



EDUCATIONAL DESIGN & CONSTRUCTION STANDARDS

Building facilities that inspire the love of learning
now and in the future.

*Bainbridge Island
School District*

Bainbridge Island School District

Strong Minds .: Strong Hearts .: Strong Community



“The Guiding Principles describe the learning environments in Bainbridge Island School District that are required to **foster every student’s ability to develop the knowledge, skills and attributes that are necessary for success in career, college and life in the 21st century.**”

“We envision the Bainbridge Island School District to be **a highly successful community of children and adults that inspires the love of learning now and in the future.**” (Master Plan 2005)

Comprehensive goals for district facilities

Facilities impact student learning. According to Bainbridge Island School District's Master Plan (MP), "all new facilities will support the tradition of excellence in the District's education program in an effective, flexible and economically feasible manner."

Understanding educational goals is an important part of planning school facilities. Facility design and construction are guided by the districts' educational Mission, Vision and Guiding Principles, to achieve a progressive, supportive learning environment that will provide optimum educational opportunities for all students. The following goals have been identified in the MP and Educational Specification processes as being relevant for future educational facility planning:

- ∴ **Personalized learning**
- ∴ **Academic rigor, relevance and student achievement**
- ∴ **Greater flexibility**
- ∴ **Integrated use of technology**
- ∴ **Community connection and community use**
- ∴ **High performance design and sustainability**
- ∴ **Safety and security**
- ∴ **Equitable learning environments**

Goals Inform Facility Design & Construction

Educational facility goals are grounded in recognition of current program delivery methods and expanded through an understanding of national trends in education. Guidelines have been developed to inform facility design and construction. These guidelines ensure that all education facilities within the district strive to meet the vision of developing strong minds, strong hearts and strong community.

Educational Facility Guidelines for Design & Construction

Personalized learning

There continues to be a shift from teacher-centered instruction to more pupil-centered learning.



- ∴ Facilities will support student-centered instruction
 - ∴ Strong teacher/adult-student relationships will be encouraged through facility design
 - ∴ Facility design should consider options for project and performance-based learning opportunities
 - ∴ Flexible learning spaces should include shared and individualized learning options both in and out of the classroom. This allows teachers to run multiple groups in the classroom and parent volunteers to simultaneously assist students outside of the classroom
 - ∴ Facilities will support opportunities to pursue areas of individualized student interest
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Academic rigor, relevance and student achievement

Educational reform efforts at state and national levels have focused on establishing rigorous academic standards, providing support for disadvantaged students, and holding schools accountable for increasing the level of student achievement.

- .: High academic expectations for all students
 - .: Reasonably equitable learning environments and resources for all schools and all students
 - .: Environments that accommodate differentiated learning allow for multiple learning strategies to reach students who are struggling, students who thrive with common core approaches, and accelerated learners
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Greater flexibility

Changes in educational requirements, programs and instructional methods require educational facilities to be multipurpose and adaptable in their design.



- .: Learning spaces designed to consider site adjacencies and visual observation
- .: Buildings designed to adapt to changes in instructional programs
- .: Core facilities and instructional spaces designed for multiple use of space

- ∴ Instructional spaces designed for individual, small group and large group activities
- ∴ Instructional spaces designed for wide range of instructional methods and activities
- ∴ Facilities and furnishings designed with student learning and building longevity in mind and allow for flexible teaching styles.



- ∴ Combining cafeteria and common areas allows for increased educational delivery time in the classroom. These areas should be designed to accommodate a wide variety of school and community uses

Integrated use of technology

Learning to use technology, and using technology to learn, is integral to all aspects of curriculum. Technology affects student learning and the way teachers teach, requiring spaces that are flexible and systems that can be adapted over time.

- ∴ Building infrastructure to keep pace with technology requirements and future advancements.

- ∴ Technology design should not be centered on specific equipment needs which change over time, but rather focused on flexible arrangements for technological multi-media opportunities
 - ∴ Voice enhancement allows teachers to speak at conversation levels from any space within the classroom. Enhancement systems contribute to improved student attention and teacher comfort
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Community connection and community use

There continues to be an increasing interest in bringing the community into schools to utilize equipment and facilities.



- ∴ Spaces, finishes and furnishings should be versatile and durable
 - ∴ High community use portions of school facilities should consider rest room access, designated points of entry and should limit access to the entire building
 - ∴ Outdoor facilities should consider how to accommodate a wide variety of uses
-

High Performance Design and Sustainability

Sustainable buildings include design and construction practices that significantly reduce or eliminate the negative impact of buildings on the environment.

- ∴ Studies confirm that facilities that incorporate design elements such as appropriate natural daylighting and natural ventilation reduce operating costs and positively impact learning results
- ∴ Facilities should minimize or eliminate finishes which require excessive maintenance and/or chemicals for cleaning



- ∴ Whenever possible, steel and concrete structure should be utilized for longevity and durability
- ∴ Low impact development (LID) should be considered in facility design and construction. BISD is committed to upholding or surpassing city standards for both building and site

Reduce negative impact through:

- Environmental site planning
- Water efficiency
- Energy efficiency
- Conservation of materials and resources
- Indoor environmental quality

Benefits

- Improve educational experience
 - Teach environmental stewardship
 - Reduce impact of consumption
 - Reduce operating costs
 - Enhance comfort and health
-

Safety and Security

Facilities are created to provide safety and security, while promoting the warmth and energy of an educational environment.



- ∴ Controlled and screened access should be incorporated into facility design
- ∴ Visual access from main office to main entry facilitates controlled access
- ∴ Electronic entry systems keep facility entry controlled
- ∴ Camera security systems should be installed in all new facilities
- ∴ Clear physical boundaries between public property and school property
- ∴ Layers of visual and site access to main office

INTRODUCTION

BISD believes in high quality and long lasting facilities, easy to maintain and flexible to meet the educational program of future generations. We have developed excellent relationships in the industry and strive to be leaders in progressive and sustainable facility design. Together, we can create engaging, effective and distinctive spaces that meet the needs of the community and students now and far into the future.

WSSP, LEED and other systems of checks are important to the construction industry, the costs involved with the reporting process involved in these systems is often not to the Taxpayers' advantage--the District intends its facilities to be designed and constructed as the benchmarks for environmental stewardship, energy efficiency, indoor environmental health, conservation, recyclability and local-sourcing of materials, and provide state-of-the-art educational delivery.

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The Bainbridge Island School District Design and Construction Standards were developed through a collaborative process of engineers, architects, and BISD staff. Professional recommendations are based on current best practice and look to future trends in design and construction. BISD staff shared information and lessons learned during decades of hands-on maintenance experience. Their expertise with replacement of countless varieties of components and systems found within the BISD facilities and numerous Washington State school districts has proven to be invaluable in the development of these standards.

The goal of the Design and Construction Standards is to provide a comprehensive reference guide that will support future improvements to the physical environment of all BISD facilities. Recommendations are based on their ability to best support the academic goals of the District; maximize operational efficiencies; minimize general fund expenditures; provide ease of maintenance; develop common finishes, equipment, and materials; simplify system maintenance and repair; advance sustainable practice; honor community investment; meet staff, student and community expectations.

A total of 33 Divisions (cross-referencing CSI Format) are included in the Design and Construction Standards. Each section considers the following criteria:

Performance

Construction

Maintenance and Custodial

Sustainability

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BISD

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Maintenance Staff

Grounds Staff

Technology Staff

Food Service Staff

Custodial Staff

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DIVISIONS OF WORK (GENERAL)

- **General 00: District General Design and Construction Guidelines**
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- **Division 03: Concrete**
- **Division 04: Masonry**
- **Division 05: Metals**
- **Division 06: Wood, Plastics and Composites**
- **Division 07: Thermal and Moisture Protection**
- **Division 08: Openings**
- **Division 09: Finishes (interior finishes)**
- **Division 10: Specialties (for example, signs, toilet accessories)**
- **Division 11: Equipment (for example, kitchen equipment)**
- **Division 12: Furnishings**
- **Division 13: Special Construction (for example, greenhouses)**
- **Division 14: Conveying Equipment (elevators, escalators, lifts)**
- **Division 21: Fire Suppression**
- **Division 22: Plumbing**
- **Division 23: Heating, Ventilating and Air Conditioning**
- **Division 26: Electrical**
- **Division 27: Communications**
- **Division 28: Electronic Safety and Security**
- **Division 31: Earthwork**
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- **Division 33: Utilities**

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DIVISION 00

DISTRICT GENERAL DESIGN AND CONSTRUCTION GUIDELINES

- .: Design with a goal of 75-year life with flexibility to meet the needs of current and future educational delivery
 - .: Meet and/or exceed the parameters of WSSP, LEED and other industry-leading construction and environmental standards when cost effective and/or appropriate
 - .: Select materials for durability, longevity, ease of maintenance and sustainability. Focus on inherent beauty over short-term aesthetic trends
 - .: Design for environmental stewardship and energy efficiency
 - .: Understand that community use of facilities and partnerships are part of district culture
 - .: Design using the Crime Prevention Through Environmental Design (CPTED) philosophy with safety and security integral in the design
 - .: Consider storage when designing indoor and outdoor facilities
-



PERFORMANCE CRITERIA

1. Design Life
 - a. Facilities whose primary function is education (schools) will be designed with a 75-year life.
 - b. All others District facilities (support) will be designed with longevity of use determined by project scope.
2. Washington State Sustainability Protocol
 - a. All facilities will meet the WSSP Protocol as a minimum standard with an expectation that design will be at the forefront of the industry.
 - b. LEED, and other similar programs, should be used as a guide for design, however, the costs and man-hours necessary to participate do not seem a valuable expenditure of the taxpayer's dollar (at least at the time of this writing).
3. Materials
 - a. Materials are to be selected for durability, longevity, ease of maintenance, sustainability and indoor air quality (IAQ).
 - b. Focus on the material's inherent beauty over short-term aesthetic trends.—"Materiality over Novelty".
4. Environmental Stewardship/energy efficiency should be integral in the design of any building
5. Sustainability in District facilities applies to all facets of the building. For instance, flexibility of space allows the building to adapt to changing educational delivery methods.
6. Community use is one of the Districts driving tenants. The Ed Spec process should offer suggested partnerships with the community and how the District can realistically offer use to non-District functions.
7. The safety and security of the BISD staff, students, parents and visitors is of the utmost concern. Designs should, much like energy efficiency and sustainability, have safety and security as in-built design functions integral to the building's design—use of the CPTED design philosophy is recommended.
8. Storage, the lack of, is always a concern in the District.
 - a. Provide ample structured storage for every project, the intent is not to have storage in order to accumulate unused/unusable items, rather it is to allow access to materials so they are useful.
 - b. Washington State requirements for surplussing should be taken into account when assessing appropriate storage space and type.
 - c. Storage should be provided at sports facilities—consider a light-duty structure immediate to the facility. Consult Ed Spec and/or project scope to identify the material to be stored and space requirements.



PERFORMANCE CRITERIA

1. Walls:

Provide long-lasting materials, easy to clean with little maintenance:

 - a. Acceptable surface materials:
 - i. Wood finish (not to floor level—provide an abuse resistant base).
 - ii. Concrete, exposed cast surface.
 - iii. Glass, ballistic-resistant type in entry/vestibule areas.
 - iv. Acoustic paneling.
 - v. Tackable surfaces.
 - vi. Gypsum Wall Board.
 - b. Provide mechanically-fastened stainless-steel corner-guards to 42" min on all outside corners
2. Floors:

Durability, ease of maintenance, environmental-soundness/sustainability, and indoor air quality are to be considered highest priorities.

 - a. Acceptable surface materials:
 - i. Rubber flooring tiles, linoleum sheet goods, wood flooring are acceptable at offices, reception area, conference rooms. Carpet tiles, while not preferred, may be considered if circumstances merit.
 - ii. Easily-cleanable surfaces at work room, health room, staff lounge—no carpet in these spaces.
3. Ceiling:

Focus on interesting shapes and planes to enhance light reflection, acoustical properties, expose structural elements as practical to provide discussion points on structure, sustainability—building as a teaching tool. Natural finishes or sealers are preferred over painted surfaces, although painted surfaces are acceptable.

 - a. Acceptable surface materials:
 - i. Exposed structure (wood decking, plywood, metal deck pan, purlins, beams, etc).
 - ii. Acoustical Ceiling (see acoustic chapter for required acoustical properties).
 - iii. Special ceilings (wood, gypsum board etc.) at selected areas.
 - iv. At hard ceilings, provide adequate space or access for unburdened access to equipment. Also,
 - v. At drop-ceiling conditions, provide adequate access and sufficient space for maintenance to work on equipment without complicated removal methods that require time or additional manpower.
4. Equipment:
 - a. Staff in administration should easy line-of-sight to the clock with minimum movement and, as this is a constantly-monitored piece of equipment, office ergonomics preference for a slight up and down movement of head to reduce strain on neck.
 - b. Controls and equipment-interfaces should be easily accessible.
 - c. Backs of computers, copiers and other equipment, and power and data cords are to be hidden. Use of surface-mounted wire runs is to be avoided unless exposed structure prevents burial.
 - d. Provide standard size and shape microwave in staff lounge.
5. Casework:
 - a. Provide a transaction counter at reception area that will screen equipment and serve as a welcome desk.
 - b. Consider the material of the work surface; it should not be cold to the touch, i.e., polished stone.
 - c. Consider reflectivity of material. Highly-polished surfaces reflect light, which can be bothersome and cause eye strain.
 - d. Review type of mail slots provided with the District staff. Prefer double-sided mail system.
 - e. Provide a wardrobe in administration area capable of handling coats, bags and umbrellas of staff and some visitors.
 - f. Coordinate selected microwave in staff lounge with the casework; verify the shelf provided is of adequate depth. Provide for space that will accept majority of standard size and shape microwaves.
 - g. Lockable casework shall match the key for entry to the space (District standard is 6-pin Corbin) or be on RFD keycard system ("Accuride Senseon" or sim).

6. Mechanical:
 - a. A vestibule shall be provided to minimize draughts on administration staff, as well as for safety and security..
 - b. Avoid locating ADA door hold-open where it will be easily used by ambulatory students.
 - c. Design the mechanical system of admin reception areas to mitigate cool air from frequent door activity, while natural ventilation is preferred, a mechanical means will be necessary to positively pressurize this space to minimize influx of outdoor air.
 - d. At the workroom, provide a point-of-use override switch for exhaust fan at the printer and laminator.
7. Plumbing:
 - a. Staff workrooms shall be plumbed with a hand sink. All infrastructure, such as point of service water heaters, shall be contained within casework.
 - b. Provide for residential-grade dishwasher.
8. Lighting/Power:
 - a. Lighting to be provided primarily by natural daylight. Artificial lighting to be LED-source with controls for light-harvesting. Verify that lighting is ample for the space and tasks being performed.
 - b. Occupancy sensors shall be provided for overhead lighting.
 - c. Provide for adequate convenience outlets at appropriate locations.
 - d. Provide for adequate data ports per BISD Technology Department and the Ed Spec.
9. Miscellaneous:
 - a. Provide visual relief from internal rooms, relate from the room to the adjacent space. Consider safety in placement and type of glazing. Good lines of site from the Administration Office to entry help deter security issues.
 - b. Provide appropriate and ample storage in the administration area—consult the Ed Spec for specific requirements.
 - c. Provide an entry vestibule/lobby to allow access to office but prevent unauthorized access to the school proper.
 - d. Keycard entry systems should be employed and standardized across the District.
 - e. Consider a “panic button” system in the Principal’s office to lock-down the facility.
 - f. Provide blinds at all windows.
 - g. Provide a secondary means of egress from the Superintendent’s office and Principal’s office to the exterior, preferably away from the entry (at least visibly).
10. Acoustics:
 - a. Pay attention to sound transmission between rooms, office-to-office, office-to-conference room, etc.
 - b. Refer to 09 5100 and 09 83 00 for specific acoustical requirements.
 - c. Consider the acoustics at the Staff Lounge.
11. Safety and Security
 - a. Principal’s office shall be provided both a secondary means of exit and ability to manually ventilate the space.
 - b. Provide radios, booster systems and intercoms consistent with District-wide standards.
 - c. Consider installing a “Panic Button” lockdown and automated announcement system.

CONSTRUCTION CRITERIA

1. Verify the adhesives used are compatible with the material.

MAINTENANCE and CUSTODIAL CRITERIA

1. Mark the grid to locate equipment, shut off valves, etc for easy location.
2. Consider the frequency of access to equipment when choosing the ceiling material.
3. Consider the "cleanability" of the ceiling materials including acoustical tiles.
4. When selecting the floor material consider reparability, tile products are easier to repair than sheet goods.
5. Minimize the number of products used.
6. When choosing the floor consider the effects of water damage and the wear and tear of the furniture on the flooring material.
7. Identify locations for discreet but accessible recycle and trash bins.

