.0
Y-Y (depth) axis :
Unbraced Length for Y-Y Axis buckling = 10.170 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 69.674 lbs * Dead Load Factor
AXIAL LOADS . . .
1/2 OF RIDGE BEAM RXT: Axial Load at 10.170 ft, Xecc = 1.0 in, D = 3.202, S = 8.148 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS	Max. Axial+Bending Stress Ratio =	**0.6589** : 1
	Load Combination	+D+S
	Location of max.above base	10.102 ft
	At maximum location values are . . .	
	Pa : Axial	11.420 k
	Pn / Omega : Allowable	24.083 k
	Ma-x : Applied	0.0 k-ft
	Mn-x / Omega : Allowable	4.522 k-ft
	Ma-y : Applied	-0.9395 k-ft
	Mn-y / Omega : Allowable	4.522 k-ft
PASS	Maximum Shear Stress Ratio =	**0.006526** : 1
	Load Combination	+D+S
	Location of max.above base	0.0 ft
	At maximum location values are . . .	
	Va : Applied	0.0930 k
	Vn / Omega : Allowable	14.252 k

Maximum Load Reactions . .

Top along X-X	0.0930 k
Bottom along X-X	0.0930 k
Top along Y-Y	0.0 k
Bottom along Y-Y	0.0 k

Maximum Load Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination :

Along X-X -0.1533 in at 5.938 ft above base
for load combination : +D+S

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STUD-1 OF STUD-1

Wood Column

Description : EXTERIOR WALL STUD ANALYSIS - 2019-40

Code References

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combinations Used : IBC 2015

General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 8.0 ft
(Used for non-slender calculations)

Wood Species : Douglas Fir - Larch
Wood Grade : Stud

Fb +	700.0 psi	Fv	95.0 psi
Fb -	700.0 psi	Ft	450.0 psi
Fc - Prll	850.0 psi	Density	31.20 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,400.0	1,400.0	1,400.0 ksi
Minimum	510.0	510.0	

Wood Section Name : **2x6**
Wood Grading/Manuf. : Graded Lumber
Wood Member Type : Sawn

Exact Width	**1.50** in	Allow Stress Modification Factors
Exact Depth	**5.50** in	
Area	8.250 in^2	Cf or Cv for Bending : 1.0
Ix	20.797 in^4	Cf or Cv for Compression : 1.0
Iy	1.547 in^4	Cf or Cv for Tension : 1.0
		Cm : Wet Use Factor : 1.0
		Ct : Temperature Factor : 1.0
		Cfu : Flat Use Factor : 1.0
		Kf : Built-up columns : 1.0 *NDS 15.3.2*
		Use Cr : Repetitive ? : Yes

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 1.0 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 8.0 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 14.30 lbs * Dead Load Factor
AXIAL LOADS . . .
SL = 30 psf & up to 18" O.H.: Axial Load at 8.0 ft, Xecc = 1.0 in, D = 0.2410, S = 0.3360 k
BENDING LOADS . . .
Lat. Uniform Load creating Mx-x, W = 0.0640 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.5031 : 1**
Load Combination : +D+0.60W
Governing NDS Forumlanp + Mxx + Myy, NDS Eq. 3.9-
Location of max.above base : 4.242 ft
At maximum location values are . . .
Applied Axial : 0.2553 k
Applied Mx : 0.3061 k-ft
Applied My : -0.01065 k-ft
Fc : Allowable : 945.22 psi

PASS Maximum Shear Stress Ratio = **0.1837 : 1**
Load Combination : +D+0.60W
Location of max.above base : 0.0 ft
Applied Design Shear : 27.927 psi
Allowable Shear : 152.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.2560 k	Bottom along Y-Y	0.2560 k
Top along X-X	0.006010 k	Bottom along X-X	0.006010 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y : 0.2048 in at 4.027 ft above base
for load combination : W Only

Along X-X : -0.1589 in at 4.671 ft above base
for load combination : +D+S

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

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FLR-1 OF FLR-7

Printed: 11 APR 2019, 3:27PM

Wood Beam

Description : TYP FLOOR JOIST- DIST LOAD (OFFICE) - 2019-40

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2015

Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Fb +	900.0 psi
Fb -	900.0 psi
Fc - Prll	1,350.0 psi
Fc - Perp	625.0 psi
Fv	95.0 psi
Ft	575.0 psi

E : Modulus of Elasticity

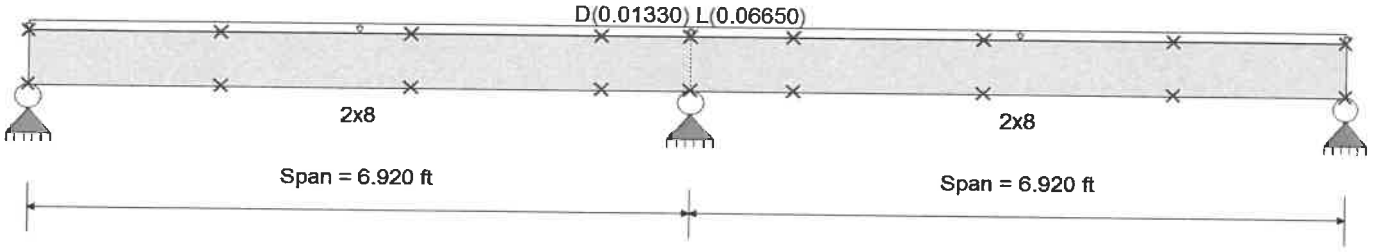
Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	32.210 pcf

Repetitive Member Stress Increase

Beam Bracing : Beam bracing is defined as a set spacing over all spans

Unbraced Lengths

First Brace starts at ft from Left-Most support
Regular spacing of lateral supports on length of beam = 2.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Loads on all spans...
Uniform Load on ALL spans : D = 0.010, L = 0.050 ksf, Tributary Width = 1.330 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.365 : 1	Maximum Shear Stress Ratio	=	0.447 : 1
Section used for this span		2x8	Section used for this span		2x8
fb : Actual	=	449.50 psi	fv : Actual	=	42.48 psi
FB : Allowable	=	1,231.38 psi	Fv : Allowable	=	95.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	0.000 ft	Location of maximum on span	=	6.920 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.019 in	Ratio =	4387 >=360.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360.0
Max Downward Total Deflection	0.023 in	Ratio =	3547 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.213	0.711	0.213
Overall MINimum	0.173	0.575	0.173
D Only	0.041	0.136	0.041
+D+L	0.213	0.711	0.213
+D+0.750L	0.170	0.568	0.170
+0.60D	0.024	0.082	0.024
L Only	0.173	0.575	0.173

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FLR-2 OF FLR-7

Printed: 11 APR 2019, 3:28PM

Wood Beam

Description : TYP FLOOR JOIST - PT LOAD at CNTR (OFFICE) - 2019-40

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2015

Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Fb +	900.0 psi
Fb -	900.0 psi
Fc - Prll	1,350.0 psi
Fc - Perp	625.0 psi
Fv	95.0 psi
Ft	575.0 psi

E : Modulus of Elasticity

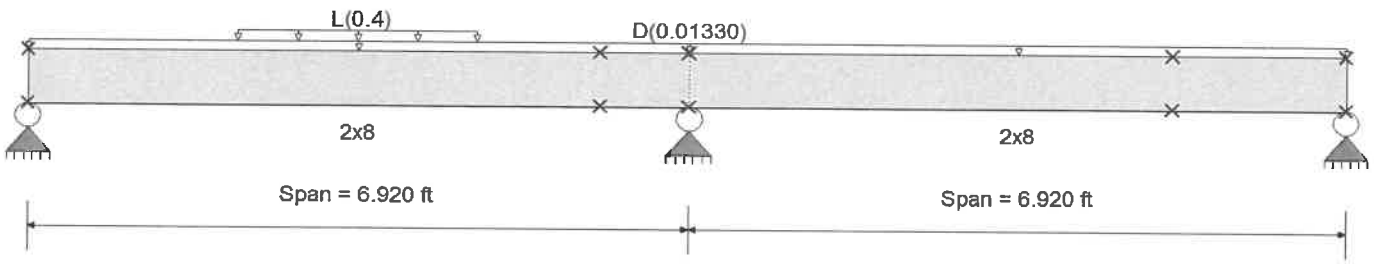
Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	32.210 pcf

Repetitive Member Stress Increase

Beam Bracing : Beam bracing is defined as a set spacing over all spans

Unbraced Lengths

First Brace starts at ft from Left-Most support
Regular spacing of lateral supports on length of beam = 6.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Loads on all spans...
Uniform Load on ALL spans : D = 0.010 ksf, Tributary Width = 1.330 ft
Load for Span Number 1
Uniform Load : L = 0.40 k/ft, Extent = 2.20 -->> 4.70 ft, Tributary Width = 1.0 ft, (2k pt load over 2 joists; 1k on 1 joist (dist))

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.965 : 1	Maximum Shear Stress Ratio	=	0.939 : 1
Section used for this span		2x8	Section used for this span		2x8
fb : Actual	=	1,066.64 psi	fv : Actual	=	89.25 psi
FB : Allowable	=	1,105.75 psi	Fv : Allowable	=	95.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.209 ft	Location of maximum on span	=	6.340 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.106 in	Ratio =	780 >=360.
Max Upward Transient Deflection	-0.044 in	Ratio =	1895 >=360.
Max Downward Total Deflection	0.111 in	Ratio =	749 >=240.
Max Upward Total Deflection	-0.040 in	Ratio =	2070 >=240.

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.453	0.814	-0.090
Overall MINimum	0.412	0.678	-0.026
D Only	0.041	0.136	0.041
+D+L	0.453	0.814	-0.049
+D+0.750L	0.350	0.644	-0.026

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Engineer: MCL
Project ID: 2019-40
Project Descr: 28 x 64 Modular Classroom

FLR-3 OF FLR-7

Printed: 11 APR 2019, 3:28PM

Wood Beam

Description : TYP FLOOR JOIST - PT LOAD at CNTR (OFFICE) - 2019-40

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+0.60D	0.024	0.082	0.024
L Only	0.412	0.678	-0.090

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Project Descr: 28 x 64 Modular Classroom

FLR-4 OF FLR-7

Printed: 11 APR 2019, 3:30PM

Wood Beam

File = C:\Projects\ENERCA~4\2019-4~2\2019-40 Struct Calcs.ec6
Software copyright ENERCALC, INC. 1983-2018, Build:10.18.12.13 .
Lic. # : KW-06009251 Licensee : MODERN BUILDING SYSTEMS

Description : TYP FLOOR JOIST - PT LOAD at SUPPORT (OFFICE) - 2019-40

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2015

Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Beam bracing is defined as a set spacing over all spans

Fb +	900.0 psi
Fb -	900.0 psi
Fc - Prll	1,350.0 psi
Fc - Perp	625.0 psi
Fv	110.0 psi
Ft	575.0 psi

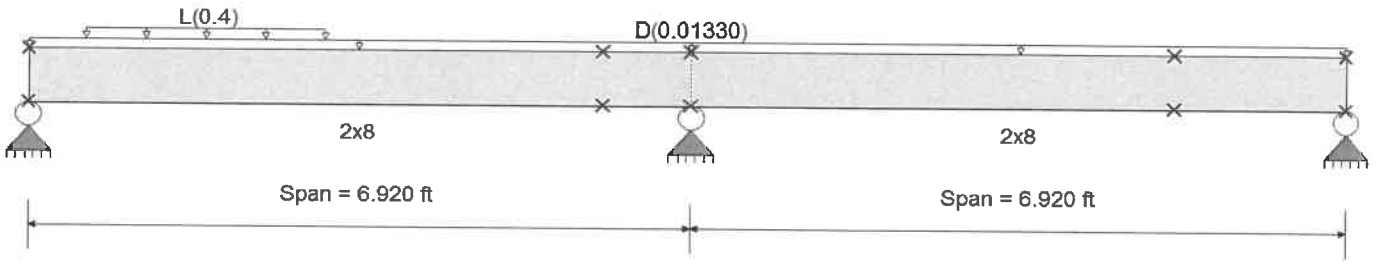
E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	32.210 pcf

Repetitive Member Stress Increase

Unbraced Lengths

First Brace starts at ft from Left-Most support
Regular spacing of lateral supports on length of beam = 6.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Loads on all spans...
Uniform Load on ALL spans : D = 0.010 ksf, Tributary Width = 1.330 ft
Load for Span Number 1
Uniform Load : L = 0.40 k/ft, Extent = 0.60 –>> 3.10 ft, Tributary Width = 1.0 ft, (2k pt load over 2 joists; 1k on 1 joist (dist))

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.844 : 1	Maximum Shear Stress Ratio	=	0.883 : 1
Section used for this span		2x8	Section used for this span		2x8
fb : Actual	=	932.98 psi	fv : Actual	=	97.17 psi
FB : Allowable	=	1,105.75 psi	Fv : Allowable	=	110.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	2.281 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.084 in	Ratio =	993 >=360.
Max Upward Transient Deflection	-0.029 in	Ratio =	2836 >=360.
Max Downward Total Deflection	0.088 in	Ratio =	942 >=240.
Max Upward Total Deflection	-0.026 in	Ratio =	3240 >=240.

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.714	0.523	-0.060
Overall MINimum	0.673	0.387	0.024
D Only	0.041	0.136	0.041
+D+L	0.714	0.523	-0.019
+D+0.750L	0.545	0.426	-0.004

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FLR-5 OF FLR-7

Printed: 11 APR 2019, 3:30PM

Wood Beam

Description : TYP FLOOR JOIST - PT LOAD at SUPPORT (OFFICE) - 2019-40

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+0.60D	0.024	0.082	0.024
L Only	0.673	0.387	-0.060

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Project Title: EUGENE SD V
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Project ID: 2019-40
Project Descr: 28 x 64 Modular Classroom

FLR-6 OF FLR-7

Printed: 11 APR 2019, 3:31PM

Wood Beam

Description : TYP FLOOR JOIST- SUPT BEAM (OFFICE) - 2019-40

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2015

Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Fb +	900.0 psi
Fb -	900.0 psi
Fc - Prll	1,350.0 psi
Fc - Perp	625.0 psi
Fv	110.0 psi
Ft	575.0 psi

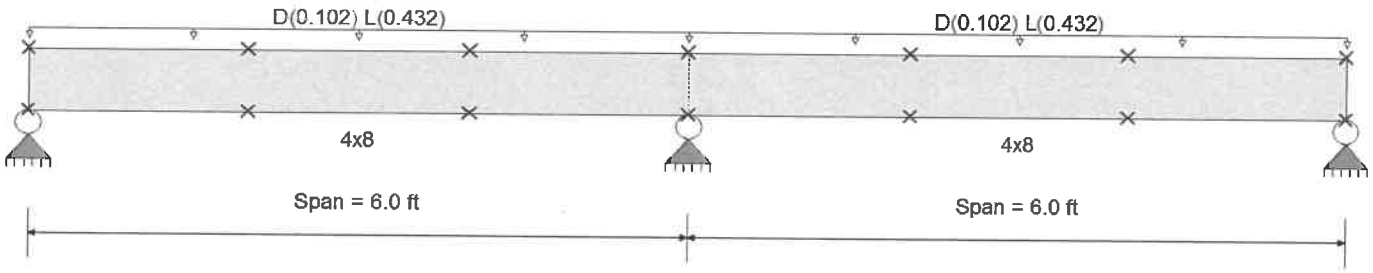
E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	32.210 pcf

Beam Bracing : Beam bracing is defined as a set spacing over all spans

Unbraced Lengths

First Brace starts at ft from Left-Most support
Regular spacing of lateral supports on length of beam = 2.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.1020, L = 0.4320 , Tributary Width = 1.0 ft, (Joist Rxt 711# @ 1.33' = 535 plf)
Load for Span Number 2
Uniform Load : D = 0.1020, L = 0.4320 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.814 : 1**	Maximum Shear Stress Ratio	=	**0.913 : 1**
Section used for this span		**4x8**	Section used for this span		**4x8**
fb : Actual	=	950.46 psi	fv : Actual	=	100.38 psi
FB : Allowable	=	1,166.97 psi	Fv : Allowable	=	110.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	6.000 ft	Location of maximum on span	=	5.397 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.030 in	Ratio =	2417 >=360.
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360.0
Max Downward Total Deflection	0.037 in	Ratio =	1935 >=240.
Max Upward Total Deflection	0.000 in	Ratio =	0 <240.0

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	1.214	4.048	1.214
Overall MINimum	0.972	3.240	0.972
D Only	0.242	0.808	0.242
+D+L	1.214	4.048	1.214
+D+0.750L	0.971	3.238	0.971

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Engineer: MCL
Project ID: 2019-40
Project Descr: 28 x 64 Modular Classroom

FLR-7 OF FLR-7

Printed: 11 APR 2019, 3:31PM

Wood Beam

Description : TYP FLOOR JOIST- SUPT BEAM (OFFICE) - 2019-40

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+0.60D	0.145	0.485	0.145
L Only	0.972	3.240	0.972

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JOB # 2019-40 Eugene SD V		
SHEET NO LFA-1	OF LFA-4	
CALCULATED BY MCL	DATE	4/12/2019
CHECKED BY	DATE	
SCALE		

SHEAR DIAPHRAGM DESIGN

BUILDING INFORMATION:

BUILDING LENGTH (L) =	64.00 '
BUILDING WIDTH (B) =	27.67 '
SHEAR WALL PLATE HEIGHT =	8.00 '
ROOF OVERHANG =	1.00 '
TRANSVERSE LOADING WIND =	10309 #
LONGITUDINAL LOADING SEISMIC =	4539 #

TRANSVERSE **(WIND CONTROLS)**

WIND = 10309 #

ROOF = WIND / 2 = 5155 #

81 plf

Vrf = ROOF / 2 WALLS = 2577 #

2577 #

Lrf = 27.67 '

v rf = 93 plf <210 plf (WIND) OK

USE MIN 7/16" SHTG w/ 15 GA STAPLES AT 6" EDGE & 12" FIELD (UNBLOCKED) (ESR-1539, TABLE 6) UPGRADE TO 6" & 8". AT ROOF

SHEAR WALL PIER LENGTHS

17.83 '	5.83 '	Lwall =	23.66 '
0.00 '	0.00 '		
0.00 '	0.00 '	*v* wall =	109 plf

<215 plf (WIND) OK

USE MIN 7/16" SHTG w/ 15 GA STAPLES AT 6" EDGE & 12" FIELD (BLOCKED) (ESR-1539, TABLE 8)

Vflr = 2577 #

Lflr = 27.67 '

v flr = 93 plf <265 plf (WIND) - OK

USE MIN 19/32" SHTG w/ 8d (.113) AT 6" EDGE & 12" FIELD (UNBLOCKED) (ESR-1539, TABLE 6) UPGRADE TO 23/32" SHTG AT 6" & 8". AT FLOOR

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JOB # 2019-40 Eugene SD V

SHEET NO LFA-2	OF LFA-4	
CALCULATED BY MCL	DATE	4/12/2019
CHECKED BY	DATE	
SCALE		

SHEAR DIAPHRAGM DESIGN (CON'T)

LONGITUDINAL **(SEISMIC CONTROLS)**

SEISMIC ROOF = 4539 #

Vrf = ROOF / 2 WALLS = 2270 #
Lrf = 64.00 '

2270 #

v rf = 35 plf <110 plf (CASE 3) (SEISMIC) OK

USE MIN 7/16" SHTG w/ 15 GA STAPLES AT 6" EDGE & 12" FIELD (UNBLOCKED) (ESR-1539, TABLE 6) UPGRADE TO 6" & 8". AT ROOF

SHEAR WALL PIER LENGTHS

6.00 '	4.00 '	Lwall =	31.00 '
5.50 '	5.50 '		
4.00 '	6.00 '	*v* wall =	73 plf

<155 plf (SEISMIC) OK

USE MIN 7/16" SHTG w/ 15 GA STAPLES AT 6" EDGE & 12" FIELD (BLOCKED) (ESR-1539, TABLE 8)

Vflr = 2270 #
Lflr = 64.00 '

v flr = 35 plf <140 plf (CASE 3) (SEISMIC) - OK

USE MIN 19/32" SHTG w/ 8d (.113) AT 6" EDGE & 12" FIELD (UNBLOCKED) (ESR-1539, TABLE 6) UPGRADE TO 23/32" SHTG AT 6" & 8". AT FLOOR

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JOB # 2019-40 Eugene SD V

SHEET NO LFA-3	OF LFA-4	
CALCULATED BY MCL	DATE	4/12/2019
CHECKED BY	DATE	
SCALE		

SHEARWALL HOLD DOWNS (TRANSVERSE)

	UNIT SHEAR =	109 plf
	PIER WIDTH =	5.83 '
	ROOF TRIB WIDTH =	3.00 '
Mot =	109plf X 5.83' X 8' =	5080 lb-ft
Mr =	[3'(12psf)+8'(10psf)] X 5.83'^2/2 X 0.6	1183 lb-ft
T=C=M/b	(5080 - 1183)lb-ft / (5.83 - 0.5)'	731 #
	PER NAIL VALUE (SIMP C-2017 PG 305)	171 # DF
	N = 731# / 171# EA =	5 NAILS 4 (MIN)

USE MIN SIMP CS-18 w/ (5) N-10's EA END

SHEARWALL HOLD DOWNS (LONGIT)

	UNIT SHEAR =	73 plf
	PIER WIDTH =	4.00 '
	ROOF TRIB WIDTH =	7.92 '
Mot =	73plf X 4' X 8' =	2343 lb-ft
Mr =	[7.92'(12psf)+8'(10psf)] X 4'^2/2 X 0.6	840 lb-ft
T=C=M/b	(2343 - 840)lb-ft / (4 - 0.5)'	429 #
	PER NAIL VALUE (SIMP C-2017 PG 305)	171 # DF
	N = 429# / 171# EA =	4 NAILS 4 (MIN)

USE MIN SIMP CS-18 w/ (4) N-10's EA END

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JOB # 2019-40 Eugene SD V

SHEET NO LFA-4	OF LFA-4	
CALCULATED BY MCL	DATE	4/12/2019
CHECKED BY	DATE	
SCALE		

SIDEWALL TOP PLATE SPLICE

T=C=M/b	(81plf X 64'^2)/(8 X 27.67')	1490 #	
PER NAIL VALUE (NDS 2015 TABLE 12N, Cd=1.6) =		155 #	DF
N = 1490# / 155# EA =		12 NAILS	12 (MIN)

USE MIN 4 ft SPLICE w/ (12) 12d's (.131) EA END

ENDWALL TOP PLATE SPLICE

T=C=M/b	(164plf X 27.67'^2)/(8 X 64')	245 #	
PER NAIL VALUE (SIMP C-2017 PG 305)		171 #	DF
N = 245# / 171# EA =		4 NAILS	4 (MIN)

USE MIN SIMP CS-18 w/ (4) N-10's EA END

SHEAR TRANSFER AT M.L.