SUSTAINABILITY

1. When possible provide natural light to every occupied space.

END OF SECTION



PERFORMANCE CRITERIA

1. Walls:
 - a. Acceptable surface materials:
 - i. Gypsum Board, tackable surface, glazing, exposed structure.
 - ii. Splash resistant surface at sinks, such as tile or other solid-surface abuse-resistant material.
 - iii. Acoustical treatment.
 - iii. Provide blocking in hollow walls to provide flexible location of white boards, acoustical treatments and other surface-applied treatments.
2. Floors:
 - a. Acceptable surface materials:
 - i. Concrete, Retro-plate or other similar durable, easily-maintained and abuse-resistant finish.
 - ii. Rubber tile.
3. Ceiling:
 - a. A higher ceiling is preferred in art and science rooms, with plenty of diffuse natural lighting (north).
 - b. Acceptable surface material:
 - i. Exposed structure (wood decking, plywood, metal deck pan, purlins, beams, etc).
 - ii. Acoustical Ceiling (see acoustic chapter for required acoustical properties).
 - iii. Special ceilings (wood, gypsum board etc.) at selected areas.
 - iv. At hard ceilings, provide adequate space or access for unburdened access to equipment. Also,
 - v. At drop-ceiling conditions, provide adequate access and sufficient space for maintenance to work on equipment without complicated removal methods that require time or additional manpower.
4. Equipment:
 - a. Provide flexibility when locating projectors, marker boards, etc.
 - b. Provide the ability to darken the classroom.
 - c. Provide multiple power outlets on all walls.
 - d. At the art room consider the growth of programs, provide space and electrical power for future growth (for example an additional kiln).
 - e. At the high school provide chemical storage cabinets, vented to exterior—refer to ed spec for quantity.
5. Casework:
 - a. Identify space for recycle and trash containers in the classroom.
 - b. At the high school consider use of epoxy resin counter tops, Richlite or like material that is abuse-resistant, easily cleanable, durable, sustainable and environmentally-friendly.
 - c. At the middle school use chemical-resistant counter tops with similar properties to b. above.
6. Mechanical:
 - a. Preference for passive ventilation methods over mechanical (assure all ventilation systems, natural or other, are accessible for servicing).
 - b. Consider use of ceiling fans to mix indoor air and prevent layering (use manual user control—not automated).
 - c. At the art room provide a mechanical system that provides adequate exhaust at special areas, jewelry area, painting, etc. with appropriate filtering and scrubbers to prevent hazardous exhaust.
 - d. At the science room use of stainless steel exhaust duct work with appropriate filtering and scrubbers to prevent hazardous exhaust.
7. Plumbing:
 - a. Provide clay/solids intercepting traps at all sinks in the art room (provide adequate space for servicing).
 - b. Provide emergency shower washoff and eye-rinse systems in science rooms.
8. Lighting/Power:
 - a. Provide diffuse natural daylighting as much as possible (north).
 - b. All artificial lighting to be LED source combination of direct and indirect with controls for light-harvesting.
 - c. Provide adequate task-lighting for the work to be performed.
 - d. At the art room, provide a spot lighting system to highlight students' work on display.
 - e. Provide adequate power at each wall for multiple users. At the art room and science room consider drop power cords above the work tables and benches rather than floor boxes.



9. Acoustics

- a. As Science and Art spaces tend to be noisier environments, provide appropriate detailing for acoustic separation between learning spaces, with special consideration of penetration in walls and the wall to floor and ceiling intersections.
- b. Because of the activity in the art and science room, acoustics are critical to maintain a “teachable atmosphere” within the room itself.

CONSTRUCTION CRITERIA

- 1.

MAINTENANCE and CUSTODIAL CRITERIA

1. Flooring material must be highly resistant to spills from a variety of materials, easily cleanable.

SUSTAINABILITY

1. Provide diffuse natural light and views to outdoors for every teaching space.
2. Provide highly flexible spaces able to adapt to varying programs for years to come.
3. Provide materials with the following characteristics: high recycled content, ability to be recycled, locally-sourced, non-petroleum based, ease of replacement if damaged or worn/at end of useful life, durable and resistant to abuse, beautiful not trendy.

END OF SECTION



PERFORMANCE CRITERIA

1. Exterior wall systems
 - a. Materials shall be selected which will remain in service through the life of the building (minimum 75 years). Preference for rain-screen layered weather-defense assembly system.
 - b. Materials shall be "permanent" and not require replacement during the 75- year life of the building.
 - c. Acceptable materials:

NEAR GRADE (within 8' of grade--use graffiti-resistant sealers, see Div 7)

 - i. Brick masonry veneer—provide appropriate detailing for weeping with stainless steel hardware.
 - ii. Concrete with cast-face finish (provide mutually-agreed-to sample of approved finish)
 - iii. Pre-finished metal siding with "Kynar" or similar finish, painting in the field is acceptable only if material is treated with a "Zincalume"-type or other approved primer coating to resist corrosion and rusting. Use appropriate gage and section to avoid oil-canning. Special care and detailing for attachment to substrate to accommodate expansion and contraction.
 - iv. Glazing curtain wall systems (storefront), use care in locating with regard to maintenance (like the errant-rock from the weed-eater). Simple details resist water infiltration better than complicated ones.
 - v. Precast concrete panels

ABOVE 8'

 - i. Brick masonry veneer—provide appropriate detailing for weeping with stainless steel hardware.
 - ii. Concrete with cast-face finish (provide mutually-agreed-to sample of approved finish)
 - iii. Pre-finished metal siding with "Kynar" or similar finish, painting in the field is acceptable only if material is treated with a "Zincalume"-type or other approved primer coating to resist corrosion and rusting. "Zaqtique"-type integral finishes are approved if consistency of finish is warranted by manufacturer. Verify one-batch material supply for each surface and adjacent visible surfaces for continuity of aesthetic. Use appropriate gage and section to avoid oil-canning. Special care and detailing for attachment to substrate to accommodate expansion and contraction.
 - iv. Glazing curtain wall systems (storefront), use care in locating with regard to maintenance (like the errant-rock from the weed-eater). Simple details resist water infiltration better than complicated ones.
 - v. Cementitious board and plank products are approved materials; the product should be sealed and/or painted according to manufacturer's specifications.
 - vi. Pre-cast concrete panels.
 - vii. Wood siding systems with appropriate detailing—prefer this material placed in areas with weather protection (eave coverage) finished with environmentally friendly sustainable coatings (semi-transparent or solid-body stains preferred over paint products). Use stainless-steel fasteners. If through fastening, leave head at face of siding (do not countersink). "All six surfaces" to be sealed with same product. Particular care to be paid to base of siding material adjacent to flashings or other horizontal surfaces that may encourage wicking of water (recommend sealing exposed open-grain edges with a high-performance sealer).
 - d. Unacceptable materials:
 - i. Stucco, both natural and acrylic, is not acceptable.
 - ii. Exterior Insulation and Finishing Systems (EFIS, aka "Dryvit") products are not acceptable.
 - iii. Painted surfaces, while acceptable, are not preferred—prefer materials with finish integral to the material itself.
 - iv. Wood Siding is strongly discouraged are areas below 8' and in areas that will receive weathering or in areas that will be continuously-damp and prone to decomposition.
 - e. Provide a high-quality weather-resistive-barrier (WRB) drainage system behind the exterior cladding system, with proper flashing details—consider path of water and air circulation.
 - f. Building design should assume there is no "back" to the building—all finishes should be consistent all around the building.
2. Exterior Soffits:
 - a. Acceptable materials: Cementitious board and plank, pre-manufactured metal panel systems, wood, plastered cement board. Use stainless-steel fasteners.
 - b. Gypsum wall board type products are not acceptable.



3. Roofing:
 - a. Roofing material to be selected for longevity/durability (prefer materials that have longer serviceable life—50 years+), energy savings (reflective vs non reflective surfaces), ease of maintenance (prefer none...), appearance/aesthetic, ease of replacement in the event of damage. Metal roofing products are preferred with clip-type fastening systems that allow the material to expand and contract minimizing warping (oil-canning). Select proper gage to conditions (min 24).
 - b. Flat or “slope to drain”-type roofs are inevitable on a school, however, pitched-roofing systems (gable or single pitch) are preferred as maintenance is simpler, products have longer life, and provide for aesthetic interest outside and inside. Provide hose bibs and electrical connections for cleaning.
 - c. Exposed downspouts and gutters are preferred over concealed systems. Consider locations of overflow scuppers and where the water goes—both for building longevity and possible opportunity for teachable building.
 - d. Use naturally anti-fungus/algae materials. Solid zinc materials (VM or sim) at ridge caps and detailing at the high points of roof assemblies help discourage growth and minimize need for maintenance and minimize need for cleaning and use of chemical agents.
 - c. Care should be taken that aesthetic is maintained from various viewing locations (equipment locations, flashings, etc, should be positioned to maintain quality of building design).

CONSTRUCTION CRITERIA

1. Provide careful detailing and close inspection of junctures at wall to: underside of roof decking; to adjacent grade; and at dissimilar material transitions to prevent water intrusion at the joint.
2. Poured-in-place concrete walls with cast face finish that will not be furred or sacked shall have an example within the region that the BISD, Architect, and Contractor all agree meets the spec. This example will become the standard in case of future concerns over quality of construction. Preferably, this example is identified prior to bidding so that the contractor can bid accordingly.

MAINTENANCE and CUSTODIAL CRITERIA

1. Field painted metal panels allow for re-painting if damaged by graffiti.
2. Products and assemblies should be selected and detailed to ensure longevity of the product and minimal maintenance over the course of the building's life.
3. Simple details without hidden places, cracks and crevices discourage unwanted insect and animal intrusion/habitation.
4. Provide suggested re-application schedule for anti-graffiti sealers to maintain serviceability.

SUSTAINABILITY

1. Consider the carbon footprint (ie, local products preferred over those shipped long distances; manufacture process and materials, etc...) of the materials selected to be an educational opportunity as well as a factor of decision-making. Consider LEED and WSSP protocol for material and assembly selection.

END OF SECTION



PERFORMANCE CRITERIA

1. Corridors

a. Walls:

- i. Acceptable surface materials:
 - a. Concrete
 - b. Brick masonry veneer
 - c. Glazed ceramic tile
 - d. Cementitious board with plaster veneer
 - e. Wood
 - g. Glazing
 - h. Tackable surfaces
- ii. Corridor walls should be composed of an abuse-resistant/washable surface to minimum 5'-0" AFF.
- iii. Consider wainscot at elementary school.
- iv. Gypsum wall board is acceptable as a finish material 5—0" AFF and higher.
- v. Provide stainless steel, mechanically-affixed corner guards at all exterior corners to 5' typical. At halls where carts are moved, corner guards should be full height.

b. Floors:

- i. Acceptable surface materials:
 - a. Concrete (integral color, "Retro Plate" type finish)
 - b. Resilient flooring (rubber, linoleum)
 - c. Carpet Tile (in limited circumstances with BISD approval)
 - d. Full thickness wood flooring is an acceptable material, with BISD approval. When selecting the product the following should be taken into consideration:
 - Durability – resistance to scratching, denting, scuffing, etc.
 - Substrate should be considered – moisture transfer can be an issue from concrete slabs – floating multi-layer plywood systems on a vapor barrier are recommended.
 - Finish: oil finish preferred.
 - Acid-cured, conversion varnish "Swedish" finishes are to be avoided.
 - Location of the material: located on the second floor and away from main entry doors.
 - Avoid wood flooring under/adjacent to drinking fountains.
 - e. Engineered wood flooring, with BISD approval. In addition to the above considerations, observe the following:
 - Consider thickness of veneer and how that will affect lifespan of the product with capability to sand minimum 2 times and re-oil.
 - Engineered wood floors should only be considered in lower use areas (second floors, not near entry door, etc...)
 - In light of recent events related to misreported VOC content in imported engineered wood flooring, verify sources of material and VOC content.

c. Ceilings:

- i. Recommended minimum height: 9'-0" AFF.
- ii. Minimum clear vertical distance from floor to lowest obstruction above shall be limited to 8'-0" AFF.
- iii. Provide access with ceiling hatches or suspended ceiling where access to space above is required, and ensure adequate space for maintenance and service of equipment. Access should be easily-performed by a single person. Coordinate identification system for operable equipment above ceiling with BISD.
- iv. Lay in ceiling (up to 2' x 6' tiles are acceptable – larger per BISD approval).
- v. Direct-glued ceiling tile is not an acceptable finish-material.
- vi. "Tectum"-type products are to be used only with BISD approval. When used consider aesthetic appropriateness.
- vii. Exposed structure with acoustical treatment is the generally-preferred ceiling treatment.
- viii. Exposed beams often have slotted holes for bolted connections that need acoustic consideration. Exposed steel deck ceilings must be broken between adjacent spaces for acoustic separation. Particular attention should be paid to the acoustic insulated flutes.



- d. Corner guards
 - i. Corner guards at all outside corner, full-height preferred; otherwise 36" high (min.) in corridors and 60" high in utility areas including receiving and loading dock areas.
 - ii. Preferred material is brushed stainless steel, mechanically-fastened.
- 2. Stairs
 - a. Acceptable Tread Surfaces:
 - i. Wood, provide full-thickness treads, no engineered (laminated) products. Wood can be a maintenance concern, locating near entry for high use may be unadvisable. Finish should match wood flooring standards (no painting).
 - ii. Steel, with careful detailing to ensure aesthetic continuity, slip-resistance, visibility (safety) and acoustics (steel stairs can be loud)
 - iii. Concrete, with careful detailing to ensure aesthetic continuity and slip resistance. Provide a common real-world sample that contractor, architect and BISD agree as the standard.
 - iv. Rubber and vinyl treads and risers are not acceptable.
 - b. Treads shall be textured to prevent slipping. Prefer edge treatment of riser so that it does not match the surface of the tread below—contrast to assist those with limited eyesight to see transitions.
 - c. Risers may be of solid or perforated material in wood or metal (verify gage and perforations to resist damage from toe-kicks). In any case, the riser should be positioned to allow proper toe clearance and of a contrast to the tread.
 - d. All tread and riser material to be full width stock—no runners.
 - e. Steel or aluminum nosing with roundover in full width of tread with slip-resistant texture.
 - f. Guardrails and Handrails
 - i. All handrails shall be attached to appropriate solid backing and lag bolted into backing.
 - ii. No open risers, perforated metal is acceptable.
 - iii. Preferred access to mechanical spaces is by elevator, if possible, or stairs that are adequately sized for adult-size bodies carrying tools and equipment; ship's ladders are acceptable for access to roofs and mechanical spaces so long as they are sized for adult-sized bodies carrying tools and equipment.
 - iv. Acceptable material for railings include wood, stainless steel, powder coated steel, tempered or laminated glass.

CONSTRUCTION CRITERIA

- 1. Expansion joints are more necessary with all flooring materials within Bainbridge Island's marine environment than in other locations.
- 2. Provide adequate time for off-gassing of VOCs in the construction schedule prior to occupancy.

MAINTENANCE and CUSTODIAL CRITERIA

- 1. Wood flooring that has an oil finish can be easily repaired with steel wool, fine sandpaper, and re-oiling with manufacturer approved products, and accepts District-approved maintenance procedures and products.
- 2. Light fixtures at stairwells should be easily accessible for re-lamping.
- 3. Wall mounted fixtures are preferred at stairwells; they should be breakage resistant and/or vandal-proof and/or at a height out of reach of occupants.
- 4. Ceiling mounted light fixtures are not acceptable unless directly above landings.
- 5. Include the required cleaning equipment specification and interval for products specified in the project.

SUSTAINABILITY

- 1. In general, strive to use materials with low/no VOC content, with low odor, of recycled content, that are recyclable, are of low waste in manufacture and installation, are durable, are washable, are sustainable, are locally-sourced.
- 2. Lighting shall be primarily provided naturally with LED artificial direct and indirect lighting controlled for light-harvesting.

END OF SECTION



PERFORMANCE CRITERIA

1. Walls:
 - a. Acceptable surface finish materials:
 - i. Tackable surface
 - ii. Whiteboards
 - iii. Acoustical treatment
 - iv. Exposed structure
 - v. Gypsum wall board (paint)
 - vi. Panelized wood (and other) finishes (verify material does not inhibit access for maintenance).
 - vii. Casework as finish
 - viii. Glass shall be used to great effect with regard to natural daylighting, views to interior hall/shared spaces and exterior. Much consideration needs to be given to classroom safety and functionality. Glass closer to the floor can be inhibitive.
 - b. Provide great consideration regarding the location white-boards, technology and teaching stations. While placing blocking in the wall to provide for flexibility of placement of the marker boards is important, putting them in the right place to begin with should minimize need to move. White boards are to be of a type approved for interactive digital projection systems (MooreCo Projection Series or sim).
 - c. Provide acoustically-treated surfaces, acoustic batting (within hollow walls) and acoustical detailing/separation for interior shared partitions.
2. Floors:
 - a. Acceptable surface materials:
 - i. Rubber floor tiles (“Nova” or sim) or linoleum, product to be selected shall not have foul odors.
 - ii. Engineered wood flooring, use care in selection in regard to location, room use and occupant type. District Standard is for thin-concrete radiant floor heating systems and wood flooring can be problematic if not detailed properly to account for expansion and contraction.
 - iii. Concrete with hard finish surface (“Retroplate” or sim) and integral color—consideration should be given to repetitive stress injuries for teaching stations.
 - iv. Hard, water-resistant finish material required at wet areas (concrete, sheet rubber or linoleum material).
 - v. Area rugs, coordinated with the design and in conjunction with school staff, for elementary classrooms, may be acceptable in certain circumstances—consult with BISD.
3. Ceiling:
 - a. Acceptable surface materials:
 - i. Exposed structure as a “building-teaching” tool. Give consideration to acoustics and mechanical requirements to ensure a quiet environment (visually and acoustically).
 - ii. Acoustical drop ceiling (see acoustic chapter for required acoustical properties).
 - iii. Panelized finish (wood, metal, etc...)
 - iv. Gypsum wall board.
 - b. Maintenance access to mechanical spaces shall be ample and easily-accessed by a single person. Complicated or cumbersome assemblies are to be avoided.
4. Equipment/Technology:
 - a. Give much consideration regarding placement of technology interfaces, teaching stations and ease of integrating equipment (computers, phones, etc...) into building infrastructure.
 - b. While considering flexibility is important in locating projectors, marker boards and other fixtures—locating them properly to avoid need to move in the future is better.
 - c. Provide the ability to darken the classroom for projectors.
5. Casework:
 - a. Identify space for recycle and trash containers in the classroom.
 - b. Provide opportunities for multiple uses on cabinetry faces (tackable surfaces, presentation, whiteboards, etc...)
 - c. Pay close attention to the ed-spec process/results in assessing need and type of storage/casework.