$v = \frac{Vay'}{I} = \frac{2577\# \text{ X } (64' \text{ X } 27.67' / 2)(27.67' / 4)}{(64' \text{ X } 27.67'^3) / 12} =$ 140 plf

V = 140plf X (64'/2) / 2 X 2 = 4471 #

PER BOLT VALUE (NDS 2015 TABLE 12A) (600# X 1.6)=		960 #	LVL or GLB: G=0.50
N= 4471# / 960# EA =		6 BOLTS	6 (MIN)

USE MIN (6) - 5/8 in DIA M.B.'s AT RIDGE BEAM

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JOB # 2019-40 Eugene SD V

SHEET NO FDN-1 OF FDN-7

CALCULATED BY MCL 4/12/2019

CHECKED BY DATE

FOUNDATION DESIGN

MODULAR

BUILDING LENGTH (L) =	64.00 '	SITE TYPE =	ASPHALT
BUILDING WIDTH (B) =	27.67 '	MAX BRG PRESSURE =	2000 psf
FRAME RAIL OFFSET =	N/A		
FLOOR TRIB WIDTH =	6.92 '		
ROOF OVERHANG =	1.00 '		
ROOF TRIB WIDTH =	7.92 '		
WALL PLATE HEIGHT =	8.00 '	(ABOVE F.F.)	
TRANSVERSE WIND/SEIS. =	10309 #		
LONGIT. WIND/SEIS. =	5359 #		
WIND UPLIFT =	27099 #		
SNOW LOAD =	25 psf		
BUILDING WEIGHT =	49764 #	(No Snow)	
F.F. HEIGHT	2.50 '	(ABOVE GRADE)	
AVG. ROOF HEIGHT	13.00 '	(ABOVE GRADE)	
PIER PAD AREA	1.78 ft^2		

AT EXTERIOR FTG

LOAD TO SKIRTWALL 0 plf

DL = 7.92'(12 psf)+8'(10 psf)+6.92'/2(10 psf) = 210 plf

LL = 6.92' / 2 X 50 psf = 173 plf

SL = 7.92' X 25 psf = 198 plf

D + L = 382 plf

D + S = 407 plf

D + 0.75L +0.75S = 488 plf **CONTROLS**

PIER SPACING = 6.00 '

q = (488plf - 0plf) X (6') / 1.78 ft^2 = 1644 psf

∴ OK on ASPHALT

USE +/- 16 in. SQ. PADS OR 2 x 12 x 24 in. P.T. PADS AT 6' O.C.

AT INTERIOR FTG

DL = 6.92' (10 psf) = 69 plf

LL = 6.92' (50 psf) = 346 plf

D + L = 415 plf **CONTROLS**

PIER SPACING = 6.00 '

q = 415plf X (6') / 1.78 ft^2 = 1399 psf

∴ OK on ASPHALT

USE +/- 16 in. SQ. PADS OR 2 x 12 x 24 in P.T. PADS AT 6' O.C.

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JOB # 2019-40 Eugene SD V

SHEET NO FDN-2	OF FDN-7
CALCULATED BY MCL	4/12/2019
CHECKED BY	DATE
SCALE	

AT ENDWALL COLUMN FTG

COLUMN DL = 1921 #
COLUMN SL = 4074 #
DL = [3' (10 psf) + 10.5' (10 psf)] X 6.92' = 934 #
LL = 3' (50 psf) X 6.92' = 1037 #

D + L = 3892 #
D + S = 6929 # **CONTROLS**
D + 0.75L +0.75S = 6688 #

<10000# Therefore OK. (See FDN- 3,5)

AT MIDSPAN COLUMN FTG

COLUMN DL = 6404 #
COLUMN SL = 13580 #
DL = 6.92' (10 psf) (6') = 415 #
LL = 6.92' (50 psf) (6') = 2075 #

D + L = 8893 #
D + S = 20399 # **CONTROLS**
D + 0.75L +0.75S = 18560 #

<24000# Therefore OK. (See FDN- 3,6,7)

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JOB # 2019-40 Eugene SD V

SHEET NO FDN-3	OF FDN-7
CALCULATED BY MCL	4/12/2019
CHECKED BY	DATE
SCALE	

@ ENDWALL COLUMN FOOTING

TRY 2 (FLAT) P.T. HF #2, 6 x 8 x 4.00 ' L

Width (b) each = 0.63 '

Pmax = 2000psf X 2 X 0.63' X 4' = 10000 #

DL % = 41%
SL % = 59%

w_{DL} = 2000psf X 0.63' X 0.41 = 515 plf
w_{SL} = 2000psf X 0.63' X 0.59 = 735 plf

@ MIDSPAN COLUMN FOOTING

TRY 5 (FLAT) P.T. HF #2, 4 x 8 x 4.00 ' L

Width (b) each = 0.60 '

Pmax = 2000psf X 5 X 0.6' X 4' = 24000 #

DL % = 33%
SL % = 67%

W_{DL} = 2000psf X 0.6' X 0.33 = 401 plf
W_{SL} = 2000psf X 0.6' X 0.67 = 799 plf

@ MIDSPAN INTERMEDIATE POST

TRY 2 DF #2, 6 x 10 x 3.00 ' L

Width (b) each = 0.46 '

w_{DL} = 2000psf X 4' X 0.33 / 2 MEMBERS = 1337 plf
w_{SL} = 2000psf X 4' X 0.67 / 2 MEMBERS = 2663 plf

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JOB # 2019-40 Eugene SD V

SHEET NO FDN-4	OF FDN- 7
CALCULATED BY MCL	4/12/2019
CHECKED BY	DATE
SCALE	

MOD TRANSVERSE LOADING ANCHORAGE

N = 10309# /2094# = 5 ANCHORS

Mot = 10309# / 2 X 13' + 10309# / 2 X 2.5' + 27099# X 27.67' / 2 = 455 k-ft

Mr = 49764# X 27.67' / 2 = 688 k-ft

w/ ANCHORS = 5 X 2094# X 27.67' = 290 k-ft

TOTAL = (688k-ft X 0.6) + 290k-ft = 703 k-ft
> 455k-ft therefore OK

MIN NUMBER = 5 ANCHORS

USE MIN (5) HOLD DOWNS AT EA SIDEWALL

MOD LONGITUDINAL LOADING ANCHORAGE

N = 5359# /2094# = 3 ANCHORS

Mot = 5359# / 2 X 13' + 5359# / 2 X 2.5 ' + 27099# X 64' / 2 = 909 k-ft

Mr = 49764# X 64' / 2 = 1592 k-ft

w/ ANCHORS = 3 X 2094# X 64' = 402 k-ft

TOTAL = (1592k-ft X 0.6) + 402k-ft = 1358 k-ft
> 909k-ft therefore OK

MIN NUMBER = 3

USE MIN (3) HOLD DOWNS AT EA ENDWALL

MOBILE UNIT CONNECTION TO CHASSIS

(TRANSVERSE LOADING) T = 455 k-ft - (0.6) X 688 k-ft / 27.67 ft /2 = 754 # PER STRAP

PER NAIL VALUE (SIMP C-2017 PG 302) 211 # DF

N= 12 NAILS 12 (MIN)

N/A

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Project Title: EUGENE SD V
Engineer: MCL
Project ID: 2019-40
Project Descr: 28 x 64 Modular Classroom

FDN-5 OF FDN-7

Printed: 11 APR 2019, 3:32PM

Wood Beam

Description : ENDWALL COLUMN FTG - 2019-40

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2015

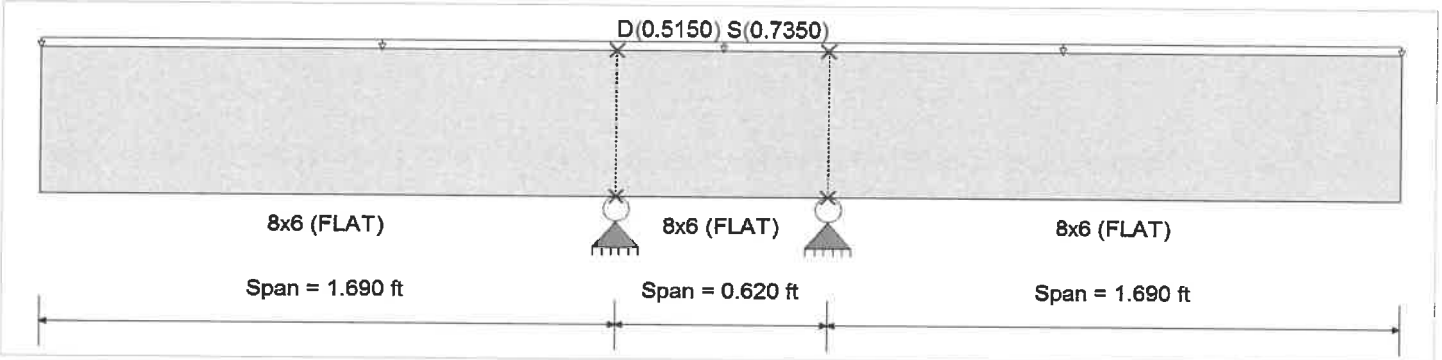
Wood Species : Hem Fir
Wood Grade : No.2

Beam Bracing : Completely Unbraced

Fb +	675.0 psi
Fb -	675.0 psi
Fc - Prll	500.0 psi
Fc - Perp	405.0 psi
Fv	95.0 psi
Ft	350.0 psi

E : Modulus of Elasticity

Ebend- xx	1,100.0 ksi
Eminbend - xx	400.0 ksi
Density	27.70 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...
Uniform Load on ALL spans : D = 0.5150, S = 0.7350 k/ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.730 : 1	Maximum Shear Stress Ratio	=	0.514 : 1
Section used for this span		8x6 (FLAT)	Section used for this span		8x6 (FLAT)
fb : Actual	=	566.50 psi	fv : Actual	=	56.16 psi
FB : Allowable	=	776.25 psi	Fv : Allowable	=	109.25 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	1.690 ft	Location of maximum on span	=	1.236 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.020 in	Ratio =	2078 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.033 in	Ratio =	1222 >=240.
Max Upward Total Deflection	-0.001 in	Ratio =	5808 >=240.

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum		2.500	2.500	
Overall MINimum		1.470	1.470	
D Only		1.030	1.030	
+D+S		2.500	2.500	
+D+0.750S		2.133	2.133	
+0.60D		0.618	0.618	
S Only		1.470	1.470	

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Project Title: EUGENE SD V
Engineer: MCL
Project ID: 2019-40
Project Descr: 28 x 64 Modular Classroom

FDN-6 OF FDN-7

Printed: 11 APR 2019, 3:32PM

Wood Beam

Description : CNTR COLUMN FTG - 2019-40

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2015

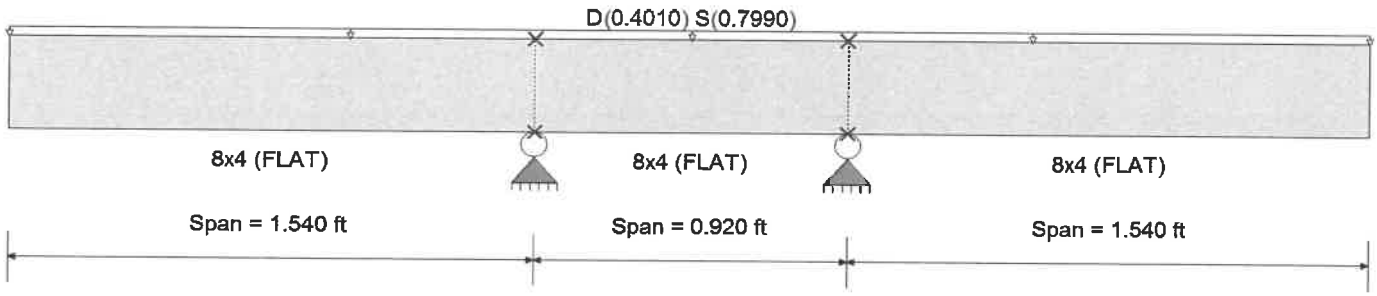
Wood Species : Hem Fir
Wood Grade : No.2

Beam Bracing : Completely Unbraced

Fb +	1,160.0 psi
Fb -	1,160.0 psi
Fc - Prll	1,300.0 psi
Fc - Perp	425.0 psi
Fv	95.0 psi
Ft	551.0 psi

E : Modulus of Elasticity

Ebend- xx	1,300.0 ksi
Eminbend - xx	470.0 ksi
Density	27.70 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...
Uniform Load on ALL spans : D = 0.4010, S = 0.7990 k/ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.865 : 1	Maximum Shear Stress Ratio	=	0.815 : 1
Section used for this span		8x4 (FLAT)	Section used for this span		8x4 (FLAT)
fb : Actual	=	1,153.59 psi	fv : Actual	=	89.05 psi
FB : Allowable	=	1,334.00 psi	Fv : Allowable	=	109.25 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	1.540 ft	Location of maximum on span	=	1.255 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.061 in	Ratio =	602 >=360
Max Upward Transient Deflection	-0.005 in	Ratio =	2279 >=360
Max Downward Total Deflection	0.092 in	Ratio =	400 >=240.
Max Upward Total Deflection	-0.007 in	Ratio =	1517 >=240.