6. Mechanical:
 - a. Consider providing ceiling fan(s) controlled by occupants (not by BAS) in order to “fine-tune” environment and lessen layering of the air.
 - b. Consider the red light/green light concept in end user control of the environment.
7. Plumbing:
 - a. At sinks in classrooms at elementary level and all art and science rooms, provide silt-trap assemblies (Trap-eze, GlecoTrap, Zurn Z1180 or sim).
 - b. Provide bubbler at elementary classroom sinks.
 - c. All plumbing and plumbing fixtures to be “lead free” – based on standards set by California Department of Toxic Substances Control (CDTSC) 2010 (rev 2011) until standards are officially adopted by Washington State (est 2017).
 - d. Typical classroom fixtures:
 - i. Sink – Elkay, Irad1722 Stainless steel single-bowl side-mount holes for faucet (and bubbler at elementary)
 - ii. Faucet – Chicago faucets, 200-axkabcp, 8” centers, 9 ½” swing spout w/side spray
 - iii. Bubbler – Chicago faucets, 748-244abcp
 - iv. Silt-trap – Zurn, z1180 solids interceptor “p-trap”
 - e. “Studor”-type vents and other in-building type plumbing venting systems are not allowed, all plumbing vents must vent to exterior of building.
8. Lighting/Power:
 - a. Lighting shall be primarily from natural sources with LED-source artificial direct and indirect lighting controlled for light-harvesting.
 - b. Multiple power outlets are required on every wall, consider the use and end user when locating. Floor boxes may be used, but are to be minimized, shall be supplied with a metal, flush fitting trim and lid.
 - c. Prefer pull-down type power sources in environment with movable tables that require power.
9. Miscellaneous:
 - a. Provide infrastructure for two teacher stations in a classroom, however, only one location for electronic white board and document camera.
 - b. Consider equity of: space, size, volume, environment, views, access to natural light, assemblies and adjacencies, amongst classrooms within the school and throughout the District.
10. Acoustics:
 - a. Provide appropriate acoustic detail when dealing with hollow walls between learning spaces. Take special care in the penetrations of the wall and the junction of wall to floor, wall to ceiling and assuring acoustical-separation of horizontal deck surfaces (floor and ceiling/roof).
11. When required by the building program, Time Out Rooms: When required by the building program meet Washington State RCWs and WACs (388-145-1830) and the following requirements:
 - a. Provide room observation, glazing shall be shatterproof and mirrored.
 - b. Provide soundproofing sufficient to avoid disruption to adjacent classrooms, prefer to have isolated wall system within a space for sound isolation.
 - c. Provide plywood backing behind the gypsum wall board on the room side.
 - d. Provide wall padding from the top of the base to the ceiling with washable finish. Product should be easily removed by maintenance when damage occurs, but tamper-resistant to prevent unwanted removal.
 - e. Provide institutional door to match finish of typical door.
 - f. Per the WAC, a door to a Time-Out Room may not receive a mechanical means of locking. Handle on interior to be of a type that cannot be leveraged (round knob or like).
 - g. Door is to open out of the room—verify door swing adjacencies, door may open abruptly and inflict harm to occupants on outside. Provide full gasket seal at door-to-jamb and mechanical seal at sill.
 - h. Door jambs to be 16 ga. steel, fully-grouted.
 - i. Floors to be sheet goods with integral cove base, easily washable (provide floor drain with self-priming p-trap and tamper-proof heavy-duty grate (brass, bronze or stainless steel)
 - j. Light fixture to be impact resistant and flush mounted.
 - k. All materials to be easily washable, no sharp edges, tamper-proof



- l. All controls, fire alarms, smoke detectors, etc..., to be armored and minimum 5' AFF.
 - m. All materials exposed to room are to be ultra-low or no VOC.
 - n. Provide means to communicate inside to outside of room.
12. Safety and Security
- a. safe rooms
 - b. glass (strength, views, tint or mirroring, armoring)
 - c. communication
 - d. exit strategies
 - e. locks
 - f. blinds
 - g. emergency protocol/procedures manual in each classroom.
 - h. Consult the BISD District-Wide Safety & Security Assessment for further direction and information.
 - i. CPTED considerations
 - j. Video surveillance infrastructure

CONSTRUCTION CRITERIA

- 1. Provide adequate VOC off-gassing period for all materials, especially rubber flooring.
- 2. Meet requirements of flooring manufacturer for moisture content in concrete slabs. This is a requirement to maintain warranty.

SUSTAINABILITY

- 1. In general, strive to use materials with low/no VOC content, with low odor, of recycled content, that are recyclable, are of low waste in manufacture and installation, are durable, are washable, are sustainable, are locally-sourced.
- 2. Lighting shall be primarily provided naturally with LED artificial direct and indirect lighting controlled for light-harvesting.
- 3. Consider implications of composting, potential locations for learning. Consider cleaning and maintenance when specifying.

END OF SECTION



PERFORMANCE CRITERIA

1. Walls
 - a. Acceptable surface materials
 - i. Cast face finish structural concrete
 - ii. Masonry veneer
 - iii. Wood veneer panel
 - iv. Metal veneer panel
 - v. Glass storefront
 - vi. Gypsum wall board (above 5' in elementary, above 8' in others)
 - vii. Acoustical treatment (mounted above 8' to minimize vandalism)
 - b. Provide tackable surfaces for posting (events, announcements, etc...)
2. Floors:
 - a. Acceptable surface materials, Commons
 - i. Concrete with integral color ("RetroPlate" or sim)
 - ii. Linoleum, rubber tile flooring
 - iii. Walk-off mats (consult the Ed Spec recommendations for individual facilities)
 - b. Acceptable surface materials, Platforms/Stage
 - i. Wood
 - ii. Rubber flooring tiles
 - iii. Carpet tiles, with BISD approval
3. Ceiling:
 - a. Acceptable materials:
 - i. Exposed Structure, consider acoustics
 - ii. Acoustical ceiling
 - iii. Gypsum wall board
 - iv. Tectum, with BISD approval
 - v. Wood panel
 - vi. Metal panel
 - b. Ceiling-mounted circulation fans are highly recommended to help alleviate layering of air.
4. Equipment
 - a. Minimum of one retractable projection screen, size to be determined by Ed Spec committee, use care in locating screen to avoid light washout from windows and skylights. Provide black-out shades to skylights. Consult Technology department for preferred equipment.
 - b. Electronic projector and sound system – use and need to be determined during Ed Spec.
 - c. LCD monitor per Ed Spec, consider use as Building Machine Dashboard.
 - d. Provide a stage curtain at the platform with durable hardware/track suitable for both the weight of the curtain and repeated use over many years.
 - e. Voice amplification system, preferably wireless. Attention to acoustics is important here, as are specification/location of equipment--with loud groups of users, many times sound systems can be drowned out (especially bad in emergencies). Consider a variable-volume system.
 - f. WiFi access points shall be provided as necessary for complete coverage.
5. Lighting
 - a. Lighting shall be primarily from natural sources with LED-source artificial direct and indirect lighting controlled for light-harvesting. Artificial lighting shall be able to fully-light space during night-time events.
 - b. Interior lighting shall have controls with the ability to darken the room manually by the user.
 - c. Provide black-out shades at skylights. Provide shades to darken at windows.

- d. Consider siting, layout and direction of assembly with natural daylighting patterns and cycles. Avoid glare conditions for occupants and technology (screens)
6. Miscellaneous:
 - a. Provide adequate and easily-accessible storage for tables and stacking chairs, numbering to be consistent with the maximum seated occupancy of the space.
7. Safety and Security
 - a. safe rooms
 - b. glass (strength, views, tint or mirroring, armoring)
 - c. communication
 - d. exit strategies
 - e. locks
 - f. blinds
 - g. emergency protocol/procedures manual in each classroom.
 - h. Consult the BISD District-Wide Safety & Security Assessment for further direction and information.
 - i. CPTED considerations
 - j. Video surveillance infrastructure

CONSTRUCTION CRITERIA

1. As Commons areas typically have large expanses of flooring, use care in locating expansion control joints, consistency of finish, and exposure to heat-cycling (large expanses of glass open to east, south and west exposure can differentially heat a surface, lead to excessive cracking and uneven UV bleaching)
2. These spaces often have finish floor levels that are below adjacent grade—consideration of drainage, quality detailing and close supervision of waterproofing will be required.

MAINTENANCE and CUSTODIAL CRITERIA

1. Location for adequate trash, recycling, and compost containers must be developed along with school's plan for use. Provide containers with easily-removable liners.
2. Floor boxes for power and data are discouraged, however, if included must be water tight (for both spills and cleaning) and allow for expansion of cabling, steel frame and lid.
3. Consider public use (large group) when sizing length and breadth of walk-off mats.

SUSTAINABILITY

1. Ceiling fans are recommended for naturally cooling especially with high ceiling heights, controllable by users.
2. In general, strive to use materials with low/no VOC content, with low odor, of recycled content, that are recyclable, are of low waste in manufacture and installation, are durable, are washable, are sustainable, are locally-sourced.
3. Lighting shall be primarily provided naturally with LED artificial direct and indirect lighting controlled for light-harvesting.
4. Consider implications of composting, potential locations for learning. Consider cleaning and maintenance when specifying.

END OF SECTION



PERFORMANCE CRITERIA

1. Walls:
 - a. Cementitious backer board and fiberglass reinforced plastic (FRP) or similar water/chemical-resistant panel, from floor to ceiling on walls exposed to water—provide z-channel at bottom of panel to sink transition. Water resistant gypsum wall board and paint is allowed on dry walls.
 - b. Identify, and provide blocking, at locations for storage shelving and hangers for required custodial equipment.
2. Floors:
 - a. Exposed concrete with area drain.
3. Ceiling:
 - a. Water-resistant gypsum wall board.
4. Plumbing:
 - a. Heavy duty floor drain and grate (brass, bronze or stainless steel) with self-priming trap.
 - b. Floor mop sink with raised sides, 32" to 36" in length and 24" to 32" wide.
 - c. Two-compartment utility sink in main custodial office with commercial-grade pre-rinse type high-flow hose assembly.
5. Mechanical/Electrical:
 - a. Provide mechanical exhaust at all custodial rooms, override-controllable by user.
 - b. Major electrical equipment, electrical panels and data equipment shall not be installed in custodial rooms without BISD approval.
 - c. Lighting to be on occupancy-sensor control.
6. Miscellaneous:
 - a. Storage cabinet for flammable materials shall be vented to the outside.
 - b. 4' high back splash at sinks. Provide
 - c. Wall-mounted mop and broom rack, mounted such that mops can drip-dry into the mop-sink.
 - d. Allow space for custodial cleaning cart.
 - e. Supply storage shelving.
 - f. Provide full-size commercial washer and dryer in main custodial room.
 - g. Provide counter space, electrical, and data to serve users.

CONSTRUCTION CRITERIA

1. Use care in locating the custodial spaces throughout the facility to minimize transit time from room to areas of work.
2. Provide full-sealing doors to custodial spaces (full-gasketing jamb; mechanically-sealing threshold is preferred to ease in-and-out of custodial equipment)

MAINTENANCE and CUSTODIAL CRITERIA

1. Mop sink of size indicated above gives custodians room to rinse out the mops and let them hang and drip dry in the sink.
2. Size custodial rooms to accommodate equipment storage and ease of use for the custodians.

SUSTAINABILITY

1. The care of BISD schools is in the hands of our custodians. The easier it is for them to do their work, the better our facilities will be maintained.
2. Consider methods for water conservation both at the tap and in recycling water used to clean in the building.
3. Provide adequate lighting, ventilation to support a high-quality working environment. Lights should be on occupancy sensors to conserve energy.

END OF SECTION



PERFORMANCE CRITERIA

1. Kitchen/General
 - a. Walls:
 - i. Acceptable surface material: Cementitious backer board with reinforced fiberglass panels (RFP) or stainless steel panels throughout including areas where carts will be stored, provide z-flash at bottom panel transitions. Gypsum wall board can be located above RFP where the kitchen ceiling is high.
 - ii. Walls are cleaned by spray, consider water penetration at the base of the panel when detailing. Give consideration to wall assembly regarding inevitable water penetration—consider concrete curbs in these locations.
 - iii. Panel wainscot to 42" AFF at circulation areas.
 - iv. Provide stainless steel mechanically-fastened corner protection to same height as paneling .
 - b. Floors:
 - i. Flat floors with flush-mounted heavy duty brass bronze or stainless steel drains with removable brass, bronze or stainless steel grates—self-priming trap.
 - ii. Acceptable surface materials: Unglazed quarry tile with epoxy grout, others with BISD approval.
 - iii. Dark colored grout.
 - iv. Do not use polished concrete in the serving area (slippery when wet).
 - v. If quarry tile is used provide a thick-set mortar bed method of installation.
 - c. Ceiling:
 - i. Acceptable surface material: water-resistant gypsum wall board with scrub-resistant painted surface. Minimize cracks, crevices, undulations or changes in plane--simple surfaces are easier to keep sanitary. Drop ceilings are to be avoided (ceilings shall be permanently installed and assemblies constructed to prevent movement of persons or rodents).
 - ii. Provide minimum 10 foot ceilings.
 - iii. Provide a hard ceiling at any food storage room (room should not be open to structure).
 - d. General:
 - i. Work Tables: prefer flat tables, extra depth where possible, to allow usage from two sides. Do not provide a splash between two work tables.
 - ii. Provide a desk with data point in the kitchen.
 - iii. Condiment table is flat, non-refrigerated.
 - iv. Consider a pulper and dehydrator to minimize waste from the kitchen.
 - v. Provide pantry with free-standing NSF-certified shelving units.
 - vi. Locate and coordinate with BISD on containers for trash, recycling, and compost.
2. Ware Washing:
 - a. Provide (3) compartment sink – stainless steel in 18 gage up to 20" bowl and 16 gage over 20"--may be near or removed from soiled dish area.
 - b. Dishwashing machines to accommodate multiple sheet pans. Avoid corner-loading – the reach is too long and requires twisting while carrying significant weight.
 - c. Provide high temperature "sanitizing" dish washing machines—verify manufacturer's requirements for venting of steam-cycle.
 - d. Use of "collector" for scrapping system.
 - e. Provide minimum 24" counter before the dish washing.
3. Preparation Areas:
 - a. One -two compartment prep sink – stainless steel in 18 gage up to 20" bowl and 16 gage over 20".
 - b. Allow for "farm to cafeteria" concepts when designing prep spaces. Possibly provide a second prep area for the students, make it "kid size".
 - c. Prefer that prep areas in middle/high schools be closed off from serving areas.
 - d. Elementary kitchens can be open to prep areas.
 - e. Industrial-grade floor mixer (Hobart or sim, 60 qt.) at secondary schools.
 - f. Consult with food service for preferred type and location of pan racks.
 - g. Provide, and provide storage for, hot/cold transport carts
 - h. Consult with food service for preferred type and location of pot/pan shelving.
 - i. Walk-in cooler/freezer at pre-kitchens, reach-in freezer at satellite kitchens. Elevation of the freezer/cooler floor should be the same as the kitchen floor.



4. Serving Areas:
 - a. Prefer that kitchen/serving areas are centrally-located within the building/to the students on campus.
 - b. Prefer mobile equipment for flexibility in serving options and ability to reconfigure layout.
 - c. Accommodate for mechanically-refrigerated units for food bars.
 - d. Condiment counters to be flat tops (adjustable height or lower at elementary schools).
 - e. Mobile cashier stands.
 - f. Slope serving unit at secondary schools.
 - g. Serving lines at the elementary schools to have unique protector guard/shelf combination, 7" up from top, 34" height above finish floor at top.
 - h. Milk dollies are used instead of milk cooler.
5. Cooking Equipment:
 - a. Combination oven-steamers (combi-ovens). Note: at the elementary schools one deck of combi-oven over a convection oven deck as an alternative.
 - b. 2-burner commercial cooktop at elementary schools (satellite kitchen) size for large pots.
 - c. Kettle (40 gal.).
 - d. Braising Pan.
 - e. Type 1 stainless-steel hood (at grease-type cooking environments) with welded seams. Simple and clean in form to ease cleaning. Provide shortest route to exterior with minimal bends.
 - f. Type 2 stainless-steel hood (at steam-producing cooking environments) with welded seams. Simple and clean in form to ease cleaning. Provide shortest route to exterior with minimal bends.
6. Lighting:
 - a. Provide ample lighting for the task being performed. A lighting professional should be consulted regarding optimal foot-candle ratings at countertop.
 - b. Provide ample natural lighting and views to exterior—better working environment promotes better morale and productivity.
 - c. Provide LED direct and indirect artificial lighting with controls for light harvesting.
7. Electrical
 - a. In the serving area, provide multiple floor boxes for power/data to provide maximum flexibility in placement of serving equipment—boxes should be water-tight with drains.
 - b. No floor boxes should be placed in the kitchen/prep areas.
 - c. Provide electrical service for signage at serving areas as directed by BISD.
 - d. Provide electrical and data at multiple locations for satellite snack and water kiosks.
8. Plumbing:
 - a. Provide floor drains flush to finish-floor.
 - b. Floor drains to self-priming in heavy-duty brass, bronze or stainless steel with heavy-duty brass, bronze or stainless steel grate.
 - b. Provide a domestic hot water system that maintains temperature requirements and storage capacity.
 - c. Consider a solar-source DHW system.
 - d. Provide a staff restroom at the kitchen or convenient to the kitchen.
 - e. Provide a hot water hose bib.
 - f. Provide a hand wash sink outside toilet room.
 - g. Provide an under sink food macerator (garbage disposal) controlled by a remote-operated switch (air-type). Verify the disposal is connected to appropriate waste line and that sewerage system is capable of handling such waste.
9. Miscellaneous:
 - a. Provide line of site from ware washing to serving area.
 - b. Provide 42" wide doors.
 - c. Provide mechanically fastened, stainless steel corner guards at all outside corners, to 84" AFF.
 - d. Provide a system for washing cushioning/non-slip floor mats and hooks and hanging the units outside for washing/drying.
 - e. Provide lockers: ½ height locker per employee.
 - f. Provide Washer/Dryer at middle and high schools.
 - g. Provide nylon-locking nuts and/or liquid-applied thread locks on fasteners to prevent back out due to machine vibration/use. Thread lock should be of a long-serviceable type (non-hardening).