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum		2.400	2.400	
Overall MINimum		1.598	1.598	
D Only		0.802	0.802	
+D+S		2.400	2.400	
+D+0.750S		2.001	2.000	
+0.60D		0.481	0.481	
S Only		1.598	1.598	

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Project Title: EUGENE SD V
Engineer: MCL
Project ID: 2019-40
Project Descr: 28 x 64 Modular Classroom

FDN-7 OF FDN-7

Printed: 11 APR 2019, 3:33PM

Wood Beam

Description : CNTR COLUMN FTG INTERMEDIATE POST- 2019-40

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2015

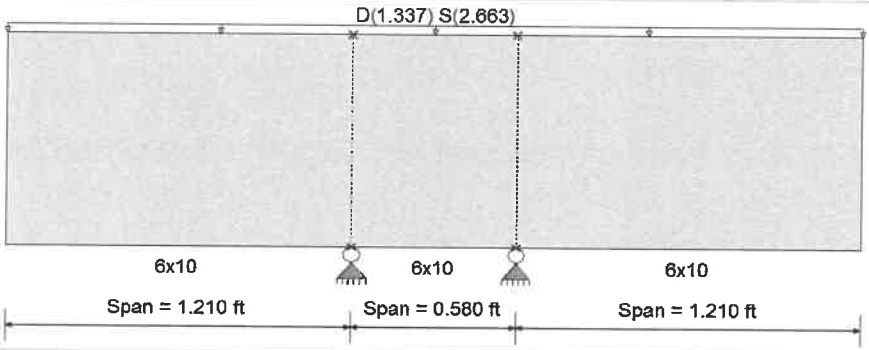
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Beam Bracing : Completely Unbraced

Fb +	875.0 psi
Fb -	875.0 psi
Fc - Prll	600.0 psi
Fc - Perp	625.0 psi
Fv	95.0 psi
Ft	425.0 psi

E : Modulus of Elasticity

Ebend- xx	1,300.0 ksi
Eminbend - xx	470.0 ksi
Density	32.210 pcf



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Loads on all spans...
Uniform Load on ALL spans : D = 1.337, S = 2.663 k/ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.422 : 1	Maximum Shear Stress Ratio	=	0.834 : 1
Section used for this span		6x10	Section used for this span		6x10
fb : Actual	=	424.74 psi	fv : Actual	=	91.07 psi
FB : Allowable	=	1,005.39 psi	Fv : Allowable	=	109.25 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	0.000 ft	Location of maximum on span	=	0.793 ft
Span # where maximum occurs	=	Span # 3	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.005 in	Ratio =	6240 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.007 in	Ratio =	4154 >=240.
Max Upward Total Deflection	-0.000 in	Ratio =	17256 >=240.

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum		6.000	6.000	
Overall MINimum		3.995	3.995	
D Only		2.006	2.006	
+D+S		6.000	6.000	
+D+0.750S		5.001	5.001	
+0.60D		1.203	1.203	
S Only		3.995	3.995	

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JOB #	2019-40 Eugene SD V		
SHEET NO	L-1	OF	L-5
CALCULATED BY	MCL	DATE	4/11/2019
CHECKED BY		DATE	
SCALE			

WIND ANALYSIS FOR ENCLOSED SIMPLE DIAPHRAGM LOW-RISE BUILDINGS - BASED ON IBC 2015 / ASCE 7-10 CHAPTER 28, PART 2

INPUT DATA

Risk Category =	RC	II		(Table 1.5-1)
Basic Wind Speed =	Vult	140	Vasd =108	mph (3 sec gust)(Fig 26.5-1)
Exposure Category =	EC	B		(Sec. 26.7)
Topographic Factor =	Kzt	1.00		(Sec. 26.8 & 26.8-1)
Adjustment Factor =	Lambda	1.00		(Sec 28.6-1)
Building Length =	L	64.00	ft	
Building width =	B	27.67	ft	3:16:09 PM
Building Height to Eave =	he	11.00	ft	
Building Height to Ridge =	hr	15.00	ft	
Eave Overhang	oh	1.00	ft	
Building End Zone =	a	3.00	ft	
Roof Pitch =	RP	2.0	:12	
Approx. Roof Angle =	RA	10	degrees	(Ref. Fig. 28.6-1)

OUTPUT

Wind Pressure, ps30 (Fig. 28.6-1)

Horizontal	A-ps30	35.10	psf
Horizontal	B-ps30	-14.50	psf
Horizontal	C-ps30	23.30	psf
Horizontal	D-ps30	-8.50	psf
Vertical	E-ps30	-37.30	psf
Vertical	F-ps30	-22.80	psf
Vertical	G-ps30	-26.00	psf
Vertical	H-ps30	-17.50	psf
O.H.	Eoh-ps30	-52.30	psf
O.H.	Goh-ps30	-40.90	psf

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JOB #	2019-40 Eugene SD V		
SHEET NO	L-2	OF	L-5
CALCULATED BY	MCL	DATE	4/11/2019
CHECKED BY		DATE	
SCALE			

Wind Pressure, ps

ps = Lambda * Kzt * ps30

				Min Loading
Horizontal	A-ps	35.10	psf	16.00
Horizontal	B-ps	-14.50	psf	8.00
Horizontal	C-ps	23.30	psf	16.00
Horizontal	D-ps	-8.50	psf	8.00
Vertical	E-ps	-37.30	psf	0.00
Vertical	F-ps	-22.80	psf	0.00
Vertical	G-ps	-26.00	psf	0.00
Vertical	H-ps	-17.50	psf	0.00
O.H.	Eoh-ps	-52.30	psf	
O.H.	Goh-ps	-40.90	psf	

CASE A - Transverse Wind				**Min Loading**
	A-tw	2317	lbs	1056 lbs
Set to 0	B-tw	-348	lbs	192 lbs
	C-tw	14865	lbs	10208 lbs
Set to 0	D-tw	-1972	lbs	1856 lbs
Total		17182	lbs (SD)	13312 lbs
Convert to ASD x		0.6		0.6
Total Force on building side L =		**10309**	**lbs (ASD)**	**7987** lbs

CASE B - Longitudinal Wind				
	A-lw	1211	lbs	552 lbs
	C-lw	7612	lbs	5227 lbs
Total		8823	lbs (SD)	5779 lbs
Convert to ASD x		0.6		0.6
Total Force on building end B =		**5294**	**lbs (ASD)**	**3468 lbs**

CASE A - Transverse Uplift			
w/ gable end OH uplift	E-up	-3612	lbs
w/ gable end OH uplift	F-up	-2208	lbs
w/ gable end OH uplift	G-up	-21223	lbs
w/ gable end OH uplift	H-up	-14285	lbs
sidewall eaves OH uplift	Eoh-up	-451	lbs
sidewall eaves OH uplift	Goh-up	-3387	lbs
Total		**-45166**	**lbs (SD)**
Convert to ASD x		0.6	
Total Uplift Force =		**-27099**	**lbs (ASD)**

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JOB #2019-40 Eugene SD V		
SHEET NO L-3	OF	L-5
CALCULATED BY MCL	DATE	4/12/2019
CHECKED BY	DATE	
SCALE		

28' x 64' MODULAR

SEISMIC per IBC 2015 / ASCE 7-10

ASCE 7-10 Table 1.5-1	Risk Category		II	
ASCE 7-10 Table 1.5-2	Seismic Importance Factor	Ie =	1.00	
ASCE 7-10 Table 12.2-1	Response Modification Factor	R =	6.50	
USGS Data	Spectral Response Accel.	Ss =	1.500	
ASCE 7-10 11.4.2	Site Class D			
ASCE 7-10 Table 11.4-1	Site Coefficient	Fa =	1.000	
ASCE 7-10 Eqn. 11.4-1	Sms = Ss * Fa	Sms =	1.500	
ASCE 7-10 Eqn 11.4-3	Sds = 2/3 * Sms	Sds =	1.000	
ASCE 7-10 Table 11.6-1	Seismic Design Cat.		D	
ASCE 7-10 Eqn 12.8-1	$V = Cs * W = (Sds /(R/Ie) * W)* 0.7$	V =	0.108	W
IBC 2015 1605.3.1	Note: 0.7 converts to ASD			
ASCE 7-10 Eqn 12.8-5		Vmin =	0.010	W

Building Weight

	Roof (psf)		Exterior Wall (psf)
Comp	2.5	7/16 Shtg	1.5
7/16 Shtg	1.5	2x6 @ 16	1.7
2x10 @24	1.9	R-21U	1.3
R-38L	1.8	5/8 Gyp	2.8
Drp Grd	1.8	FC Lap	2.5
	0		0
	0		0
Total	9.5		9.8

	Interior Wall (psf)		Floor (psf)
5/8 Gyp	2.8	Misc	1.0
2x4 @ 16	1.1	23/32 Shtg	2.5
5/8 Gyp	2.8	2x8 @ 16	2.2
	0	R-30U	1.6
	0		0
	0		0
Total	6.7		7.3

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JOB #2019-40 Eugene SD V

SHEET NO L-4	OF	L-5	
CALCULATED BY	MCL	DATE	4/12/2019
CHECKED BY		DATE	
SCALE			

Building Weight (con't)

No Snow	29.67 '		66.00 '	0.0 psf	=	0	lbs
Roof =	29.67 '		66.00 '	9.5 psf	=	18603	lbs
Ext. Wall =	8.00 '		183.34 '	9.8 psf	=	14374	lbs
Int. Wall =	8.00 '		72.00 '	6.7 psf	=	3859	lbs
Floor =	27.67 '		64.00 '	7.3 psf	=	12927	lbs
Chassis =					=	0	lbs
					=	0	lbs
Total					**W=**	**49764**	**lbs**

Wr = Total DL tributary to roof 27720 lbs
W1 = Total DL tributary to floor 22044 lbs

Fx Story (Shearwall) Force Table

Story	Height	Weight		Story Force - k Fx= wx*hx/ (∑ wx*hx)*V	Fx Coef = V*hx/(∑ wx*hx)	Story Shear
	(hx)	(wx)	(wx*hx)			(Vx)
R	11.00 '	27.72 k	305 k-ft	**4.54 k**	0.164	4.54 k
1	2.50 '	22.04 k	55 k-ft	**0.82 k**	0.037	5.36 k
Grade	0.00 '					
Sum (∑)		**49.76 k**	**360 k-ft**	**V= 5.36 k**		