- h. Coordinate equipment with architectural layout--verify equipment is appropriate for conditions and vice-versa. To avoid conflicts, consider providing interior elevations with equipment in place to evaluate layout.
- i. If there is a divider between the serving area and the kitchen, place it so the servery can remain in place when the divider is closed.
- j. Shelving should be accessible, free-standing (secure to walls for seismic concerns) and NSF-certified.
- k. Try to standardize equipment to minimize the spare parts the District will have to inventory.
- m. Consider storage space for cold and hot transport cart at the pre-kitchen and the satellite kitchens.
- n. Avoid countertop pass-doors that are pneumatically supported. Pass-doors that are secured to the wall are acceptable. Or, consider a mobile cart that can be removed when the kitchen is busy or secured in place when it is not busy.
- o. Provide a secure office that is visually connected to the kitchen and servery areas.

CONSTRUCTION CRITERIA

- 1. Food Service consultant should be part of the punch list process and construction close-out process.
- 2. Level and even finish flooring and sub-flooring where the walk-in freezer doors swing is required to seal moisture out, avoid tearing the bottom door gasket, and prevent icing of freezer floor.
- 3. Provide ample additional power for future use.
- 4. Kitchen layout and detailing should focus on ease of use, simplicity of form and efficiency of movement.

MAINTENANCE and CUSTODIAL CRITERIA

- 1. Carefully coordinate the kitchen plan with district staff.
- 2. If a tile floor is used provide semi-annual application of sealer.
- 3. Provide user training if combi-type ovens are specified.
- 4. Kitchen layout should focus on ease of cleaning and maintenance. Details that require complicated cleaning processes, maintenance or frequent refurbishing should be avoided. Focus on clean lines and simple durable materials.

SUSTAINABILITY

- 1. Use energy efficient equipment.
- 2. Provide insulation under-coating at counters to improve acoustics.
- 3. Consider heat recovery from walk-in freezers.
- 4. In general, strive to use materials with low/no VOC content, with low odor, of recycled content, that are recyclable, are of low waste in manufacture and installation, are durable, are washable, are sustainable, are locally-sourced.
- 5. Lighting shall be primarily provided naturally with LED artificial direct and indirect lighting controlled for light-harvesting.
- 6. Consider implications of composting, potential locations for learning. Consider cleaning and maintenance when specifying.
- 7. Consider solar-source DHW.

END OF SECTION



PERFORMANCE CRITERIA

1. Walls:
 - a. Acceptable surface materials:
 - i. Cast-face structural concrete.
 - ii. Smooth-face or ground-face masonry.
 - iii. Provide plywood or cementitious backer board if gypsum wall board finish will be used. (BISD studies of impact-resistant wall board show that it is not tough enough to resist contact from an athletic environment).
 - b. Washable, scuff-resistant wainscot to 60" AFF.
 - c. All interior corners, provide stainless steel mechanically-fastened corner guards to 60" AFF with adhesive-applied (apply adhesive only to stainless steel surface) foam corner protectors to same height ("Boing Safety, Basic Corner Strip 48-2001XX" or sim)
2. Floors:
 - a. Acceptable surface material:
 - i. Hardwood maple flooring grade (2) or better at high schools and middle schools.
 - ii. Non-petroleum-based rubber flooring is acceptable at elementary level.
 - ii. Wood flooring at elementary schools per BISD direction.
3. Ceiling:
 - a. Acceptable surface material:
 - i. Exposed Structure, use care in assessing acoustics with exposed structure.
 - ii. Drop acoustic ceiling, verify confined above lid spaces with mechanical, electrical, plumbing, etc..., have adequate access for maintenance (room to move is better).
 - iii. Gypsum wall board.
4. Equipment –
 - a. High School – consult the Ed Specs for final equipment needs:
 - i. Chinning bar, mount bottom 60" AFF.
 - ii. Provide lockable storage area for BISD-supplied equipment.
 - iii. Glass backboards at all courts, break-away rims at competition courts only.
 - iv. Fully-recessed floor sleeves for volleyball standards, ring and coverplate to be completely-flush with finish floor when closed.
 - v. Wrestling mats (provide storage area, preferably utilizing a hoist lift).
 - vi. Electronic score board either able to withstand impact or with protective cage.
 - vii. Clocks with protective cages
 - viii. Provide protection for lighting.
 - ix. Dividing Curtain
 - ix. Sound system—preferably wireless.
 - x. Wall-mounted impact-resistant mats beneath all backboards.
 - xi. Bleachers per Ed Specs.
 - b. Middle School – consult the Ed Specs for final equipment needs:
 - i. Backboards, glass backboards at end courts.
 - ii. Chinning bar, mount bottom 60" AFF.
 - iii. Provide lockable storage for BISD-supplied equipment.
 - iv. Fully-recessed floor sleeves for volleyball standards, ring and coverplate to be completely-flush with finish floor when closed.
 - v. Climbing Rope.
 - vi. Score board.
 - vii. Clocks with protective cages.
 - viii. Provide protection for lighting.
 - ix. Dividing Curtain
 - x. Sound System—preferably wireless.
 - xi. Wall-mounted impact-resistant mats beneath all backboards.
 - xii. Bleachers per Ed Specs.
 - c. Elementary School – consult the Ed Specs for final equipment needs:
 - i. Backboards mounted at 10' at end courts and (4) side court backboards adjustable 8' to 10'.



- ii. Fully-recessed floor sleeves for volleyball standards, ring and coverplate to be completely flush with floor when closed.
 - iii. Provide lockable storage for BISD-supplied equipment.
 - iv. Adjustable chinning bars, mounted with bottom of bracket 30" AFF.
 - v. Climbing Rope
 - vi. Sound System—prefer wireless.
 - vii. Wall-mounted impact-resistant mats beneath all backboards.
5. Plumbing:
- a. Drinking Fountain, Location in the gym or adjacent to the gym per the Ed Specs
6. Electrical:
- a. Consider the placement of electrical outlets and switches for lighting, bleachers, basketball backboards, sound system, etc.
7. Lighting:
- a. Provide ample LED sourced artificial lighting with controls for light harvesting and manual dimming for the various activities.
 - b. Provide ample diffuse natural lighting. Special attention should be paid to avoid direct bright daylight as glare can interfere with activities. Provide shading and/or blackout blinds. Direct daylighting can also affect wood floors both from UV bleaching and differential heating can lead to warping, buckling, etc...
- b. Protective cages at light fixtures.
8. Miscellaneous:
- a. Sound attenuation on walls above 8'-0", give consideration for impact-resistance
 - b. Game lines per Ed Specs
 - c. Provide wire covers at fire sprinkler heads, clocks, etc.
 - d. Provide AEDs per the Ed Spec.
 - e. Consider water vapor management that is prevented from passing through the gym floor vapor barrier. This moisture will find a path to exit, best if this is managed purposefully.

CONSTRUCTION CRITERIA

- 1. Do not locate plumbing piping under gymnasium floors.
- 2. When finish floor levels are below grade provide special attention and detailing to waterproofing and drainage at walls, slab and intersection between the two.
- 3. Make accommodation for attachment, and protection of, rock climbing wall surfaces.

MAINTENANCE and CUSTODIAL CRITERIA

- 1. Walls finish below 8' should be durable, easily-cleanable and scuff-resistant.

SUSTAINABILITY

- 1. Provide ample diffuse natural lighting. Special attention should be paid to avoid direct bright daylight as glare can interfere with activities.
- 2. Ample artificial lighting to be provided by LED source. Provide controls for light-harvesting.
- 2. Give consideration to natural cooling and ventilation methods and ceiling fans to mix air that can layer in large-volume environments.

END OF SECTION

PERFORMANCE CRITERIA

1. Walls:
 - a. Acceptable surface materials:
 - i. Cast-face structural concrete
 - ii. Masonry veneer
 - iii. Wood panel
 - iv. Metal panel
 - v. Acoustic panel
 - vi. Tack wall panels
 - vii. Glazing/curtain wall/storefront (provide operable windows for natural ventilation)
 - viii. Gypsum wall board
 - b. Prefer that walls below 8' AFF be dedicated to casework (bookshelves, storage, built in seating)
2. Floors:
 - a. Acceptable surface materials:
 - i. Rubber tile (Nora or sim)
 - ii. Wood, engineered preferred, give consideration to source of material, VOC content) solid-sawn is acceptable, give much consideration to radiant floor heat detail requirements.
 - iii. Linoleum sheet goods.
 - iv. "Retroplate" or similar intergrally-sealed concrete.
 - v. Carpet tile,
 - vi. Area rugs for elementary group reading with BISD approval.
 - b. Give special attention to acoustics in Library especially with a large area of hard floor.
3. Ceiling:
 - a. Acceptable surface material:
 - i. Exposed structure with acoustical treatment
 - ii. Acoustical drop ceiling.
 - iii. Gypsum wall board (minimize inaccessible ceiling cavities).
 - b. "Tectum"-type acoustical finish products may be considered only when ceilings are very high.
4. Equipment:
 - a. One retractable projection screen, 9' x 12' - location per Ed Spec
 - b. Ceiling-mounted projector with wall mounted operating controls - per Ed Spec.
 - c. Electronic white board per Ed Spec.
 - d. Document camera.
5. Casework:
 - a. Book shelves, confirm per Ed Spec.
 - i. 11,200 volumes at Elementary Schools,
 - ii. 11,350 volumes at Middle Schools
 - iii. 12,300 volumes at High School
 - b. Standard width for shelving units is 3'-0", typical depth 10" for fiction and biography and 12" for reference, nonfiction and picture books.
 - c. Magazine rack.
 - d. Flat storage for oversized materials.
 - e. Checkout desk.
 - f. Book drop.
 - g. Display case.
 - h. Teachers wardrobe.
 - i. Computer tables.
 - j. Countertop surfaces should not be cold to the touch or highly reflective.
6. Plumbing:
 - a. Provide sink in workroom.
7. Lighting:
 - a. Provide LED direct and indirect artificial lighting with light harvesting controls.
 - b. Provide ample diffuse natural daylight, use care to prevent direct daylight as UV can deteriorate collections and glare can be an issue for users.



8. Electrical:
 - a. Provide wiring pathway from Main Distribution Frame (MDF) room or Intermediate Distribution Frame (IDF) room and computer labs. As a security measure, these rooms should be identified by number, not named as “MDF”, “IDF”, “Data Room” or “Electrical Room”
 - b. Provide adequate wall-mounted outlets. Use floor boxes only as necessary. Consider location of lap-top cart and the trend toward electronic devices in lieu of books. Consider use of USB-type plug-ins for charging electronics.
 - c. Provide adequate WiFi for full coverage throughout Library.
 - d. Floor receptacles to be avoided unless an expressed need for a specific program or by code.
9. Miscellaneous:
 - a. Maximize tack surfaces—wall surfaces below 8’ AFF not covered by casework (or other) to receive tackable surface treatments as much as practical.
 - b. Provide electrically-operated blinds to darken room.

CONSTRUCTION CRITERIA

1. Coordinate location of power and data outlets for easy access where known devices will be located.
2. Coordinate location of motors for electric shades above ceiling.

MAINTENANCE and CUSTODIAL CRITERIA

1. Locate recycling and trash containers where they will be handy yet not obtrusive.

SUSTAINABILITY

1. Natural light
2. Provide a “red light/green light” system to inform users and allow natural ventilation methods, teachable building concept.
3. Ceiling fans are recommended for naturally cooling especially with high ceiling heights, controllable by users.
4. In general, strive to use materials with low/no VOC content, with low odor, of recycled content, that are recyclable, are of low waste in manufacture and installation, are durable, are washable, are sustainable, are locally-sourced.
5. Lighting shall be primarily provided naturally with LED artificial direct and indirect lighting controlled for light-harvesting.

END OF SECTION



PERFORMANCE CRITERIA

1. Walls:
 - a. Gypsum wall board, painted – use water resistant-type in potentially-moist environments.
 - b. ¾" plywood to 8' AFF, painted, where equipment is likely to be wall-mounted. Seal base edge to prevent water wicking.
2. Floors:
 - a. Exposed concrete floors.
 - b. At MDF, IDF and Electrical Rooms provide resilient flooring material, rubber flooring or linoleum, preferably not VCT (district is moving away from floor wax).
3. Ceiling:
 - a. Exposed structure or gypsum wall board are acceptable only if access to electrical, plumbing and mechanical infrastructure is maintained. Room should be isolated, ceiling should not be open to other areas.
4. Plumbing:
 - a. Floor drains to be heavy duty brass, bronze or stainless steel with brass, bronze or stainless steel heavy duty grates and equipped with like-material debris baskets and trap primers at all mechanical spaces (prefer trap primers via wastewater)
 - b. Maintain easy access to regularly-serviced maintenance items such as:
 - i. Check-valves/back-flow preventers
 - ii. Pressure gauges and testing ports
 - iii. Valves, cleanouts and sampling ports
5. Mechanical/Electrical:
 - a. MDF shall have an independent mechanical cooling system which can operate 24/7 separate from main building cooling system. Emergency power via generator required. HVAC unit to be placed either out of reach or within a tamper-proof enclosure.
 - b. No plumbing or heating duct lines shall run through or above MDF rooms.
 - c. Mechanical ventilation shall be provided in all mechanical/electrical rooms and accessible tunnels located below ground level.
 - d. Provide a double interlock pre-action fire suppression system in all electrical and data rooms. Consider use of a chemical-type fire suppression system in these rooms.
6. Miscellaneous:
 - a. Door sizes to accommodate equipment access to provide alternate means of equipment access, minimum 3'-6".
 - b. All mechanical and electrical equipment rooms shall have room signs similar to standard room sign except, for security reasons, there should be no room name, only a number that is identifiable to users.
 - c. Boiler Rooms shall have a custodial workstation complete with power/phone/data similar to office.
 - d. Provide a hoisting-track system in rooms with large pieces of equipment that would be difficult to manage.

CONSTRUCTION CRITERIA

1. Line walls with painted plywood for attaching wall-mounted equipment.
2. Prefer mechanical rooms with floors adjacent to grade to aid in ease of regular access for testing and maintenance as well as equipment replacement (see 6d above)

MAINTENANCE and CUSTODIAL CRITERIA

1. Review location of mechanical equipment with the District. If mechanical equipment is located on the roof provide easy access with stairs or ships ladder.
2. At boiler rooms, provide an hoisting rack to be used when replacing the boiler.
3. Provide house-keeping pad at boiler and hot water tanks.

SUSTAINABILITY

1. Use occupancy sensors for lighting systems.
2. All LED lighting, ample for the space.
3. Use high-efficiency HVAC equipment for MDF rooms.

END OF SECTION



PERFORMANCE CRITERIA

1. Classroom
 - a. Provide a “sound reinforcement” sound system in the classrooms. Include wireless microphone and 4-speakers located around each classroom. Consider a sound/acoustical engineer to establish optimal speech and music rendering qualities.
 - b. Individual classroom sound systems shall be interconnected to the whole-building system for announcements.
2. Commons
 - a. Provide a sound reinforcement system for speech intelligibility and music quality.
 - b. This space can be very loud and the sound system has the potential of being drown-out, especially important in the event of emergency announcements.
 - c. Coordinate with the BISD Technology department on recommended equipment and interfaces as well as the Ed Spec.
3. Gymnasium:
 - a. Provide a sound reinforcement system for speech intelligibility and music quality.
 - b. This space can be very loud and the sound system has the potential of being drown-out, especially important in the event of emergency announcements.
 - c. Provide a wireless headset system for the PE teacher.
 - d. Coordinate with the BISD Technology department on recommended equipment and interfaces as well as the Ed Spec.
4. Music rooms
 - a. Elementary School
 - i. Provide a sound reinforcement system for speech intelligibility and music quality.
 - b. Middle/High School
 - i. Provide a sound reinforcement system for speech intelligibility and music quality.
5. Theater
 - a. Provide a sound reinforcement system for speech intelligibility.
 - b. Consult professionals in theater equipment and design and the Ed Spec for latest criteria.
 - c. Provide training for appropriate end users of equipment.

CONSTRUCTION CRITERIA

1. In the case that the budget is not sufficient, provide the infrastructure (conduit) and purchase the equipment later when the funds are available.
2. Take care to layout and maintain appropriate separation for other electronics, power cabling, etc...that may cause interference with AV cabling and equipment.

MAINTENANCE and CUSTODIAL CRITERIA

1. Maintenance and custodial crews should be trained on the operation of the AV systems.
2. Technology Department should be trained on the operation and maintenance of the AV systems.
3. Consider AV integration for maintenance and custodial spaces.

SUSTAINABILITY

1. AV equipment should be selected for energy efficiency, however, long-term durability also needs consideration. If it saves electricity, but needs frequent replacement, that is at cross-purpose.
2. Use care in designing and specifying infrastructure for AV systems as technology changes frequently. Better to have systems in place that support equipment that may not be in current budget, but added at a later date.