Shear Value Comparison	OK

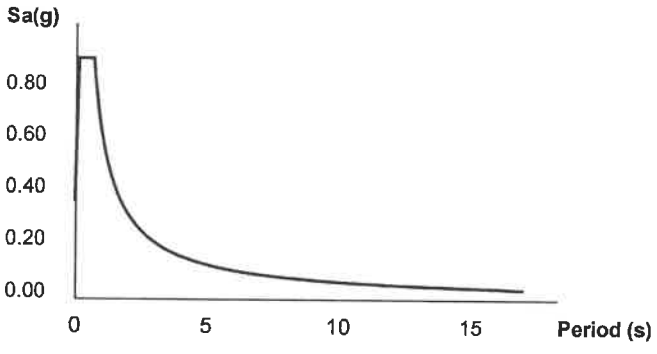
L-5 OF L-5

Hazards by Location

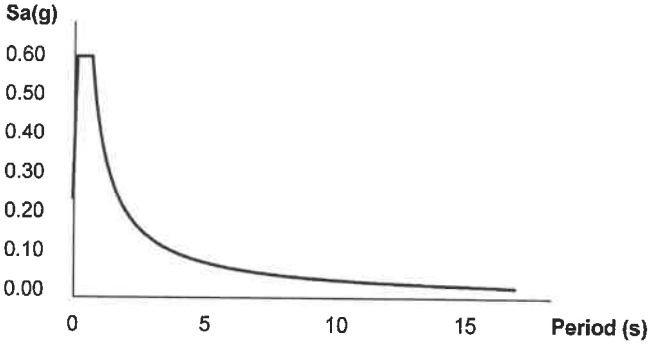
Search Information

Address:	1155 Crest Dr, Eugene, OR 97405, USA
Coordinates:	44.01602099999999, -123.110275
Elevation:	837 ft
Timestamp:	2019-04-12T17:44:42.245Z
Hazard Type:	Seismic
Reference Document:	ASCE7-10
Risk Category:	II
Site Class:	D

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	0.777	MCE_R ground motion (period=0.2s)
S_1	0.408	MCE_R ground motion (period=1.0s)
S_{MS}	0.924	Site-modified spectral acceleration value
S_{M1}	0.649	Site-modified spectral acceleration value
S_{DS}	0.616 < 1.000 ∴ OK	Numeric seismic design value at 0.2s SA
S_{D1}	0.433	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	D	Seismic design category
F_a	1.189	Site amplification factor at 0.2s
F_v	1.592	Site amplification factor at 1.0s
CR_S	0.845	Coefficient of risk (0.2s)
CR_1	0.831	Coefficient of risk (1.0s)

ULTIMATE FRICTION FACTORS AND ADHESION FOR DISSIMILAR MATERIALS
(NAVFAC DM 7.2, Table 1, p7.2-63)

Interface Materials	Friction factor	Friction angle, degrees
Mass concrete on the following foundation materials:		
Clean sound rock	0.70	35
Clean gravel, gravel-sand mixtures, coarse sand	0.55 to 0.60	29 to 31
Clean fine to medium sand, silty medium to coarse sand, silty or clayey gravel	0.45 to 0.55	24 to 29
Clean fine sand, silty or clayey fine to medium sand	0.35 to .045	19 to 24
Fine sandy silt, non-plastic silt	0.30 to 0.35	17 to 19
Very stiff and hard residual or pre-consolidated clay	0.40 to 0.50	22 to 26
Medium stiff and stiff clay and silty clay	0.30 to 0.35	17 to 19
(Masonry on foundation materials has same friction factors.)		
Steel sheet piles against the following soils:		
Clean gravel, gravel-sand mixtures, well-graded rock fill with spalls	0.40	22
Clean sand, silty sand-gravel mixture, single size hard rock fill	0.30	17
Silty sand, gravel or sand mixed with silt or clay	0.25	14
Fine sandy silt, non-plastic silt	0.20	11
Formed concrete or concrete sheet piling against the following soils:		
Clean gravel, gravel-sand mixtures, well-graded rock fill with spalls	0.40 to 0.50	22 to 26
Clean sand, silty sand-gravel mixture, single size hard rock fill	0.30 to 0.40	17 to 22
Silty sand, gravel or sand mixed with silt or clay	0.30	17
Fine sandy silt, non-plastic silt	0.25	14
Various structural materials:		
Masonry on masonry, igneous and metamorphic rocks:		
Dressed soft rock on dressed soft rock	0.70	35
Dressed hard rock on dressed soft rock	0.65	33
Dressed hard rock on dressed hard rock	0.55	29
Masonry on wood (cross grain)	0.50	26
Steel on steel at sheet pile interlocks	0.30	17

Interface Materials (Cohesion)	Adhesion C_a (psf)
Very soft cohesive soil (0 - 250 psf)	0 - 250
Soft cohesive soil (250 - 500 psf)	250 - 500
Medium stiff cohesive soil (500 - 1000 psf)	500 - 750
Stiff cohesive soil (1000 - 2000 psf)	750 - 950
Very stiff cohesive soil (2000 - 4000 psf)	950 - 1,300

CO

PGM Inc
TIE DOWNS
ENGINEERED TIE DOWN SYSTEM

GENERAL NOTES

DESIGN LOADS:

DESIGN LOADS:

* WIND ——— 15 PSF (70 MPH EXPOSURE "C") CAC T-25 and COMPLIES WITH 2015 IBC Vult = 115 MPH Exp C
* SOIL BEARING ——— 1000 PSF
* TIE DOWN STRAP ——— 3150# WORKING LOAD
* SEISMIC ZONE ——— 4 CAC T-25 AND 2015 IBC S_s=1.5 Fa=1.4 S_{m1}=1.41 Site Class D

TIE DOWN STRAPS TO BE MIN. 1 1/4" WIDE x 0.035 THICKNESS ZINC PLATED AND MEET ASTM D-3953-97 ALT. STRAP; 1 1/4" WIDE X 0.029" THICK ZINC PLATED F'ult' =5400 LBS

* EARTH AUGERS ——— 2962 # (TESTED TO 4750# MIN.)
* CROSS DRIVES ——— 2962 # (TESTED TO 4750# MIN.)
* CONCRETE SLAB ANCHORS ——— 2962 # (CALCULATED)

1. THE CHARTS SHOW THE REQUIRED NUMBER OF TIE DOWNS ON THE SIDES AND ENDS OF THE MANUFACTURED HOME.
2. COMBINATIONS OF THE DIFFERENT TYPES OF TIE DOWNS CAN BE USED.
3. FOR ALL TIE DOWN INSTALLATIONS, THE MANUFACTURED HOME CHASSIS MEMBERS ARE SHOWN AS "I" BEAMS, (FOR ILLUSTRATION PURPOSE ONLY) CHASSIS BEAMS
4. SIDE TIE DOWNS ARE REQUIRED ALONG THE OUTSIDE CHASSIS BEAMS. END TIE DOWNS ARE REQUIRED AT EACH END OF EACH TRANSPORTABLE SECTION OF THE MANUFACTURED HOME.
5. END TIE DOWNS CAN BE LOCATED WITHIN 18" OF EITHER SIDE OF CHASSIS BEAM

6. THE SIZES, TYPES, LENGTHS, ECT, OF MATERIALS SHOWN HEREON ARE MINIMUM, LARGER, LONGER, HEAVIER MATERIALS SUPPLIED BY SAC INDUSTRIES, INC. MAY BE USED AT THE SAME SPACING AND LOCATION SHOWN.
7. ALL PARTS ARE COATED WITH RUST RESISTANT INDUSTRIAL SHOP PRIMER

STATE APPROVAL

PGM Inc
21822 Old Hwy 99
Centralia, WA 98532
888-265-8981

CA

PACIFIC CONSULTING ENGINEERS
2150 BELL AVE. SUITE 145
SACRAMENTO, CA. 95838
Ph: (916)-564-6028

ENGINEERS APPROVAL

OR

REGISTERED PROFESSIONAL ENGINEER 7462 OREGON JULY 14, 1972 DAVID A. DAHMEN

Exp 12-31-19

WA

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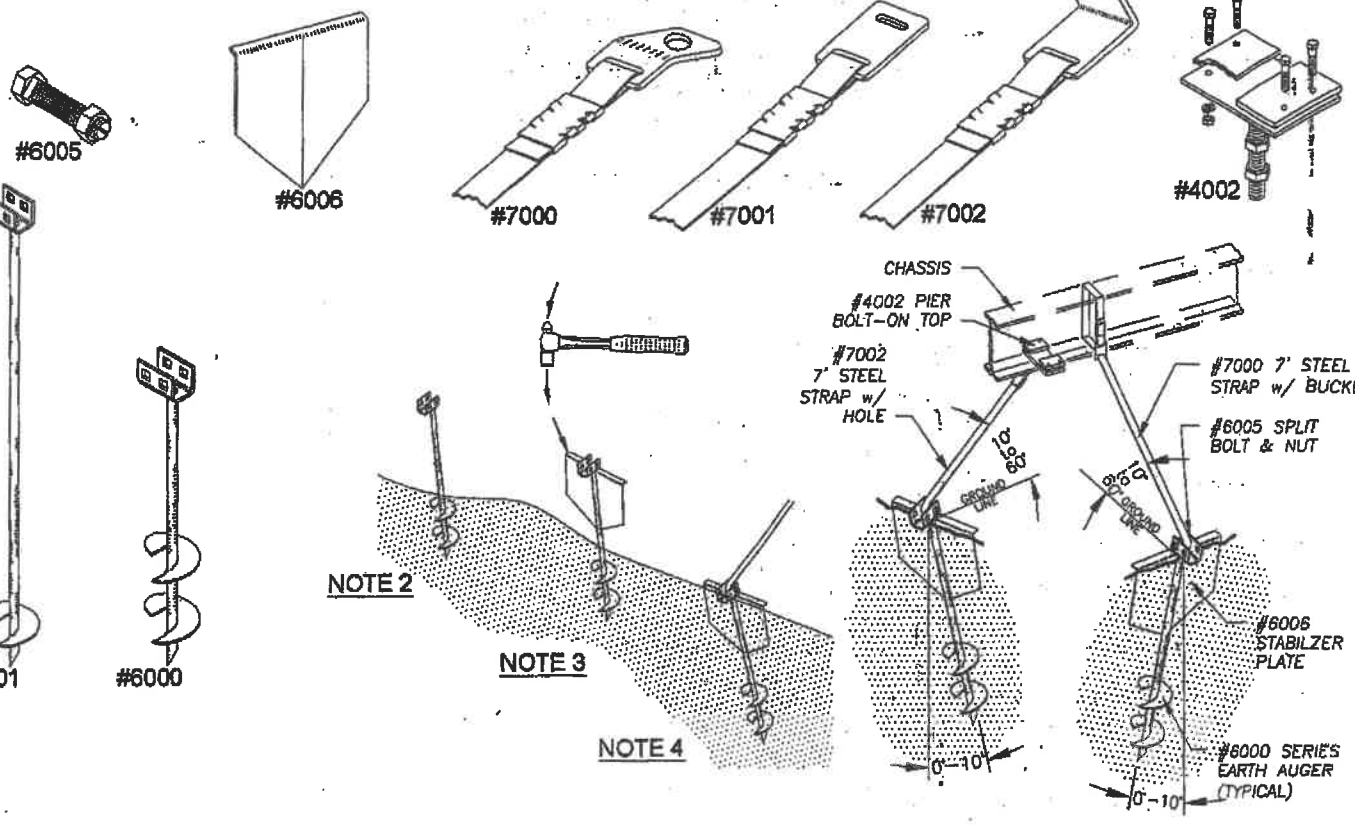
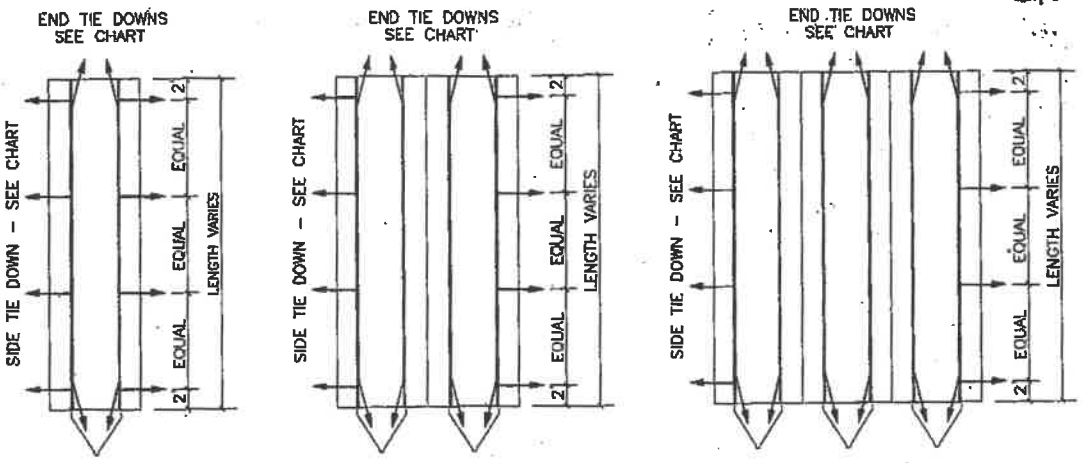