END OF SECTION



PERFORMANCE CRITERIA

1. Walls:
 - a. Use great care in detailing of floor-to-wall conditions. The toilet room environment lends to corrosion of metal studs and wall failure (this is result of heavy use and required cleaning). Consider standoff-curbs in concrete or other impermeable material to 6" AFF. Also consider water-proof membrane systems.
 - b. Provide full height ceramic tile with epoxy grout on all walls in public and student toilet rooms. Provide a minimum height of 60" AFF in staff toilet rooms. Use a high-quality anti-microbial silicone caulk color-matched to grout, at all inside corners. Consider sanded to match texture.
 - c. Use cementitious backer-board as substrate to all walls in toilet rooms. (Water resistant gypsum wall board does not hold up to district cleaning).
 - d. Consider using CDX (verify VOC) plywood as a backer substrate in upper middle and high school environments.
 - e. Use epoxy-type paints at existing environments where CMU is the finish wall.
 - f. Water-resistant gypsum wall board may be used above 60" AFF in areas not to receive tile.
2. Floors:
 - a. Unglazed ceramic tile with matching coved 6" base is preferred.
 - b. Linoleum sheet is acceptable, with integral cove base.
 - c. Use dark colored grout at floor and walls to minimize unsightly stains showing.
 - d. Use epoxy grout.
3. Ceiling:
 - a. Moisture resistant gypsum wall board.
4. Plumbing:
 - a. Provide heavy-duty brass, bronze or stainless steel floor drain(s) with trap-primers with tamper-proof matching heavy duty grates at all toilet rooms. In male bathrooms, locate drain near urinals.
 - b. Urinals: ultra-low or no-water units. Provide screens in urinals that are removable for service.
 - c. Lavatories: high-quality porcelain-coated cast-iron or stainless steel with BISSD approval.
 - d. Faucets: solid brass chrome-plated and lead-free. Function to be push-button (Chicago MVP or sim) or touchless infrared actuation—metered water usage tied to a "dashboard" to lower overall building usage.
 - e. Toilets: Consider dual-flush toilets (provide instruction cards on walls immediately behind fixture). Ultra-low water usage. Toilets shall be of a type with overflow protection (electronic fill stop or in-bowl rim drain)
5. Electrical/Lighting:
 - a. Provide electrical outlet in corridor near entrance to restrooms.
 - b. Provide vandal-resistant LED source light fixtures with occupancy sensors. Consider diffuse natural light as primary light source. Either way, ample lighting leads to less vandalism in bathrooms.
 - c. Electric hand-dryers may be considered with BISSD approval.
6. Miscellaneous:
 - a. Avoid locating mirrors where reflections can be seen from outside of toilet room.
 - b. When possible locate soap dispensers over sink but within ADA reach range.
 - c. Provide appropriate backing or blocking at all wall mounted fixtures.
 - d. Solid recycled-plastic toilet partitions are preferred. Continuous, stainless steel piano-type hinges shall be used. Provide coat hooks (order spare coat hooks to match to be stored for use when there are breakages). All fasteners shall be stainless-steel through-type with backing plates and either nylock-type nuts or use thread-lock, threaded stud shall be flush to surface of nut. Fasteners to be tamper-proof.
 - e. Toilet accessories including toilet paper, soap, and towel dispensers shall be provided by the district according to the current custodial standard. Verify backing requirements and perform a backing pre-cover walk-thru. Fasteners to be tamper-proof.
 - f. Provide permanently-attached fold-down changing tables at pre-K and developmental preschool restrooms in stainless-steel

CONSTRUCTION CRITERIA

1. At locations with wall-hung toilets, confirm solid installation of toilet carriers at time of plumbing rough-in inspection. Photograph each one during pre-cover walk-thru. Provide fully-captured third leg in single installations (provide thread-lock on all thread)—prefer back-to-back (four legged) installations.
2. Water temp at 110 degrees Fahrenheit is preferred.

3. Use care in installation of, and oversight to, waterproofing membranes associated with toilet rooms.

MAINTENANCE and CUSTODIAL CRITERIA

1. The wall structure of toilet rooms that are regularly cleaned with hoses connected to hose bibs in the toilet room fail. Metal stud track and bases of studs corrode. Pressure treated lumber corrodes metal track. Non-treated wood rots. For these reasons, the district prefers to minimize 'hosing down' toilet room walls. Hose bibs will be installed in custodial areas. Hoses can then be connected for occasional hosing down of toilet rooms.

SUSTAINABILITY

1. Use low flow, ultra-low flow and waterless fixtures.
2. Provide water use information cards/placards as part of the "teaching building" effort.
3. Consider storm water or grey water systems for toilet flush.
4. Consider use of a dashboard to track water use.
5. In general, strive to use materials with low/no VOC content, with low odor, of recycled content, that are recyclable, are of low waste in manufacture and installation, are durable, are washable, are sustainable, are locally-sourced.
6. Lighting shall be primarily provided naturally with LED artificial direct and indirect lighting controlled for light-harvesting.

END OF SECTION

PERFORMANCE CRITERIA

1. Walls:
 - a. Gypsum wall board with a scrubbable paint finish.
 - b. Cast-face structural concrete.
 - e. Consider tile (on cementitious backer-board) as a wainscot and backsplash at counter.
2. Floors:
 - a. Unglazed ceramic tile
 - i. Use matching covered 6" base is preferred, similar to toilet rooms.
 - ii. Use epoxy grout.
 - b. Rubber tile ("Nora" or sim)
 - c. Rubber sheet ("Nora" or sim)
 - d. Linoleum sheet'
 - e. Concrete with "Retroplate" or sim integral concrete finish.
3. Ceiling:
 - a. Gypsum wall board.
 - b. Exposed structure (use great care considering acoustics in the Nurse's Office as this is often a quiet place of refuge).
 - c. Drop ceilings may be used with BISD approval, however, access must be prevented from adjacent spaces.
4. Plumbing:
 - a. Sink: Provide a kitchen-type stainless steel sink, faucet and bubbler similar to classroom spec.
 - b. Faucets: solid brass chrome-plated and lead-free.
 - c. Consider a toilet room adjacent to the Nurse's Office. Consult the Ed Spec for specific requirements (ie: shower).
5. Electrical/Lighting:
 - a. LED source light fixtures with manual operation and dimability by users.
 - b. Consider diffuse natural light as primary light source with blackout shades.
 - c. Consult the Ed Spec for equipment electrical needs.
6. Miscellaneous:
 - a. Consider a space separate from the bed area for the Nurse's Admin Office. Provide a window between the two spaces with blind.
 - b. Consult the Ed Spec for number of beds.
 - c. Provide appropriate backing or blocking at all wall mounted fixtures and curtain supports.
 - d. Hospital curtains to be: Track system 9600 and carrier 9616/061 with 72" "Architex Rx8006" fabric or sim with 18" open mesh top.
 - e. Provide cabinetry capable of storing sensitive files and materials (ie: inhalers, drugs, epi-pens, etc...) with lockable casework matching the key for entry to the space (District standard 6-pin Corbin) or RFD keycard system ("Accuride Senseon" or sim).

CONSTRUCTION CRITERIA

1. Consider a stand-alone booster heater for water temp at 120 degrees Fahrenheit.

MAINTENANCE and CUSTODIAL CRITERIA

1. All surfaces shall be easily wiped clean with minimal cracks and crevices for sterile environment.

SUSTAINABILITY

7. Strive to use materials with low/no VOC content, with low odor, of recycled content, that are recyclable, are of low waste in manufacture and installation, are durable, are washable, are sustainable, are locally-sourced.
8. Lighting shall be primarily provided naturally with LED artificial direct and indirect lighting controlled for light-harvesting.

END OF SECTION

DIVISION 03

CONCRETE

- .: When used as a structural component, expose concrete walls and floors as finish elements where appropriate
 - .: The use of concrete as wall finish eliminates the need to apply further finishes, allows the structure of the building to be expressed for educational purposes and provides contrast with other architectural finishes
 - .: Retro-plate, integral color concrete as a floor finish provides a durable, easily cleaned surface requiring minimal maintenance
 - .: Provide high quality materials, detailing and stringent installation requirements to ensure long-term performance
-



PERFORMANCE CRITERIA

1. Exposed concrete is acceptable as an interior wall finish.
 - a. Specify "Architectural Cast-Face Finish" for exposed concrete walls. See Construction Criteria below for additional comments--Reference the most recent update available to and for American Concrete Institute (ACI) 301.
2. Acceptable Finishes:
 - a. Exposed aggregate at exterior walkways.
 - b. Broom finish at exterior walkways and loading docks.
 - c. Pervious concrete at exterior walkways and drives.
 - d. Integral color concrete.
 - e. "RetroPlate" or sim integral seal finish system at interior locations (note: slippery when wet).
 - f. Seal concrete floors at the following locations:
 - i. Industrial Arts
 - ii. Arts at middle and high schools
 - iii. Custodial Closets
 - iv. Storage Rooms
 - v. Locker Rooms
 - vi. Mechanical/electrical Rooms
 - vii. Stairs
3. Unacceptable Finish:
 - a. Exposed aggregate at interior floors.
4. Provide embedded steel stair tread nosings with non-slip texture.
5. Plan for flexibility, provide conduit for future use.
6. Show location of expansion and control joints on drawings, use care in locating to limit cracking of the finish slab (use extra care at reentrant corners), control-joint depth to slab depth should be considered.
7. Fill all cracks with, 2-part epoxy grout. The grout makes the floor cleaner and it protects the edges from spalling and chipping over time. Clear epoxy grout picks up the color of the concrete, pigment may be advised at darker floors.
8. In the construction documents elevate all exposed concrete walls and identify panel breaks and hanger ties.
9. Avoid extruded concrete curbs. Install cast-in-place curbs with integral color at fire lanes to limit future painting maintenance.
10. Below-Grade Vapor Barriers:
 - a. Performance Standard: Minimum 15 mil polyolefin or accepted sheet vapor retarder, exceeding ASTM E1745, Class A. (Polyethylene vapor retarders are not accepted):
 - i. Vapor Barrier: Exceed provisions ASTM E1745 Class A, 15-mil polyolefin vapor retarder, as specified by this Section.
 - ii. Performance Standard:
 1. Moisture Vapor Permeance: Under 0.02 perms, tested to ASTM E154 or ASTM F1249.
 2. Tensile Strength: Minimum 45 foot-pounds per inch, tested to ASTM E154, Section 9, Method ASTM D882.
 3. Puncture Resistance: Minimum 2300 grams, tested to ASTM D1709 Method B.
 - iii. Initial Tear Resistance: Minimum 8.0 pounds force in machine direction and transverse direction, tested to ASTM D1004.
 - iv. Low Temperature Impact: Pass minus 120 degrees C, tested to ASTM D1790.
 - b. Subgrade, Granular Base, Capillary Break: Industry standard has shifted to pouring directly against vapor barrier or foam insulation. Crushed gravel granular base that is capable of being compacted to 95% with no fines—all sub slab material to be free draining--8"-12" with a 4" top lift "cushion" compacted to no more than 75%.
 - c. Manufacturers:
 - i. STEGO Industries LLC 15-mil Class A.
 - ii. W.R. Meadows, Sealtight, Perminator 15 MIL.
 - iii. Fortifiber Corp., Moistop Ultra 15.



CONSTRUCTION CRITERIA

1. Pre-construction Meeting required
2. Protect all exposed-finish concrete floors during construction with an abuse-resistant sheet good, "RamBoard" or sim at light to medium duty, use plywood at areas expecting heavy use, over dust and dirt resistant sheeting (felt or sim breathable, no plastic sheeting as it will inhibit curing).
3. Give proper attention to details on plans regarding location of form ties, panel joints, control joints (location and depth), etc.
4. Install vapor barrier sheet over compacted granular base (no fines) course and rigid extruded polystyrene (XPS) below grade insulation (verify compression rating for expected use), conforming to ASTM E1643.
5. Install vapor barrier in widest practical width, parallel with direction of concrete pour.
6. At terminations, turn vapor barrier up to full slab thickness. Seal with pressure sensitive tape to foundation walls to prevent ground water from infiltrating between vapor retarder and bottom of slab.
7. Make 6 inch minimum overlaps and seal with manufacturer's pressure sensitive tape. Roll tape to remove wrinkles and to make continuous contact with vapor retarder, and to achieve water-tight performance.
8. Seal pipes and other penetrations with vapor barrier tape approved by vapor barrier manufacturer and/or prefabricated boots and pressure sensitive tape, again, approved by the vapor barrier manufacturer. Field-fabricate boots and other shapes as necessary to seal vapor barrier and assure a water-tight assembly, with materials and in processes approved by the vapor barrier manufacturer.
9. Prevent puncturing, tearing, or displacement of vapor barrier sheet membrane. If a malady occurs, remediate immediately to prevent a missed penetration prior to pour.
10. Tape seams, tears, and other penetrations with manufacturer's self-adhering tape.
11. When specifying exposed concrete walls with architectural finish, take the time to tour examples with the architect, contractor and concrete sub-contractor, to clarify expectations of finished product.
12. Review locations for control and expansion joint locations with BISD prior to bid.

MAINTENANCE AND CUSTODIAL CRITERIA

1. No wax at "RetroPlate" or similar integral sealing floor finishes.
2. Treat exposed exterior walls and interior walls with anti-graffiti coating (see Div. 7) up to 8' AFF or adjacent finish grade.
3. Discuss with BISD the latest in skateboard deterrents and provide.

SUSTAINABILITY

1. Use fly ash recycled material in concrete walls and foundations (fly ash may be used in floor slabs with BISD approval).
2. Use certified wood for formwork, encourage re-use of formwork.
3. Use concrete reinforcement that contains recycled steel.
4. Use locally manufactured materials (within 500 miles)
5. Use no petroleum-based release agents

END OF SECTION

DIVISION 04

Masonry

- ∴ Brick masonry veneer is a preferred exterior finish due to its durability and long-lasting aesthetic characteristics
 - ∴ Brick masonry should be protected with an appropriate anti-graffiti coating
 - ∴ Locally manufactured materials and recycled steel reinforcing should be used whenever possible
-



PERFORMANCE CRITERIA

1. Exposed masonry is acceptable as an interior and exterior veneer finish.
 - a. Brick
 - b. Concrete masonry units (CMU) is not a preferred material.
 - c. Avoid use of split face CMU.
2. Single width masonry construction is not recommended.

CONSTRUCTION CRITERIA

1. Coordinate location of electrical items in masonry walls.
2. When the masonry wall is exposed on two sides the same quality standards should apply to both sides.
3. A pre-construction meeting is required.
4. Provide a full-size on-site mock up, movable to assess aesthetic in differing conditions.
5. Provide adequate overlap of thru-wall flashing.
6. Provide ample weepholes protected by stainless-steel mesh screens.

MAINTENANCE AND CUSTODIAL CRITERIA

1. Treat exposed exterior and interior walls with anti-graffiti coating (see Div. 7) up to 8' AFF or adjacent finish grade.

SUSTAINABILITY

1. Use locally manufactured materials (within 500 miles) whenever possible.
2. Use steel reinforcing which contains recycled steel whenever possible.

END OF SECTION

DIVISION 05

METALS

- .: Structural steel is preferred as a primary construction material due to its longevity and resistance to seismic forces
 - .: Exposing structural steel provides learning opportunities and eliminates need for application of additional layers of finish materials. It also provides an aesthetic contrast to other architectural finishes
 - .: Steel provides a clear “chain of custody” allowing sourcing of domestically produced material
-



PERFORMANCE CRITERIA

1. Exposed structural steel is acceptable:
 - a. Use appropriate primer for conditions when the steel is exposed.
 - b. If a natural “raw” appearance is preferred, specify an appropriate sealer.
2. Use non-slip decking at cat walks and on exterior entry grates.
3. Steel Studs:
 - a. Verify appropriate gage and depth for conditions, consider:
 - i. Height
 - ii. Potential impact from users
 - iii. Finish surface
 - ix. Potential out-of plane loading (ie: rockwalls, etc...)
 - b. Consider use of space with assembling details, for instance a curb condition should be considered in wet locations (bathrooms, kitchens, etc...) that removes the base plate from the floor to help alleviate rusting and eventual failure of the wall.
4. Metal Handrails:
 - a. Galvanized steel using the longest runs possible to minimize joints, welded connections to be contiguous, smooth, and free of burrs, hot-dip galvanized after fabrication.
 - b. Marine-grade stainless steel using the longest runs possible to minimize joints, welded connections to be contiguous, smooth and free of burrs.
 - c. Vertical members should be embedded, or sleeved, to prevent movement from torque and to prevent spalling of concrete instead of using a plate connection.
 - d. Ornamental steel should be “kid proof” – no sharp edges or points, no pinch or crush points, no potential for head and neck entrapment.
 - e. Consider LED lighting source at underside of exterior rails, “Intense Lighting V-Rail” or sim.
5. Signage:
 - a. Inset numbers within building façade. No raised letters because they become a vandalism target.

CONSTRUCTION CRITERIA

1. Know the chain of Custody, where did the material come from?
2. Establish a quality control program to make sure all components are installed, i.e. bolts.

MAINTENANCE AND CUSTODIAL CRITERIA

1. Provide adequate corrosion protection appropriate for level of exposure design life of material.

SUSTAINABILITY

1. Use locally manufactured materials (within 500 miles).
2. Use local suppliers and fabricators whenever possible.

END OF SECTION

DIVISION 06

WOOD, PLASTICS AND COMPOSITES

- .: Use of wood as an exterior building surface finish should be kept to a minimum
 - .: Locally sourced , sustainable wood products should be selected whenever possible
 - .: Providing casework in classrooms supports classroom organization and helps limit visual clutter
 - .: High quality cabinetry and hardware help resist abuse over time
 - .: Plywood and other manufactured wood products must meet indoor air quality standards (ultra-low or no VOC)
 - .: High pressure decorative countertops are long lasting and resistant to abuse
-



PERFORMANCE CRITERIA

GENERAL

1. Provide blocking, solid wood or plywood backing for case work, toilet room accessories, door stops, LCD monitors, all contractor and BISD supplied items and other materials attached through wall finish.
2. Provide continuous $\frac{3}{4}$ " plywood backing on gym storage room walls where there is no casework
3. Provide two 16" wide plywood backing bands on three classroom walls, at 3' and 7' on center AFF as backing for whiteboards and other surface mounted items.
4. Provide blocking detail in construction documents
5. The use of wood as an exterior building surface should be kept to a minimum. When used, locate in a weather and user protected area (under eaves and 8' AFF and adjacent grade), provide a product that can easily be repairable or replaceable. Use face-exposed stainless steel fasteners. Use a solid or semi-transparent stain finish to impregnate the wood and protect it at a cellular level (no paint) on all six edges. Give particular attention to open grain ends and adjacent horizontal surfaces that may encourage wicking (consider a silicone-based sealer in this location). A rain-screen detail assembly is referred--provide top quality weather resistant air barriers and flashing, etc.