INSTALLATION INSTRUCTIONS

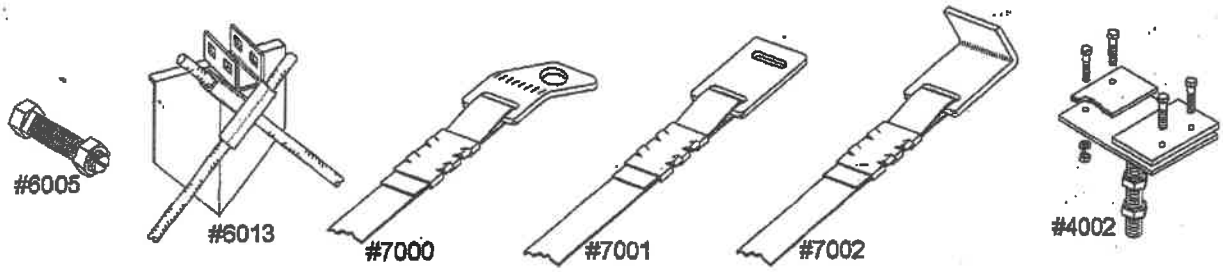
1. CONTRACTORS WARNING: CHECK FIRST FOR UNDERGROUND UTILITIES.
2. INSTALL GROUND ANCHORS INTO GROUND LEAVING 12"-14" OF SHAFT EXPOSED.
3. PLACE STABILIZER PLATE NEXT TO SHAFT BETWEEN THE ANCHOR AND CHASSIS BEAM, AND DRIVE INTO GROUND.
4. FINISH TURNING ANCHOR INTO GROUND APPLYING CONSTANT DOWNWARD PRESSURE TO MINIMIZE SOIL DISTURBANCE UNTIL ANCHOR HEAD IS FLUSH WITH STABILIZER PLATE.
5. ATTACH STRAPS TO CHASSIS BEAM IN MANNER SHOWN.
6. IF ANGLE OF SIDE STRAP IS GREATER THAN 60°, STRAP CONNECTION CAN BE MADE FROM ANCHOR TO OPPOSITE CHASSIS BEAM.
7. INSERT STRAP THROUGH SPLIT BOLT. CUT OFF EXCESS STRAP AND TIGHTEN BOLT UNTIL STRAP IS SNUG.

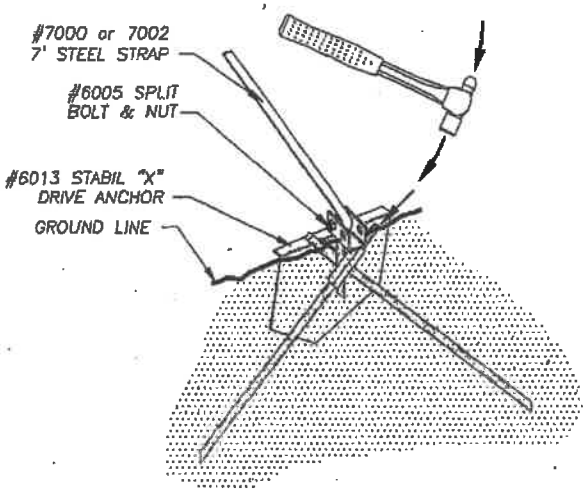
HCD 3/11/19
EB 144



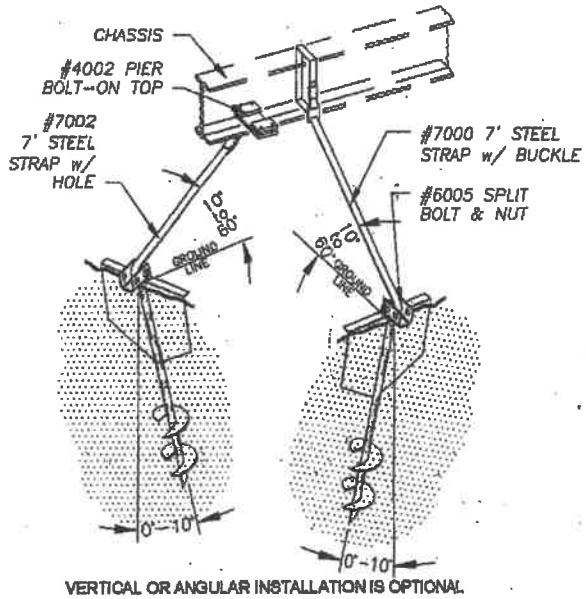
SINGLE WIDE DOUBLE WIDE TRIPLE WIDE

SAC IND. STABIL-X DRIVE TIE DOWN ANCHORS





DETAIL "A"



VERTICAL OR ANGULAR INSTALLATION IS OPTIONAL

STABIL-X DRIVE TIE DOWN
SEE DETAIL "A"

INSTALLATION INSTRUCTIONS

1. CONTRACTORS WARNING: CHECK FIRST FOR UNDERGROUND UTILITIES.
2. DRIVE STABILIZER PLATE INTO GROUND.
3. DRIVE CROSS RODS THROUGH HEAD TUBES INTO SOIL AS SHOWN.
4. ATTACH STRAPS TO CHASSIS BEAM IN MANNER SHOWN.
5. IF ANGLE OF SIDE STRAP IS GREATER THEN 60°, STRAP CONNECTION CAN BE MADE FROM ANCHOR TO OPPOSITE CHASSIS BEAM.
6. INSERT STRAP THROUGH SPLIT BOLT. CUT OFF EXCESS STRAP AND TIGHTEN BOLT UNTIL STRAP IS SNUG.
7. #6002 ANCHOR CAN BE USED WHERE HARD OR ROCKY SOIL OCCURS. IF THE GROUND SURFACE IS OTHER THAN ROCKY SOIL OR MINIMUM 2" ASPHALT, USE STABIL-X ANCHOR OR ENCASE ANCHOR WITH 12"x12"x12" CUBE OF CONCRETE.
8. WHEN #6002 ANCHOR IS USED FOR ANY REQUIRED ANCHOR – (2) ANCHORS MUST BE USED AT THAT LOCATION.

SEE NOTE #7
AND NOTE #8

EARTH AUGERS						CROSS DRIVE ANCHORS						CONCRETE SLAB ANCHORS					
MAX. LENGTH OF MFG'D HOME	36'	54'	72'			MAX. LENGTH OF MFG'D HOME	36'	54'	72'			MAX. LENGTH OF MFG'D HOME	36'	54'	72'		
MIN. NO. OF SIDE TIE DOWNS	2	3	4			MIN. NO. OF SIDE TIE DOWNS	2	3	4			MIN. NO. OF SIDE TIE DOWNS	2	3	4		

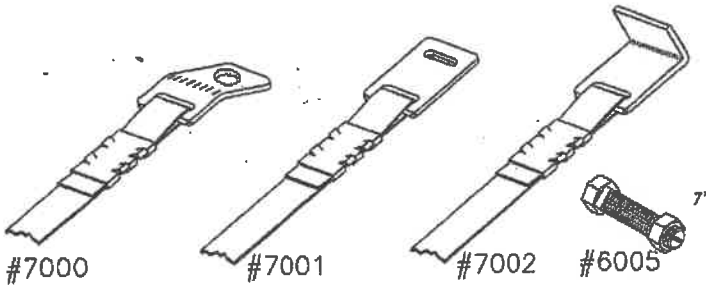
NOTE:

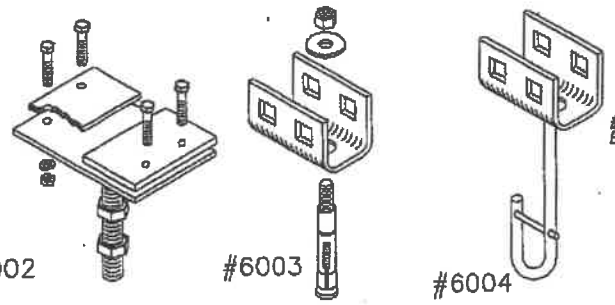
SIDE TIE–DOWNS: MUST BE WITHIN 24" OF THE END OF THE CHASSIS BEAM.

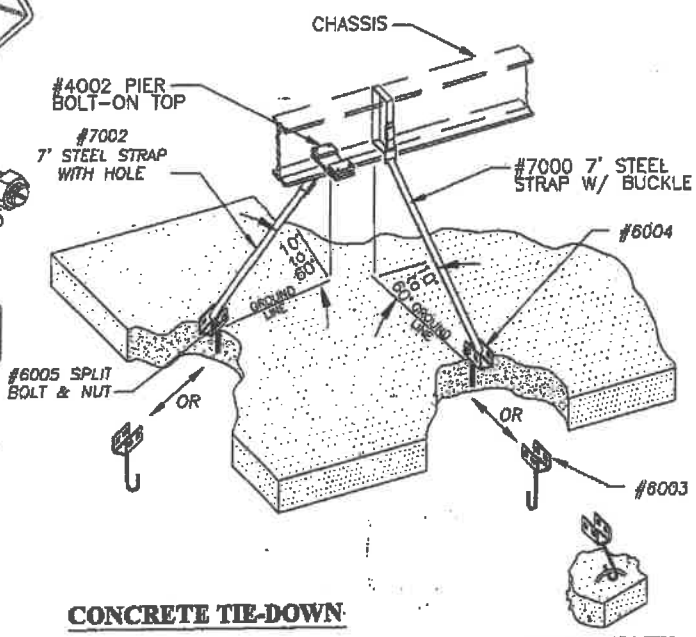
END TIE–DOWNS: CAN BE LOCATED WITHIN 24" OF EITHER SIDE OF CHASSIS BEAM ONE TIE–DOWN IS MANDATORY AT EACH END OF "I"BEAM (SEE PAGE #1 GENERAL NOTE #5).

IF SIDE WALL TIE–DOWN GROUND ANCHOR LOCATION IS SUCH THAT THE ANGLE BETWEEN THE GROUND AND STRAP EXCEEDS 60°, CONNECT THE TIE STRAP TO THE INSIDE CHASSIS BEAM ON DOUBLE AND TRIPLE WIDES AND THE OPPOSITE CHASSIS BEAM ON SINGLE WIDES.

SAC IND. CONCRETE TIE DOWN ANCHORS







CONCRETE TIE-DOWN

ALTERNATE CONNECTION

INSTALLATION INSTRUCTIONS

NEW CONCRETE - #6004

1. PLACE CONCRETE ANCHOR INTO WET CONCRETE, AND ALLOW TO PROPERLY CURE.
2. ALTERNATE CONNECTION REQUIRES #5 REBAR PROPERLY EMBEDDED IN CONCRETE.

EXSISTING CONCRETE - #6003

1. CONCRETE MUST BE A MINIMUM 3½" THICK AND IN GOOD CONDITION.
2. MINIMUM SLAB AREA OF EACH ANCHOR IS 28 SQUARE FEET.
3. DRILL PROPER SIZE HOLE IN SLAB, A MINIMUM OF 12" FROM ANY SIDE.
4. EXPANSION BOLT IS ⅝" x 3½" WITH MINIMUM 2¾" EMBEDMENT AND 6,180 POUNDS PULL OUT, 7,160 POUNDS SHEAR.

CHASSIS CONNECTION

1. ATTACH STRAPS TO CHASSIS BEAM IN MANNER SHOWN.
2. IF ANGLE OF SIDE STRAP IS GREATER THAN 60°, STRAP CONNECTION CAN BE MADE FROM ANCHOR TO OPPOSITE CHASSIS BEAM.
3. INSERT STRAP THROUGH SPLIT BOLT, CUT OFF EXCESS STRAP AND TIGHTEN BOLT UNTIL STRAP IS SNUG.

NOTE: SIDE TIE DOWNS ARE REQUIRED ALONG THE OUTSIDE CHASSIS BEAMS. END TIE DOWNS ARE REQUIRED AT EACH END OF EACH TRANSPORTABLE SECTION OF THE MANUFACTURED HOME.

NOTE: A COMBINATION OF DIFFERENT TYPES OF TIE DOWNS CAN BE USED.

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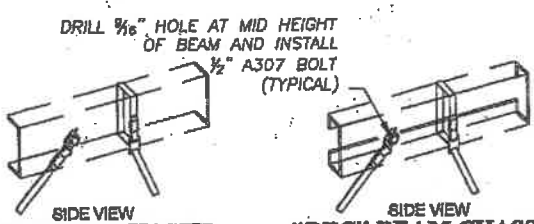
ETS 144



SIDE VIEW
"C" BEAM CHASSIS
SEE GENERAL NOTE #3

SIDE VIEW
"RFC" BEAM CHASSIS
SEE GENERAL NOTE #3

END TIE DOWN

NOTE: END TIE DOWN CAN BE LOCATED WITHIN 18" OF EITHER SIDE OF CHASSI BEAM AXIS.

CONTRACTORS CERTIFICATION

I CERTIFY THAT I HAVE INSTALLED THE SAC IND., INC. ANCHORING SYSTEM AS PER THE INSTALLATION INSTRUCTIONS. I HAVE MADE NO MODIFICATIONS TO THE ANCHORING SYSTEM OR THE BUILDING STRUCTURE.

COMPANY NAME: _____ CONTRACTORS LIC. # _____

PGM Inc.

Soil Class	Soil Description	Test Probe Values (in lbs.)	Recommended PGM Part	PGM part description
1	Hard Rock or Rocky	N/A	# 6011 or # 6002	Cross Drive Anchor W/ 30" Rods Cross Drive Anchor W/ 30" Rods
2	Very Dense and or Cemented Sands, Coarse Gravel, Cobbles and Clays	550+	# 6000 # 6006 # 6013	30" Auger Anchor W/2 4" Helix 12" Stabilizer Plate Stabil X - Drive
3	Medium Dense Coarse Sands, Sandy Gravels, Very Very Stiff Silts & Clays	351 to 550	Available Upon Request	
4a	Loose to Medium Dense Sands, Firm to Stiff Clays & Silts, Alluvial Fill	276 to 350	Available Upon Request	
4b	Very Loose Sands, Firm Clays & Silts Alluvial Fill	175 to 275	Available Upon Request	

Please Note : Each State, County or Municipality may require a specific anchor from the groups shown above for each soil classification.

Check local and stata regulations first.

CO

PGM Inc
STEEL PIERS

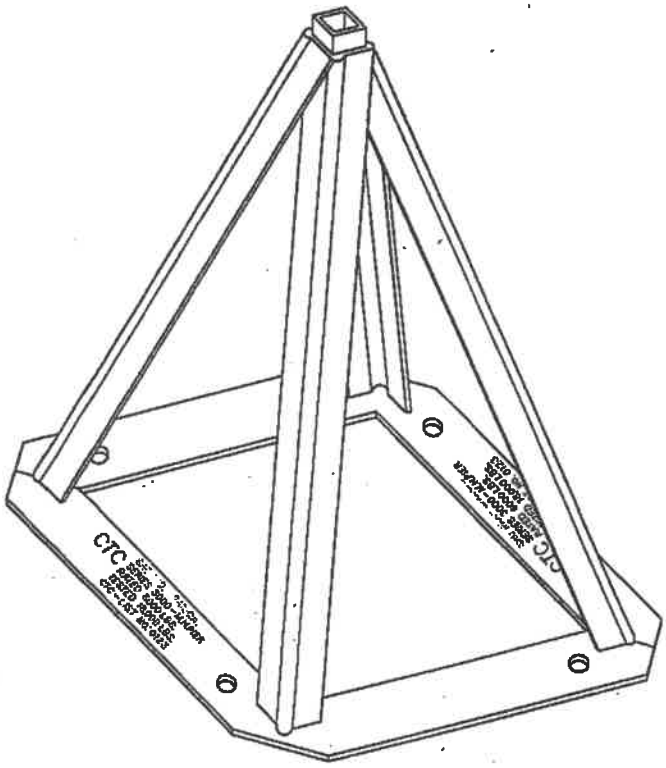
ADJUSTABLE STEEL PIERS & TOPS

OR

GENERAL NOTES

DESIGN LOADS:

* STEEL PIERS ---------- 6,000 LB, RATED LOAD CAPACITY
  18,000 LB. MINIMUM TESTED LOAD CAPACITY
* STEEL PIERS SHALL BE COATED WITH RUST RESISTANT COATING AND SHALL BE LISTED AND LABELED FOR THE FOLLOWING LOAD:
  VERTICAL=6,000 POUNDS MAXIMUM



ENGINEER APPROVAL

REGISTERED PROFESSIONAL ENGINEER 7462 OREGON JULY 14, 1972 DAVID A. DAHMEN

EXP 12-31-19

WA

ID

UT

AZ

NV

STATE APPROVAL

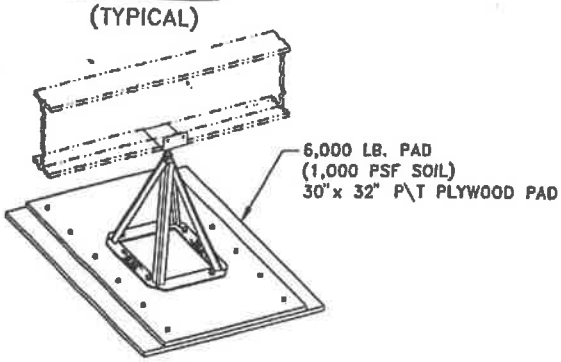
CA

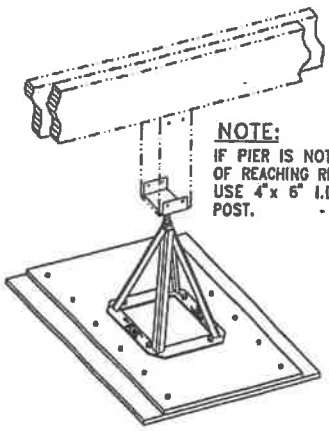
PGM Inc
21822 Old Hwy 99
Centralia, WA 98532
888-265-8981

PACIFIC CONSULTING ENGINEERS
2150 BELL AVE. SUITE 145
SACRAMENTO, CA. 95838
PH: (916) 564-6028

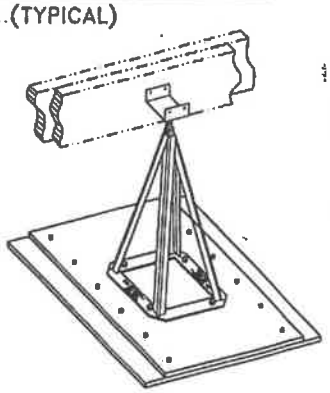
ADJUSTABLE STEEL PIERS

CHASSIS BEAM SUPPORT (TYPICAL)





MATING LINE SUPPORT (TYPICAL)



INSTALLATION INSTRUCTIONS

1. PREPARE A LEVEL SURFACE AT THE LOCATION OF EACH PIER TO INSURE A FULL CONTACT FOR THE FOOTING PAD. USE THE APPROPRIATE SIZE PAD FOR THE LOAD REQUIRED. REFER TO THE MANUFACTURERS SET UP MANUAL FOR SPECIFIC LOADS AND FOOTING SIZES.

2. SELECT THE APPROPRIATE SIZE PIERS FOR THE INSTALLATION BY DETERMINING THE PIER HEIGHT AT EACH SUPPORT LOCATION. MEASURE FROM THE TOP OF THE PAD TO THE BOTTOM OF THE CHASSIS BEAM TO INSURE THAT HEIGHT IS NO GREATER THAN 32".

3. SELECT THE APPROPRIATE TOP FOR THE CHASSIS BEAM OR MATING LINE. THE MAXIMUM ADJUSTMENT ON THE THREADED ROD ADJUSTER FOR CHASSIS BEAM SUPPORT IS 2". WHEN MORE HEIGHT IS NEEDED USE THE NEXT TALLER SIZE SUPPORT PIER.

4. PLACE THE PIER SUPPORT IN THE CENTER OF THE SUPPORT PAD. WHERE REQUIRED BY LOCAL CODE, ATTATCH THE SUPPORT PIER TO THE PAD USING APPROPRIATE FASTENERS. CAREFULLY ALIGN THE SUPPORT PIER AND TOP UNDER THE CHASSIS BEAM OR MATING LINE AND TIGHTEN UNTIL SNUG PLUS 1/2 TURN.

5. REPEAT THIS INSTALLATION PROCEDURE WITH EACH SUPPORT PIER. AFTER ALL THE SUPPORT PIERS HAVE BEEN INSTALLED, AND THE HOME SET UP HAS BEEN COMPLETED PER THE MANUFACTURERS SET UP INSTRUCTIONS, YOU MAY THEN REMOVE THE SAFTEY BLOCKING OF OTHER DEVICES USED TO LEVEL THE CHASSIS.