06 41 00 Architectural Wood Casework

1. Manufacturers that are acceptable to BISD shall have demonstrated their ability to meet the specified industry standard for a period of three (3) years, minimum.
2. General:
 - a. Maximize built-in casework in classrooms while also focusing on future flexibility
 - b. Consider a modular construction method to encourage re-use of casework as user needs evolve.
 - c. Consider mobile storage units where possible.
3. Architectural Woodwork Institute: Architectural Woodwork Standards 2nd addition.
 - a. Manufacture to AWI Custom Grade cabinet
 - b. Provide AWI Premium Grade installation
 - c. AWI Quality Certification Program, consider not specifying this requirement. Woodworkers who put money down to cover this loose out to those who don't. Often inspectors are in short supply and are not there when needed.
4. Single source responsibility: fabrication and installation of casework is under the responsibility of a single casework manufacturer/fabricator/installer.
5. Plywood and other manufactured cellulose-based products shall be certified formaldehyde free content including for glues and binders, no greater than that occurring naturally in wood and natural ambient air environments.
6. Wood finish:
 - a. When wood is used as the aesthetic finish (white oak, d-fir, etc...) there may be a wide range of color/tone in the wood. The design should take this into account. Consider allowing BISD to review selected wood for prominent custom casework at the factory location.
7. Plastic Laminate:
 - a. High Pressure Decorative Laminate (HPDL) and Thermally Fused Laminate Panel (TFLP): Meet or exceed NEMA LD3 standards for High Pressure Plastic Laminate with low glare, fine textured finish. Manufacturer's product and colors as selected by Architect.
 - i. Wilsonart, Lamin-Art, Formica, Duramine preferred
 - ii. Horizontal Grade: NEMA HGS, 0.048 inch thick.
 - iii. Vertical Grade: NEMA VGP, 0.028 inch thick.
 - b. Post-Forming (?) Grades Plastic Laminate: Provide in lieu of Horizontal and Vertical Grades where post forming is indicated:
 - i. Horizontal: NEMA HGP, 0.039 inch thick.
 - ii. Vertical: NEMA VPG, 0.028 inch thick.
 - c. Cabinet Liner: NEMA CLS, 0.020 inch thick, melamine laminate.
 - d. Cabinet Backer: NEMA BKL, 0.020 inch thick.
8. Edge Banding:
 - a. Edge Banding: Provide at plastic laminated faced casework edges. Plastic laminate edges may be acceptable with BISD approval. Rolled edges and integral backsplash/ countertops are preferred at wet locations. Minimize seams – where required, specify seams shall be between lavs:
 - i. Exposed Edges: 3 mm (1/8 inch) thick.
 - ii. Consider use of non-PVC based products ("BioPlastic BioEdge" or sim).



- iii. Semi-Exposed Edges: 0.02 inch thick.
- iv. Concealed Edges: No banding required.
- v. Trim edges and corners and buff smooth, same thickness as edge.
- b. Upturned Edge Banding: 3mm by 1-3/16 inch. Provide at open athletic shelves and laboratory shelves.
- 9. Wood Edge:
 - a. At the edge of the counter a solid piece of wood should be used, avoid having two veneer faces intersecting at 90 degrees.
- 10. Panel Cores:
 - a. Cabinet grade plywood is preferred over particleboard which is preferred to MDF for better screw-holding and better glue holding surface:
 - i. Particleboard: Particleboard: AWI Quality Standards Section 200, ANSI A208.1, Industrial Grade M-2 or M-3, 40 to 50 pound density, no added urea formaldehyde (NAUF).
 - 1. Flakeboard, VESTA particleboard.
 - ii. MDF Panels are discouraged, if the primary means of attachment to hinges, handles and other hardware, because the material does not hold up to re-fastening; if used comply with ANSI A208.2 Product Class MD, Industrial Grade, 40 to 50 pound density, no added urea formaldehyde (NAUF).
 - 1. Sierra Pine, Ltd, No-Added Urea Formaldehyde, Arreis or Medite products. AWI Quality Standards Section 200. Roseburg (formerly Arreis from Sierra Pine) is manufactured from 100 percent recycled wood fiber and is less expensive than the Medite line.
 - 2. Flakeboard, VESTA MDF.
 - b. Marine grade plywood water-resistant plywood for sinks and wet areas.
 - c. Counter tops:
 - i. Stone counter tops are cold to the touch and are not a preferred work surface. Solid wood or compressed paper are two alternate options.
 - ii. "Richlite" (locally sourced) or sim recycled composite countertop material.
 - iii.
 - d. Chemical resistant countertops:
 - i. Epoxy resin for high schools.
 - ii. Discuss chemical resistant plastic laminate for junior high schools with BISD.
 - iii. "Richlite" (locally sourced) or sim recycled composite countertop material.
- 11. Hardware:
 - a. Surface-mount hinges: specify five knuckle type hinges meeting or exceeding BHMA Class 1 with 0.095 inch thick steel, 2-3/4 inch fixed pins, 180 to 270-degree swing, and hospital type tips. "Blum" (Compact), "Hafele", "Amerock".
 - b. Concealed (Euro) hinges: – 107 to 270 degree swing. "Blum", "Hafele", "Amerock".
 - c. Drawer and Cabinet Pulls:
 - i. Oval wire pulls are preferred for use by persons with disabilities because they are easier to grip than round wire pulls.
 - ii. No plastic inset pulls: they do not conform to Barrier Free standards.
 - d. Cabinet Locks:
 - i. Lock Type: Side bolt, re-key-able 6 pin tumbler locks to match BISD Masterkey system.
 - 1. Cabinet Door Lock: Corbin-Russwin Cylinders are compatible with BISD keys.
 - 2. Drawer Lock: Corbin-Russwin Cylinder.
 - 3. All casework locks must be keyed to match room door keys.
 - ii. Submit schedule to BISD for review and acceptance prior to completion of construction documents.
 - iii. Trim Spacer: through-bolt using machine screws, Olympus Trim Spacer ETS1 reinforcing trim spacer, and through-bolt mount. Do not mount with wood screws.
 - iv. Double Doors:
 - 1. One keyed lock at right handed door.
 - 2. One No. 2LPD strike and keeper at interior side of left handed door to hold door closed using single keyed lock.



- v. Lock Locations: Discuss with BISD for locations and other locking requirements.
 - 1. Indicate locks on doors and drawers at nurse's office and clinic, laboratory preparation rooms, secretarial and administrative stations, storage casework, display cabinets, and where security may be an issue.
 - 2. Do not indicate locks at sink base cabinet doors.
 - 3. Verify locking requirements at classrooms and other student use areas.
 - 4. Verify specialty locks at highly-sensitive locations where files must be kept safe.
 - vi. Cam type locks are not accepted
 - e. Drawer Slides:
 - i. Steel ball bearing movement, rail disconnect side mounting, 1 inch to 1-1/2 inch over-travel extension, electro-plate zinc with clear lacquer coating, and load rating suitable for size and width of drawer.
 - ii. "Accuride", "Knap & Vogt", "Blum" and "Hafele" preferred.
 - iii. Bottom mounted drawer slides not accepted.
 - iv. File drawer slides not accepted – provide space for pre-manufactured steel file cabinets, verify need for fire-safe locations.
 - f. Grommets:
 - i. Locate minimum 2-1/4 inch diameter, sleeved plastic grommets at counter work stations with open knee space beneath for threading power and data cables to receptacles.
 - ii. Do not include slotted cap inserts except at adult work stations and offices.
 - g. Wire Management: Indicate wire management clips and hangers as needed to contain power and data cords that are exposed under counters and other locations.
 - h. Shelf Clips: Polycarbonate, double 5 mm pegs, fitting 32 mm support hole spacing, designed to lock shelf in place, suitable for 3/4 inch and 1-inch thick shelves, 500 pound load capacity:
 - i. Allen Field / PX Industries Inc., PX-2 / HD Double Pin Shelf Lock 55536.
 - ii. Bainbridge Manufacturing, Inc., Dual Sized Support, Item 3220C.
 - iii. Lyman Associates, Inc., Self Securing Clip.
 - iv. Hafele plug and spring clip, Item 282.17.
 - i. Adjustable Shelf Standards and Brackets:
 - i. Accepted for temporary or flexible wall-mounted open shelving.
 - ii. Specify heavy duty type of 12 gauge steel, capacity 1060 pounds on a 12 inch shelf and brackets at 16 inch on center. K&V 183 ANO is an accepted for type and quality.
 - j. Mobile Casework Swivel Casters:
 - i. Steel ball bearing, minimum 4 inch diameter, non-marking neoprene tread wheels, minimum 200 to 300 pound load capacity, full castor all 4 wheels.
 - ii. Include locking brakes on at least the front two of four wheels of moveable casework.
 - k. Display Cases:
 - i. Recommend a cleat system to support a display case
 - ii. Prefer recessed display cases.
 - iii. Consider safety glass at doors and shelves.
12. Fabrication:
- a. Casework Shelves:
 - i. Shelf span:
 - 1. Fabricate shelves to account for loading of books and other storage loads.
 - 2. Generally, do not exceed 36 inch spans with 42 inch being maximum allowable.
 - ii. Shelf Span Between Supports:
 - 1. Minimum 3/4 inch thick when less than 30 inch span.
 - 2. Minimum 1 inch thick when over 30 inch and less than 42 inch span.
 - b. Casework Durability: Counters and base cabinets must be durable and able to withstand weight of people standing or sitting on them.
 - i. Panels: Minimum 3/4 inch.
 - ii. Countertops: minimum 3/4" thick with 1/2" thick buildup at edges.
 - iii. Joinery:
 - 1. Doweled: 6 minimum 10mm diameter hardwood, fluted dowels, glued and clamped.
 - 2. Lock shoulder joint: glued and stapled or screwed.
 - 3. Rabbeted construction joints: glued and stapled or screwed.



4. Spline or biscuit joints: glued under pressure. Verify biscuit spacing adequate for conditions.
5. Flush butt panel joints: accepted only at concealed backs. Glued and screwed. Not accepted at drawer bottoms.
- c. Countertops with separate backsplash and countertop is acceptable when both are a single solid material and a waterproof, durable sealant, color-matched to material is used at the joint.
- d. Toe Kicks: Specify cross banded plywood or lumber. Water from carpet cleaning process is soaked up into particleboard and medium density fiberboard (MDF) causing toe kicks to deteriorate. Verify all concealed edges are sealed prior to install.

CONSTRUCTION CRITERIA

1. Require casework pre-submittal meeting to go over specified industry standards and BISD expectations. Consider requiring a mock-up and at very least require a casework sample as part of the submittal.

MAINTENANCE AND CUSTODIAL CRITERIA

1. Consideration should be given to toe kicks, consider providing an air gap between bottom of the base and finish floor to allow moisture to evaporate, perhaps a metal closure-piece or like.

SUSTAINABILITY

1. Use certified wood products.
2. Use rapidly renewable products.
3. Use products that do not and will not adversely impact the indoor air quality.
4. Use products whenever possible that originate and are produced within 500 miles.
5. Use materials that are both environmentally-friendly to build and finish, as well as durable, long-lasting and of a modular nature to encourage re-use as programmatic needs change.

END OF SECTION

DIVISION 07

THERMAL AND MOISTURE PROTECTION

- .: High quality building envelopes that keep the elements out while allowing the building to breathe support long lasting facilities. Special attention should be paid to windows and doors
 - .: Weather-walls are to be designed with staged protection (rain-screen, air gap, breathable barriers)
 - .: Details, proper specification of materials and methods, and strict monitoring of installation are key to a high performing building envelope
 - .: Meet and/or exceed the requirements of the Washington State Non-Residential Energy Code (WSNREC) for formaldehyde free thermal insulation
 - .: Metal and single-ply membrane roofing are both acceptable for durability, maintenance and long term service
 - .: Mechanical detailing (interlocking flashings, sill flashing, etc.) are preferred as weather barriers over liquid sealants. If sealants are used, selection of proper material and installation should be carefully considered
 - .: Invest wisely in products that are long lasting and require less maintenance and replacement
-



PERFORMANCE CRITERIA

07 10 00 Damp Proofing:

1. At foundation walls without habitable space opposite exterior grading, provide two coats of liquid membrane material from finish grade to cover exterior horizontal surface of footing:
 - a. Bitumen: asphaltic emulsion, ASTM D 3747.
 - b. Asphalt primer: ASTM D 41, compatible with substrate.
 - c. Sealing mastic: asphalt roof cement, ASTM D 2822, Type I.
 - d. Consider use of protection boards and/or drainage fabric/boards.
2. Many of the District's sites contain large amounts of migrating sub-surface water, this should be taken into account when detailing damp proofing and waterproofing systems.

07 13 00 Waterproofing:

1. At exterior of walls below grade enclosing usable/occupied space provide waterproofing:
 - a. Cold fluid-applied asphaltic-emulsion waterproofing: Two component, water-based, self-curing meeting or exceeding ASTM C836.
 - b. Cold fluid-applied synthetic-rubber waterproofing: Two-component, self-curing, solvent and bitumen free synthetic rubber based spray cold fluid-applied waterproofing, meeting or exceeding ASTM C836.
 - c. Hot fluid-applied waterproofing, sheet membrane waterproofing, and bentonite waterproofing.
 - d. Provide protection from backfilling with a protection board and drainage board/fabric system.
 - e. Use non-corrosive fasteners, prefer marine-grade stainless steel.
2. Many of the District's sites contain large amounts of migrating sub-surface water, this should be taken into account when detailing damp proofing and waterproofing systems. Use utmost care in detailing, assembling, installing, inspecting and approving waterproofing systems, especially at wall-to-footing, wall-to-slab and other seams, joints and construction joints.

07 19 00 Water Repellents:

1. ProSoCo Sure Klean Weather Seal Blok-Guard & Graffiti Control II on both concrete and brick walls.
2. Submit a written warranty, executed by the applicator and water repellent manufacturer, covering materials and labor, agreeing to repair or replace materials that fail to provide water repellency within the specified warranty period.
 - a. Warranty Period: FIVE (5) years from date of Substantial Completion.
3. Graffiti Control: consider benefits and drawbacks of permanent-applied (resists adhesion of aerosol spray paint) and sacrificial (the sealer is easily removed with mechanical means, taking the graffiti with it, then reapplied) anti-graffiti systems and their respective desired locations.

07 20 00 Thermal Insulation:

1. Thermal Insulation: Thickness and R-Values not less than Washington State Non-Residential Energy Code.
 - a. Review high performance envelope with BISD
 - b. All formaldehyde free materials.
 - c. Prefer rigid board with spray-type insulation to seal, or all spray-type insulation if placed in spaces easily-accessible to maintenance crews. Open batt type (fiberglass, fiber, etc...) insulation for permanently-concealed spaces only.
2. Acoustical Insulation: consult the recommendations of the acoustic engineer. Thermal insulation can be less expensive and can be substituted in many situations.
3. Rigid board insulation: conform to IBC Chapter 26 for foam plastic insulation. Foam insulation in wall and ceiling assemblies requires fire-resistive construction such as gypsum board separation for interior spaces unless the board itself is fire-rated for surface flame spread.
4. Insulation under concrete slabs and perimeter of foundations: extruded polystyrene board, R-10, min. but not less than Washington State Non-Residential Energy Code.
 - a. ASTM C 578, Type X
 - b. Flame Spread Index: 75 or less when tested in accordance with ASTM E 84.
 - c. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E 84.
 - d. Thermal Resistance: 5.0 per inch aged R-Value at 75 degrees F, ASTM C578.



- e. Compressive Strength:
 - i. Under slab and Cavity Walls: 25 psi (ASTM C578 Type IV).
 - ii. Vehicular Paving, Vegetated Roof Systems and Pedestals Paver Systems: 60 psi (ASTM C578 Type VII) may be applicable.
- f. Water Absorption: Maximum 0.1 percent by volume, tested to ASTM C272.
- g. Water Vapor Permeance: 0.3 to 1.0 perms, tested to ASTM E96.
- 5. Insulation Inside Cavity Walls: Glass Fiber Board Insulation mechanically fastened to stud.
 - a. ASTM C 612.
 - b. Flame Spread Index: 25 or less, when tested in accordance with ASTM E 84.
 - c. Smoke Developed Index: 50 or less when tested in accordance with ASTM E 84.
- 6. Insulation in wood or metal framed walls: Batt insulation with separate vapor retarder (see Weather Barrier above).
 - a. ASTM C 665, Type I, Class A preformed batt, friction fit
 - b. Flame Spread Index: 25 or less when tested in accordance with ASTM E 84.
 - c. Smoke Developed Index: 450 or less when tested in accordance with ASTM E 84.
 - d. Combustibility: Non-combustible, when tested in accordance with ASTM E 84.
 - e. Formaldehyde Content: Zero.
 - f. Facing: Unfaced.
 - g. Verify material is warranted against sagging and/or compaction that will render the top of the wall uninsulated.
- 7. High Density Fiberglass Insulation: Consider as an option to normal density in situations where normal density insulation will be compressed.
 - a. R-21 high density insulation fits a 5-1/2 inch stud cavity without being compressed.
 - b. R-19 normal density insulation is 6-1/2 inch thick and becomes R-18 when compressed into a 5-1/2 inch stud space.
- 8. Insulation at roof: Expanded Polystyrene (EPS) Rigid Foam Insulation Board.
 - a. Type IX, 25 psi compressive strength, for protection of roofing because maintenance cannot always follow the walkpath and allowing for future, additional, mechanical loading.
 - b. Thermal Resistance (R-Value): Minimum R-4.2 per inch at 75 degrees F, tested to ASTM D518.
 - c. Water Absorption: Maximum 2.0 percent by volume, tested to ASTM C272.
 - d. Water Vapor Permeance: Less than 3.5 tested to ASTM E96.
 - e. Tested: UL Class A for roof system over structural steel deck.
 - f. Tapered Insulation: Design to suit condition.
- 9. Insulation at roof: Polyisocyanurate Insulation Board.
 - a. Performance Requirements: Standard Specification: Conform to ASTM C1289; Type II, Class 1, and Grade 3 and as instructed by manufacturer for roofing system.
 - b. Long Term Thermal Resistance Values (LTTR): As tested to CAN/ULC-5770 / ASTM C1303.
 - c. Dimensions: Maximum 4 by 8 feet panels for mechanically fastened installation.
 - d. Polyisocyanurate core bonded to glass fiber mat on top and bottom face.
 - e. Density/Overall: Nominal 2.0 lbs per cu ft, tested to ASTM D1622.
 - f. Compressive Strength: 25 psi, tested to ASTM C1289 Grade 3.
 - g. Fire Rating: UL Class A, tested to ASTM E84.
 - 1. Flame Spread: 25 or less.
 - 2. Smoke Developed: 450 or less.
 - h. Dimensional Stability: 7 days, 158 degrees F, 95 percent RH with less than 2% linear change, ASTM D2126.
 - i. Tapered Insulation: Provide in 1/8 inch and 1/4 inch taper per foot to meet to meet requirements of installation.
 - j. Provide cover board if Polyisocyanurate is used on roof.
 - k. Manufacturer: Producing member of Polyisocyanurate Insulation Manufacturer's Association (PIMA), as accepted by roofing manufacturer for single source full system Warranty.

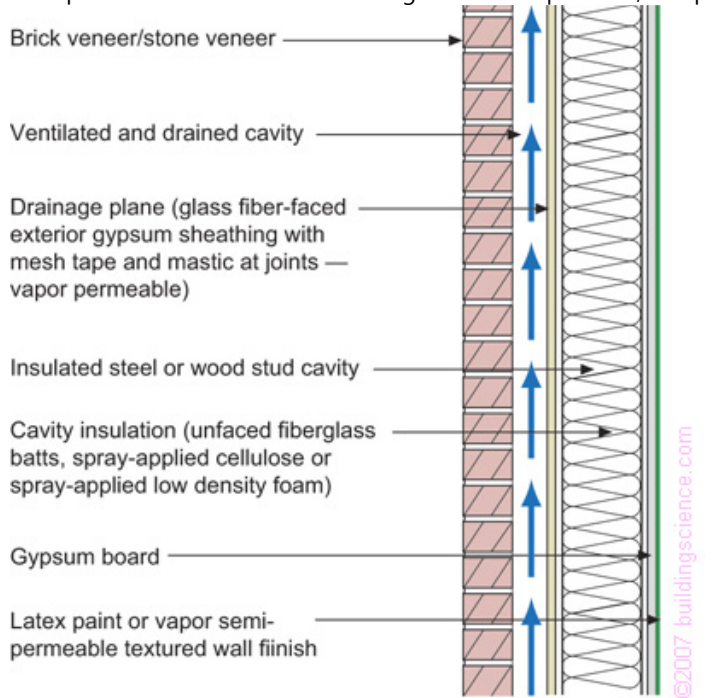


07 25 00 Weather Barriers

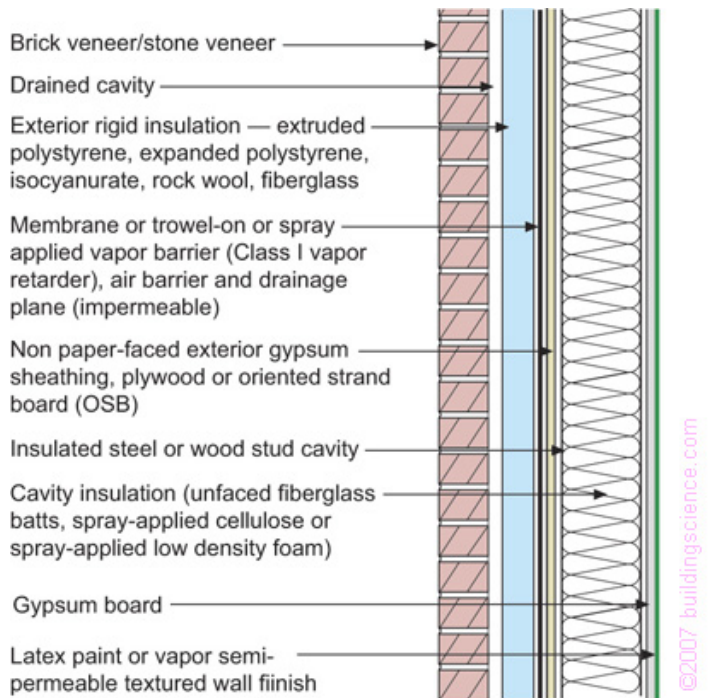
General: Provide special care when designing, detailing, installing and inspecting these assemblies.

1. Provide Weather Barrier at all exterior above-grade walls.
2. Under exterior cladding immediately-applied to structure (not recommended):
 - a. Products: "Tyvek Commercial", "Typar MetroWrap" or similar approved equal.
 - b. Tape all joints with manufacturer's approved seam tape, substitutions will be allowed only under extraordinary circumstances.
 - c. Install sheets overlapping to shed water, and per manufacturer's instructions.
 - d. Overlap at outside and inside corner as recommended by manufacturer but at least 12 inches.
 - e. Install a 40 mil minimum self-adhering water-resistive barrier at all four edges of the rough-opening.
 - f. Provide detail for water-path and consider application of siding product on vertical sleepers to provide air-gap.
 - g. Detailing at openings is critical—both in design and installation, provide special inspection for these assemblies.
3. At rain-screen conditions applications (recommended):
 - a. Products: "Vapro Shield" or similar approved equal system capable of withstanding UV and other environmental degradation while still providing a vapor-breathable membrane.
 - b. Tape all joints with manufacturer's approved seam tape, no substitutions allowed.
 - c. Install overlapping to shed water, and per manufacturer's instructions.
 - d. Overlap at outside and inside corner as recommended by manufacturer but at least 12 inches.
 - e. Detailing at openings is critical at rainscreens—both in design and installation, consider providing special inspection for these assemblies.
4. At masonry veneer provide one layer of 60 minute asphalt saturated organic felt, or other manufacturer's assembly-approved protection sheet, over weather barrier as a protection to the weather barrier--verify compatibility of products. Consider masonry veneer as a rainscreen assembly.
5. Openings and penetrations in exterior weather barriers:
 - a. Install self-adhesive flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
 - b. At openings to be filled with non-flanged frames, seal weather barrier to all sides of opening framing, using self-adhesive flashings under weather barrier extending at least 4 inches beyond face of jambs; seal weather barrier to flashing.
 - c. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
 - d. Service and other penetrations: Form self-adhesive flashing around penetrating item and seal to weather barrier surface including brick ties.
6. Provide vapor retarder on room side of insulation at exterior wall:
 - a. Sheet goods (film applied to framing) shall be a vapor semi-permeable (10perm > 1perm) product approved by BISD. See illustrations below for typical assembly details. In gypsum wall board finishes, latex paint meeting the perm criteria may be substituted for the membrain sheet.
 - i. 2 mil thick polyamide (Nylon) sheet: "CertainTeed MemBrain" or sim.
 - ii. Fire testing: Tested to ASTM E 84.
 - iii. Flame Spread Index: 20.
 - iv. Smoke Developed Index: 55.
 - v. Permeance: Tested to ASTM E96.
 - vi. Kraft and foil paper-faced batts are not accepted.
 - c. Installation:
 - i. Install unbroken, continuous vapor retarder over framing on room side of insulation at exterior walls.
 - ii. Install over framing at roof/ceiling assemblies prior to installation of gypsum board ceilings.
 - iii. Run continuously and unbroken around door frames, at intersecting partitions, and other openings and voids on room side of walls and ceilings.
 - iv. Lap ends and side flanges of vapor retarder over wall and roof/ceiling framing members. Use double backed tape at each framing member to seal in place at metal framing.
 - v. Use neoprene or EPDM washers where screws and nails are used at overhead installations.
 - vii. Do not use adhesives at exposed overhead installations to adhere vapor retarder.
 - viii. Tape to seal butt ends, lapped flanges, tears, perimeter edges, and other openings in membrane.

Example wall assemblies: See Building Science Corporation, Joseph Lstiburek 2011 for more information.



Vapor Profile



Vapor Profile

*Both images: credit Building Science Corporation, Joseph Lstiburek 2011



07 30 00 Composition Shingles (Strongly discouraged by BISD)

1. Where shingles are used at sloped roofs, specify Asphalt-coated glass felt, mineral granule surfaced, complying with ASTM D 3462; Class A fire resistance; 3-tab, 5-nail shingles required.
2. Minimum roof slope to be 4:12, provide stainless steel safety ties-offs at ridge.
3. Underlayment: 2 ply 15-pound building paper with staggered seams and joints, or 1 ply SBS 28pound base sheet. Provide a self-adhering self-healing ice & water shield to 24" above eave, lap underlayment over: "Grace Ice&Water Shield" or sim.
4. Consider manufacturer's warranty when deciding on nails or staples for shingle application.
5. Install valley protection in accordance with SMACNA Architectural Sheet Metal Manual.
 - a. At exposed Valleys: Install one layer of 24" wide sheet "W" metal flashing, on top of a 36" width high temperature ice&water shield, "Grace Ice&Water Shield HT" or sim (or standard with an underlayment slip-sheet), centered over open valley and crimped to guide water. Weather lap joints minimum 2 inch wide band of lap cement along each edge of first, press roll roofing into cement, and nail in place minimum 18 inches on center, 1 inch from edge.
6. Provide maintenance material equal to 2% of installed quantity.
7. Consider use of shingles with integral zinc or copper granules for moss control.
8. Consider use of a solid zinc ("VM Metals" or sim) or solid copper ridge cap for moss control.
9. Specify manufacturer's warranty for minimum twenty-five (25) years (non-educational facility) and fifty (50) years (educational facility)
10. Specify installer's labor and material warranty for minimum five (5) years.
11. Roofing materials manufacturer shall be nationally recognized, and shall have had a minimum of ten (10) years continuous service manufacturing roofing products, and shall be able to demonstrate three (3) installations, at least five (5) years old in satisfactory condition, similar to the proposed system.
12. Applicator shall be certified as approved by roofing materials manufacturer, and shall have a minimum of ten (10) years continuous experience with similar system applications, and shall be able to show two (2) installations, at least five (5) years old in satisfactory condition, similar to the proposed system.

07 40 00 Metal Roof Panels and Siding

1. Reference:
 - a. Comply with NCRA "Roofing and Waterproofing Manual" as appropriate for materials and applications procedures for roofing system selected. Reference compliance with NRCA in specifications.
 - b. U.L. – Fire Hazard Classifications.
 - c. ASTM as applicable to specific materials.
 - d. Comply with SMACNA "Architectural Sheet Metal Manual", "Sheet Metal and Air Conditioning Contractors" National Association, Inc., and NRCA "Roofing and Waterproofing Manual" as applicable.
2. Qualifications:
 - a. Roofing materials manufacturer shall be nationally recognized, and shall have had a minimum of ten (10) years continuous service manufacturing roofing products, and shall be able to demonstrate three (3) installations, at least five (5) years old in satisfactory condition, similar to the proposed system.
 - b. Applicator shall be certified as approved by roofing materials manufacturer, and shall have a minimum of five (10) years continuous experience with similar system applications, and shall be able to show two (2) installations, at least five (5) years old in satisfactory condition, similar to the proposed system.
3. System Description:
 - a. Metal Roofing Systems:
 - i. At educational facilities: min 24 gage standing seam steel, stainless steel clip install, with galvalum corrosion-resistant coating and high-quality reflective painted (Energy Star listed "cool colors") finishes per manufacturer and BISD approval.
 - ii. At other District facilities: min 26 gage standing seam or thru-fastened panel metal roof with galvalum corrosion-resistant coating and high-quality reflective painted (Energy Star listed "cool colors") finishes per manufacturer and BISD approval.

- b. Continuous panel whenever possible, however, extremely-long runs can lead to issues with expansion/contraction. In these cases, provide staggered lapping of joints with a minimum of 2' offset.
- c. Finish: PVDF Fluoropolymer Resin factory-applied coating system. Use care in handling to avoid damage to surface.
- d. Field drilled holes and cut edges to be corrosion-protected prior to installation.
- e. Comply with manufacturer's recommendations for roof slope. Lower slopes may require extra detailing of underlayment (ie: full ice&water shield and slip sheets).

07 51 00 – Built-up bituminous roofing (not allowed by BISD)

07 54 00 – Single-ply membrane welded seam roofing (TPO and PVC):

1. Reference:
 - a. Comply with NCRA "Roofing and Waterproofing Manual" as appropriate for materials and applications procedures for roofing system selected. Reference Compliance with NRCA in specifications.
 - b. U.L. – Fire Hazard Classifications.
 - c. ASTM as applicable to specific materials.
2. Qualifications:
 - a. Roofing materials manufacturer shall be nationally recognized, and shall have had a minimum of ten (10) years continuous service manufacturing roofing products, and shall be able to demonstrate three (3) installations of similar scope, at least five (5) years old in satisfactory condition in the region (Washington/Oregon), similar to the proposed system.
 - b. Applicator shall be certified as approved by roofing materials manufacturer, and shall have a minimum of five (5) years continuous experience with similar system applications, and shall be able to show two (2) installations of similar scope, at least five (5) years old in satisfactory condition in the region, similar to the proposed system.
3. System Description:
 - a. Thermoplastic Membrane Roofing: Single-ply thermoplastic polyolefin (TPO) complying with ASTM D 6878.
 - i. Minimum thickness: 60 mils.
 - ii. Solar reflectance index: minimum SRI 82 (LEED v4) and 3 year aged SRI 64 (LEED v4).
 - iii. EPA Energy Star rated roof – compliant, consider options other than "bright white".
 - b. PVC Membrane Roofing: Single-ply polyvinyl chloride (PVC) complying with ASTM D 4434.
 - i. Minimum thickness 60 mils
 - ii. Solar reflectance index: minimum SRI 82 (LEED v4) and 3 year aged SRI 64 (LEED v4).
 - iii. EPA Energy Starr rated roof – compliant, consider options other than "bright white"
 - iv. PVC is a readily-recyclable material and should be considered sustainable.
4. Roof slope shall be a minimum of ½" per foot to roof drains. Provide minimum of ¼" per foot for all crickets. Steeper slopes are preferred.
5. Locate roof drains at points of maximum deflection on roof deck structure; do not locate adjacent to columns, beams or bearing walls. Provide sumps for roof drains where possible.
6. Do not construct equipment supports directly on roofing membrane.
7. Roofs adjacent to playground shall be sloped to prevent keeping errant balls. If low slope roof is required adjacent to playground, provide, if possible, access from interior for custodian to retrieve play equipment.
8. Warranty:
 - a. Manufacturer: Provide written standard ten (10) year non-prorated, labor and materials water tightness Warranty for complete roofing system including flashing endorsement signed by the manufacturer's authorized representative:
 - i. Verify warranty requirements available from manufacturer
 - ii. Do not specify extended warranties that may add cost to project, unless directed by BISD.
 - b. Contractor: 5 year workmanship warranty guaranteeing water tightness for system including all flashing, terminations, and penetrations.

07 60 00 – Flashing & Sheet Metal

1. Comply with SMACNA "Architectural Sheet Metal Manual", Sheet Metal and Air Conditioning Contractors' National Association, Inc., and NRCA "Roofing and Waterproofing Manual" as applicable.
2. Clearances between pipes and from walls and curbs shall be a minimum of the dimensions defined in the NRCA.
3. Internally constructed gutters and downspouts shall be stainless steel with welded seams, but should be used as little as possible, external gutters are preferred.
4. Downspouts shall be designed to be climb-proof. Consider niches in the building surface to embed downspouts or install downspouts flat against the wall such that fingers cannot fully grasp downspout.
5. Downspouts should be schedule 40 pipe up to 8' AFF and adjacent finish grade minimum.
6. Provide mesh screen dome with ½-inch openings at conductor heads.
7. Provide continuous external gutters and downspouts (as much as practical):
 - a. Gutter to be prefinished 20 gage galvanized.
8. Flashing should be designed for, and material selected for, performance, durability, longevity and aesthetic harmony with surrounding structure.

07 90 00 – Joint Sealants

1. Performance / Design Criteria:
 - a. Exterior joint liquid (caulk) sealants are generally designed to adhere best to either porous or non-porous substrates:
 - i. Porous materials absorb water, masonry, wood, and concrete, and require special attention when applying.
 - ii. Non-porous materials, metal and glass, may require special primers to guarantee adhesion.
 - iii. Sealants adhered to joints between porous and non-porous materials usually require a primer for proper adhesion, especially in the case of polysulfides.
 1. Example: Aluminum windows at masonry construction usually require a primer on the aluminum if the sealant was designed for porous materials.
 2. Primer should be field verified by manufacturer's representative and include preconstruction pull-out tests after an initial curing period of about 14 days.
 - b. Masonry, siding, and cladding systems:
 - i. Joint sealants, while the initial defense against environmental intrusion, should not be considered as a singular means to maintain water tightness. Assembly should be designed to act as primary barrier. All gaps should include a backer-rod system to ensure proper application depth and location of sealant.
 - ii. Design construction with a drainage membrane or cavity, continuous air barrier, and other means to direct infiltrating water to building exterior. "Water in -- water out".
 - c. Skyward facing parapet joints:
 - i. Consider metal copings at parapets (in lieu of precast concrete and masonry copings with vertical facing joints).
 - ii. Where exposed joints are skyward facing, design flashing under parapet copings and other skyward-facing elements to drain water to exterior.
2. Exterior joint sealants:
 - a. Specify silicone-based sealants, some are paintable but lose their elasticity.
 - b. Polyurethane for exterior installations subject to UV exposure may be used if painted.
 - c. Adhered to porous materials, weatherproofing sealant, non-paintable:
 - i. Reference Standard: ASTM C920, Type S, Grade NS, Class 100/50, Use T, NT, M, G, A, and O.
 - ii. Single Component Silicone:
 1. Dow Corning 79.
 2. Pecora 890.
 3. Tremco, Spectrem 1.
 4. GE Silpruf LM SCS2700.
 - iii. Joint Movement Capabilities: 100 percent extension and 50 percent compression in accordance with ASTM C719.
 - d. Non-porous materials adhered to both porous and non-porous materials, weatherproofing sealant, non-paintable. neutral curing.
 - i. Reference Standard: ASTM C920, Type S, Grade NS, Class 50, Use NT, M, G, A, and O.