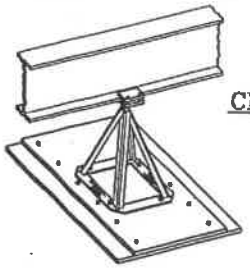
LABORATORY TESTING REPORT

PART No.	STAND SIZE	SAMPLE #1	SAMPLE #2	SAMPLE #3
3008	8"	23,100 Lbs.	24,600 Lbs.	23,200 Lbs.
3010	10"	25,130 Lbs.	25,950 Lbs.	24,320 Lbs.
3012	12"	27,200 Lbs.	26,500 Lbs.	26,300 Lbs.
3014	14"	27,700 Lbs.	28,175 Lbs.	26,175 Lbs.
3016	16"	28,250 Lbs.	27,700 Lbs.	23,400 Lbs.
3018	18"	26,400 Lbs.	33,300 Lbs.	25,500 Lbs.
3020	20"	24,950 Lbs.	25,000 Lbs.	23,225 Lbs.
3022	22"	20,500 Lbs.	22,400 Lbs.	24,200 Lbs.
3024	24"	22,225 Lbs.	21,650 Lbs.	23,000 Lbs.
3026	26"	22,250 Lbs.	21,500 Lbs.	19,700 Lbs.
3028	28"	20,550 Lbs.	23,720 Lbs.	21,310 Lbs.
3030	30'	22,950 Lbs.	26,550 Lbs.	21,500 Lbs.
3032	32"	21,200	22,000	21,900
3034	34"	20,900	21,200	21,000
3036	36"	20,500	19,900	19,800

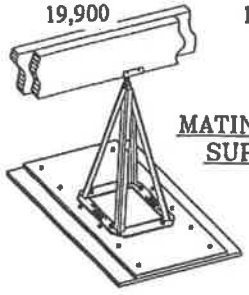
PIER IDENTIFICATION STAMP

PGM Inc-Centralia, WA
SERIES 3000–M H PIER
RATED 6,000 LBS.
TESTED 18,000 LBS
C.T.C. LIST NO. 0123

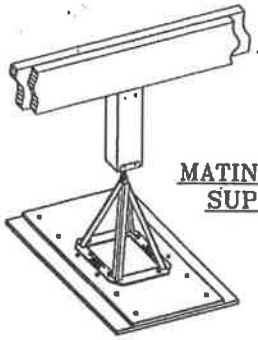
HCD
48-01



CHASSIS BEAM SUPPORT

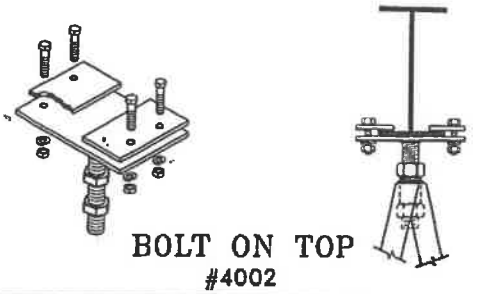


MATING LINE SUPPORT



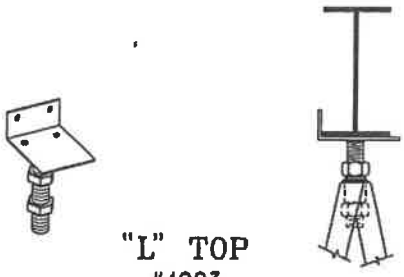
MATING LINE SUPPORT

ADJUSTABLE STEEL TOPS

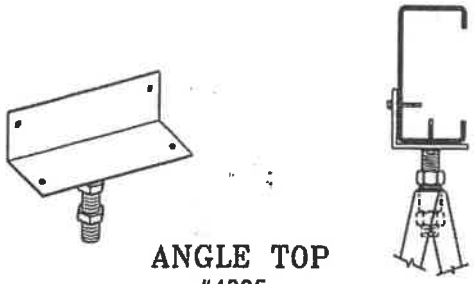


BOLT ON TOP
#4002

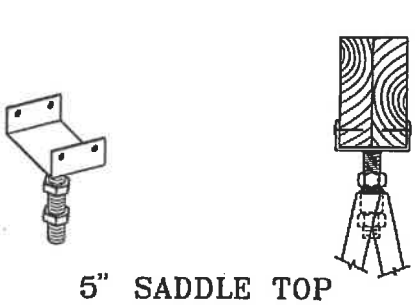
SCREW ON TOP
#4006



"L" TOP
#4003



ANGLE TOP
#4005



5" SADDLE TOP
#4000

11" SADDLE TOP
#4001

INSTALLATION INSTRUCTIONS

#4000 – PLACE SADDLE TOP FLUSH AGAINST MAIN CHASSIS BEAM AND OR MATING LINE – MAXIMUM HEIGHT ADJUSTMENT OF TOP IS 2".

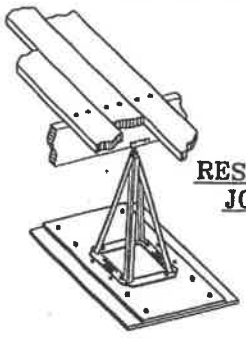
#4001 – 11" SADDLE CAN TO BE USED ON MATING LINE SUPPORTS, PORCHES AND DECKS – ATTACH TOP OF PIER WITH 2nd 3/4" NUT – MAXIMUM HEIGHT ADJUSTMENT OF TOP IS 8".

#4002 – ATTACH BOLT ON TOP TO "I" BEAM WITH (4) 3/8" BOLTS AND NUTS – WITH 2nd 3/4" NUT, ATTACH BOLT ON TOP TO PIER – MAXIMUM HEIGHT ADJUSTMENT OF TOP IS 2".

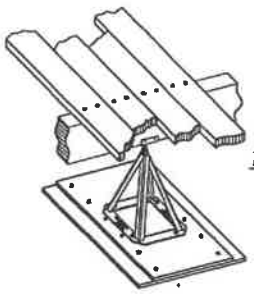
#4003 – PLACE "L" TOP FLUSH AGAINST MAIN BEAM – ALTERNATE "L" TOP DIRECTION EVERY OTHER PIER – MAXIMUM HEIGHT ADJUSTMENT OF TOP IS 2".

#4005 – PLACE ANGLE TOP FLUSH AGAINST MAIN BEAM ("C" BEAM or "RFC" BEAM) – MAXIMUM HEIGHT ADJUSTMENT OF TOP IS 2".

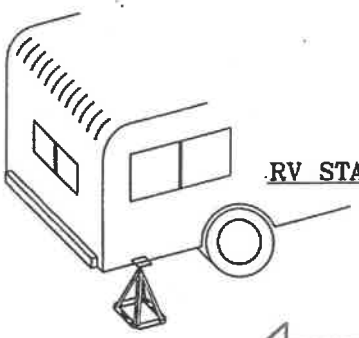
#4006 – ATTACH SCREW ON TOP TO MAIN CHASSIS BEAM WITH (4) #12 SMS TEK SCREWS. WHEN USED AT MATING LINE AND OR PERIMETER, ATTACH WITH NAILS OR SCREWS. MAXIMUM HEIGHT ADJUSTMENT OF TOP IS 2".



RESIDENTIAL FLOOR JOINT SUPPORT



DECK SUPPORT



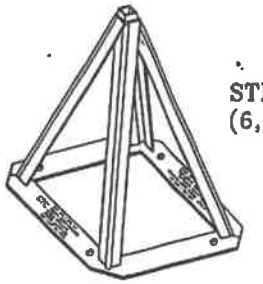
RV STABILIZER

HCD
4/8-01

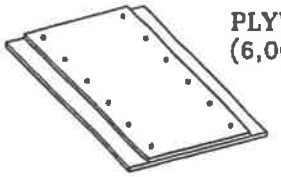
PGM Inc SYSTEM SET

(TYPICAL)

BOLT-ON TOP



STEEL PIER
(6,000 LB RATED)

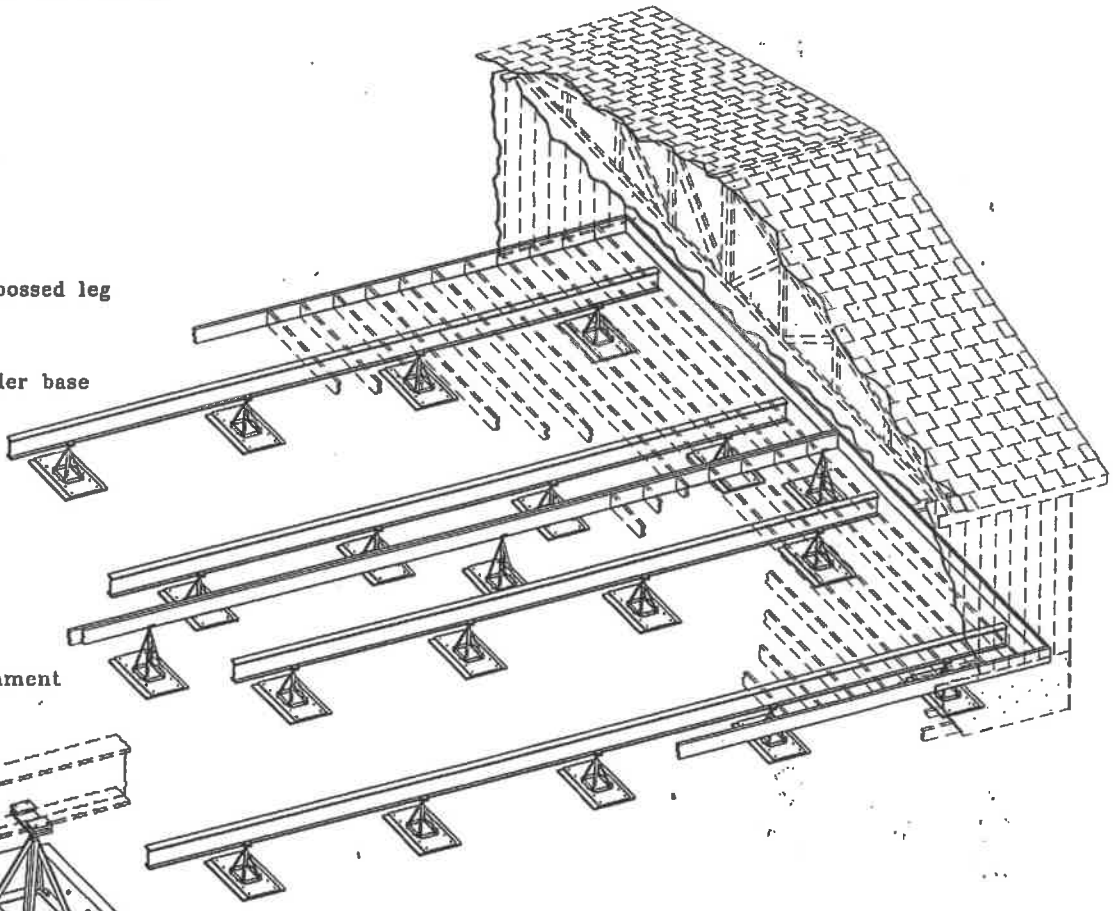


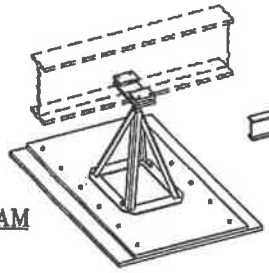
PLYWOOD PAD
(6,000 LB RATED)

NOTES

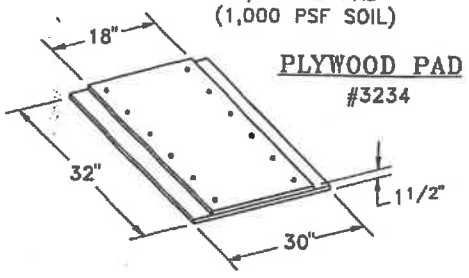
CHECK MANUFACTURED HOME SET UP INSTRUCTIONS FOR LOADS AND LOCATIONS. WHEN USING **PGM Inc** 6,000 LB. RATED PAD (960 SQ. IN.) OR EQUIVALENT, AND **PGM Inc** 6,000 LB. RATED STEEL PIER, CHASSIS BEAM SUPPORT SPACING CAN BE 8 FT. O.C. THIS SPACING IS CALCULATED ON 1,000 PSF SOIL BEARING VALUE AND SQUARE INCH AREA OF PAD SIZE.

- **PIER DESIGN**
  Patent Pending
- **STRONGER**
  With new patented embossed leg
- **MORE STABLE**
  With new two piece wider base
- **STATE APPROVED**
  Tested-Listed-Labeled
  Stamped in Base Plate
- **6,000 LB. RATED**
  3-1 Safety Factor
- **HOLES PRE-PUNCHED**
  In base for easy attachment to pad or footing



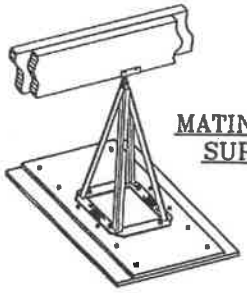


CHASSIS BEAM SUPPORT

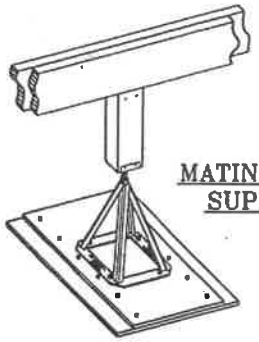


6,000 LB PAD
(1,000 PSF SOIL)

PLYWOOD PAD
#3234



MATING LINE SUPPORT



MATING LINE SUPPORT