- ii. Single component silicone:
 - 1. Dow Corning 791, Dow Corning 795, or Dow Corning 756 SMS.
 - 2. Pecora 895 or Pecora 865.
 - 3. Tremco Spectrem 2 / Tremco Spectrem 3 / Tremco 4.
 - 4. GE Silpruf SCS2000.
- iii. Joint movement capabilities: 50 percent extension and 50 percent compression in accordance with ASTM C719.
- e. Non-porous materials adhered to non-porous materials, structural sealant, non-paintable: includes glass to glass and glass to metal at aluminum curtain wall.
 - i. Reference Standard: ASTM C920, Grade NS, Class 50 Use NT, M, G, A, and O.
 - ii. Single Component Silicone: Type S.
 - 1. Dow Corning 795 or Dow Corning 995, accepted at glass to non-porous materials.
 - 2. Pecora 895.
 - 3. Tremco Spectrem 2.
 - 4. GE, Ultra glaze 4000.
 - iii. Two component silicone: type M.
 - 1. Dow Corning 983.
 - 2. Tremco Proglaze II.
 - iv. Joint movement capabilities: 50 percent (50%) extension and 50 percent (50%) compression in accordance with ASTM C719.
- 3. Traffic sealants
 - a. ASTM C920, Use T (Traffic Sealants) specifies durometer hardness of 25 to 50, as tested to ASTM C661.
 - b. Exterior pedestrian traffic: specify sealants with ASTM D2240 minimum durometer hardness of 25 and preferably not less than 35. Silicone sealants are normally too soft for traffic sealants.
 - c. Interior polyurea and epoxy Joint Sealers: Usually specified under cast-in-place concrete section and meet a durometer hardness of 75 Shore A. Verify elastomeric age of seal as these joints are prone to large movement over extended periods.
- 4. Interior Sealants
 - a. General use: paintable siliconized acrylic latex joint sealant, meeting ASTM C834.
 - b. Interior Acoustical Sealants:
 - i. Exposed joints: Non-sag, paintable, non-staining, latex sealant conforming to ASTM C834. Tested to ASTM E90 for reduction of airborne sound transmission through perimeter joints and openings in building construction at representative assemblies.
 - 1. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
 - 2. USG, SHEETROCK, Acoustical Sealant.
 - ii. Concealed joints: synthetic rubber joint sealant: single component, non-skinning, non-hardening, 90 percent (90%) solids, acoustical properties conforming to ASTM C919 and ASTM E90.
 - 1. Pecora, BA-98.
 - 2. Tremco, Acoustical Sealant.
 - iii. Water based siliconized Acrylic Latex:
 - 1. Pecora, AIS-919.
 - 2. USG, SHEETROCK, Acoustical Sealant.
 - iv. Install 2 beads under steel stud framing channel and wood plates and into ½" space between top of floor and bottom of gypsum board and plaster systems.
- 5. Backer Rod
 - a. Soft Rods: Preferred behind joint sealant to aid in creating an hourglass shape at center of sealant and to act as a bond breaker preventing 3-sided adhesion.
 - b. Open cell backer rods are preferred.
 - c. Backer rods are not required at bedding for thresholds, sheet metal lap seams, paintable interior joints using latex sealants, concealed sealants at gypsum board.



CONSTRUCTION CRITERIA

1. Provide a mock-up to show the entire system including weather barrier, water repellants, window flashing, etc.
2. Waterproofing: field quality control.
 - a. Perform inspections by manufacturer's authorized technical representative during interim and completion of work of this section.
 - b. Notify BISD and BISD's consultant and coordinate a time to conduct a final warranty inspection. Follow same protocol for additional or follow-up inspections.
 - c. Remove coverings and excavate backfilled membrane waterproofing as required for inspections and testing.
 - d. Flood test horizontal waterproofing for 24 hour duration at minimum 1" - 2" of water, as accepted by Structural Engineer and Architect. Verify water-proof condition prior to covering the other work.
 - e. Verify membrane thickness using wet mil-thickness gauge. Make random cut tests and patch with new applications of spray cold fluid-applied waterproofing.
 - f. Inspect for bug holes, blisters, and other imperfections compromising waterproofing integrity or not conforming to manufacturer's instructions.
 - g. Note deficiencies and promptly make oral and written report to Contractor and Architect.
3. Water Repellents: field quality control
 - a. Applicator/manufacturer to state the substrate is prepared correctly prior to application of water repellents to insure manufacturer requirements and recommendations are met.
4. Weather barrier: consider requiring a field test for air infiltration to verify the installation meets the required design standards.
5. Provide fall protection at roofs – fall protection should be designed and not considered a "bidder design".

MAINTENANCE AND CUSTODIAL CRITERIA

1. Roofing
 - a. Provide slip-resistant traffic pads (walkways on roof to be installed from roof access locations to and around equipment requiring maintenance); fully adhere edges of traffic pads, particularly over barrel roofs; color of the traffic pads should closely resemble roof color.
 - b. Access: Specify access to all roofs at either roof hatches or doors. Access to roofs through window or ladders accessible from the ground is not acceptable. Access to roof from within the school (i.e. mechanical room or attic space is required and shall be locked with BISD-approved padlock.
 - c. Provide roof ladder between roofs separated by a parapet over 24" tall.
 - d. Provide repair kit that is appropriate to the type of roofing installed.


SUSTAINABILITY

1. Create a high-performance envelope to reduce energy loads. Consider increasing the thermal performance of the exterior skin, i.e. increase the R value of the wall and roof beyond code requirements and minimize air infiltration.
2. For metal roofing and siding and flashing and sheet metal use steel with recycled content and locally manufactured materials whenever possible.
3. Building insulation: consider the use of rapidly renewable products such as cotton insulation.
4. Consider using materials with inherent recyclability as they are replaced.
5. Use products that last, requiring less maintenance and replacement and longer replacement cycles, over products that are cheaper in the short run.

END OF SECTION

DIVISION 08

OPENINGS

- .: Design weather-protected areas to protect door openings from the elements
 - .: Accessibility details shall follow and/or exceed ADA requirements
 - .: Entry vestibules shall be provided in high use areas to limit weather intrusion
 - .: Electronically controlled entry vestibules shall be provided at main entry of facilities
 - .: Doors to be selected for long term service in hollow metal or solid core wood
 - .: Door hinges to be continuous-type to provide long term maintenance free hinges
 - .: Windows shall be selected for thermal efficiency, day light access and durability. Wood-clad windows are acceptable for interior aesthetics, however wood exterior windows are not allowed
 - .: Windows shall be provided with a factory-applied finish for durability
 - .: All aluminum window frame systems shall be thermally **broke** to ensure a high performance building envelope 
 - .: Windows shall be placed for maximum solar access with consideration for heat gain
 - .: Hardware to be selected to meet district standard and to allow district maintenance staff to re-cylinder and key
 - .: Hardware to be selected for durability and long term serviceability
 - .: Safety glazing to be strategically placed allowing clear visual access for safety and security
-



**PERFORMANCE CRITERIA
GENERAL**

1. Entry Doors:
 - a. Design weather-protected areas for building entries (building overhangs, entry vestibules, canopies, roof projections, recessed doorways). Provide flashing details to accommodate ADA flush mounted door thresholds.
 - b. Provide vestibules at exterior doors that will experience heavy traffic and adjacent to open work areas. Air lock preferred.
 - c. Primary public entry door to be hollow metal or storefront pairs, max. 3'-0" pair with removable mullion. Provide a dual-entry vestibule with electronic controls for safety & security measures.
 - d. At service entrance provide a pair of 3'-0" doors with removable mullion.
 - e. At door to service areas, i.e. kitchen, mechanical, etc..., provide a 3'-6" door.
 - f. Provide interlocking threshold or water stop, while maintaining accessible threshold per ADAAG requirements.
 - g. Provide hardwired door access devices. All wiring to be in conduit for ready removal and replacement of controls and hardware.
 - h. All door hardware to be in current production--no discontinued stock.
 - i. State warranty requirements per each type of item (doors, windows, storefront, curtainwall, skylights, hardware, glazing, etc.
 - j. Provide continuous piano-type hinges for ease of maintenance and longevity.
2. Interior/Classroom Doors:
 - a. Provide a vision panel into the classroom or adjacent relite with blind.
 - b. Doors to be solid core wood or hollow metal. Do not use hollow core wood doors.
 - c. Face of door: wood, paint.
 - d. Provide continuous piano-type hinges on all interior doors and exterior doors.
3. Window/ Storefront/ Curtain Wall:
 - a. Arrange windows to permit washing from the inside. The configuration of operable units should be carefully considered to help with washing.
 - b. Window should be appropriately configured to accommodate natural cooling and weather protection. Consider carefully type of operable sash and clearances where sun screens and wire guards are required. Number and type of operable windows should be considered for user comfort and connected to the mechanical system design.
 - c. High bay operable windows should be designed to allow for ease of operation.
 - d. Provide aluminum-clad wood windows; do not use all wood windows.
 - e. All metal windows shall be factory finished.
 - f. Fabricate windows for inside glazing as is practical.
 - g. Provide drain at operable window sill.
 - h. Provide spare handles, gears, pinions, similar equipment for operating sash, at the rate of five (5) percent of total number of windows.
 - i. Deep interior sills, particularly in gyms, should be sloped away from window.
 - j. Discuss window washing and window replacement plan with BISD staff to ensure adequate equipment access.
 - k. Windows shall be observable, prevent "hidden" windows.
 - l. Specify weatherstripping and frame insulation.

08 11 13 Hollow metal doors and frames:

1. Fabricate interior frames from minimum 16 gage steel, exterior frames from minimum 14 gage steel. No pre-inscribed knock-outs. Hinge mounting plates thickness 3/16" or greater to be welded to frames on 2 sides. (ie: high-frequency hinge reinforcements)
2. Fabricate interior doors from 18 gage face sheets, exterior doors from 16 gage face sheets.
3. Factory prime all hollow metal doors and frames.
4. Hollow metal door frames shall be designed with trim revealed
5. Hollow metal door frames must be factory assembled and welded.
6. Exterior doors and frames should be galvanized and bottom/top of door at to be solid.



7. Grouting of Frames:
 - a. Fully grout interior frames only at masonry wall openings.
 - b. Grout is not necessary (nor recommended) at openings at framed walls (wood or metal).
 - c. Use masonry grout (no plaster).
 - d. Verify grouted frames are back-coated to resist corrosion. Use no anti-freeze agents in mortar mix.
8. Acceptable Standard Quality Product:
 - a. Steel Craft
 - b. Ceco
 - c. Curries

08 14 16 Flush Wood Doors:

1. Core:
 - a. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core/formaldehyde free (PC/FE).
 - b. Fire Rated Doors: Mineral core, Type FD.
2. Provide solid blocks at lock edge and hinge locations for hardware reinforcement and other through bolted hardware. Fasteners shall penetrate jamb material and fasten into framing material.
3. Faces: 1/16" thick, hardwood veneer for transparent finish, MDO or any closed grain hardwood for opaque finish: flush faces.
4. Door shall be 1-3/4" thick, minimum—prefer thicker especially if door exceed 7' in height.
5. Pre-fit and machine doors at shop for frames and hardware.
6. Provide 5 ply doors.
7. Acceptable standard quality products:
 - a. Lynden Door (Lynden, WA)
 - b. Northstar (Ferndale, WA)
 - c. Algoma
 - d. VT Industries

08 30 00 Special Doors

1. Overhead doors where required at Garage, Shop, Service, or other similar areas may be sectional type, or overhead coiling type with approval from BISD.
2. Interior counter doors may be overhead coiling, fabricated from stainless steel.
3. Overhead doors shall be electric or manual crank operation; type as required by size of the door. All roll doors must be accessible at both ends. Provide access doors 24" W x 30" H.

08 31 00 Access Doors and Panels

1. Access panels to be heavy duty with tamper-proof "Torx" or "Allen" type security screw fastener. Use one single type of security screw fastener per project.
2. Provide access to all motors, mechanical equipment overhead coiling door mechanism and motor, operable wall motor, trap primers, miscellaneous fans, HVAC controls etc.
3. Any panel exposed to public view shall be painted to match surrounding wall or ceiling color.

08 43 13 Aluminum-Framed Storefronts

1. Provide thermally-broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
2. When sill pans are provided they shall be continuous, with continuous weld at all joints of sill pan.
3. Extrusions must require tool removal rather than removal by manual pressure.
4. Provide Heavy Duty Entrance Doors.
5. Finish:
 - a. Anodized Aluminum
 - b. Fluoropolymer or Kynar Finish
6. Acceptable Standard Quality Products:
 - a. Efc0 Corporation, Kawneer Company
 - b. Submit specification sheets to district for approval during DD phase. Other manufacturers may be acceptable following review.



08 44 13 Glazed Aluminum Curtain Walls

1. Provide thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system
2. When sill pans are provide they shall be continuous, continuous weld all joints of sill pan.
3. Finish:
 - a. Anodized Aluminum
 - b. Fluoropolymer Finish
4. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel members as needed.
5. Acceptable Standard Quality Products:
 - a. Efco Corporation
 - b. Kawneer Company
 - c. Submit specification sheets to district for approval during DD phase. Other manufacturers may be acceptable following review.

08 51 13 Aluminum Windows

08 51 20 Wood Windows

08 56 13 Vinyl Windows

08 56 53 Security Windows

08 61 00 Roof Windows

08 62 00 Unit Skylights

1. Factory assembled glazing in aluminum frame; double dome.
2. Provide daylight control via motorized, remote-controlled shades.

08 70 00 Hardware

1. Locking Hardware/keying
 - a. Locks, cylinder, keys and key control information shall be compatible with the existing BISD Corbin/Ruswin grand master key system. Construction cylinder shall be sent to the job site with locksets to be installed by contractor. Construction cores will be removed by the hardware supplier and permanent cores will be installed by hardware supplier. This will be coordinated through the representative of the BISD.
 - i. Locks and cylinders on exterior doors: Corbin/Ruswin.
 - ii. Locks and cylinders on interior doors: Corbin/Ruswin.
 - iii. Cylinder for exit devices: Corbin.Ruswin.
 - iv. Keys: Specific stamping and key quantities shall be determined per project during CD phase:
 - v. Building Grand Master Keys.
 - vi. Master Keys per Set.
 - vii. Change keys per Lockset or Cylinder.
 - viii. Construction Keys.
 - b. Construction keying: Use temporary brass cylinders on all exterior, interior and exit device equipped doors or on the exact number of door instructed by the designated BISD representative.
 - c. Permanent Keying: Corbin/Ruswin master key system
 - i. The grand master key operates all locks in the system with the following exceptions: MDF/ IDF rooms.
 - d. Key Cabinet: Key cabinet shall be specified. It will be furnished with all the necessary key tags and additional keys for the cabinet. Cabinet shall be lockable and in an inconspicuous location—prefer a storage closet electronic card-key entry.
 - e. Keys must be stamped with the key symbol and a serial number by hardware supplier at the factory or in the field.



- f. Key quantities for each school shall be determined per project during CD phase:
 - i. Control key.
 - ii. School Master key.
 - iii. School Inside Master key.
 - iv. Change keys.
 - g. Key Control Information:
 - i. One biting list with five (5) extra (unused) change key combinations, sent via traceable carrier such as certified mail to BISD.
 - ii. File should include a record for each door and door number, door location information, key symbol, master keys that the door, and key quantity. There must be an entry for every cylinder and every key
 - h. Site Plans: Site plans will be submitted during the keying conference prior to the order being placed. Plans will be a minimum size of 11" x 17" and will be provided by the District to the field hardware supplier. It is the field hardware suppliers responsibility to note the following on the provided plan:
 - i. Door Number
 - ii. Key Symbol
 - iii. Select Master keys for that door.
 - iv. Type of lock
 - i. Door Hardware shall be reviewed and approved per project by the district during the CD phase:
 - i. Description/Manufacturer/Model/Series/Finish
 - ii. Locksets
 - iii. Cylinders
 - iv. Keys
2. Manufacturers and Products: Butt hinges
- a. Types:
 - i. Exterior doors, extra heavy four ball-bearing/two pair
 - ii. Interior doors, over 36" wide, four ball-bearing/two pair
 - iii. Interior doors, less than 36" wide and less than 7' tall, two ball-bearings/1 ½ pair.
 - b. Materials:
 - i. Exterior and Locker Room and Mechanical Room doors, non-ferrous.
 - ii. Interior, other than locker rooms, steel.
 - c. Features:
 - i. Non-removable pins for non-ferrous and extra heavy four bearing butts (set screw in barrel). Provide knurled pins on all door hinges.
 - ii. Minimize types and sizes of butts, for maintenance purposes. Exterior doors, sound retardant doors, other interior doors over 36" wide, 5" high butts. Other interior doors, 4-1/2" butts.
 - d. Acceptable Manufacturers:
 - i. McKinney/Assa Abloy
 - ii. Bommer
 - iii. Hager
3. Manufacturers and Products: Continuous geared hinges (this is the preferred product for high-use doors)
- a. Use only aluminum continuous geared hinges.
 - b. Manufacturers
 - i. Pemko
 - ii. Hager
 - iii. McKinney/Assa Abloy
4. Manufacturers and Products: Exit Devices:
- a. Types: Surface rim devices with fixed mullions for pairs. Avoid use of steel removable hardware mullions. Do not use vertical rod or mortise devices, unless required by Codes.
 - b. Features:
 - i. Plate type trim, 2 5/8" wide minimum, 14 ½" high x ¼" thick, through bolted to lock case. Provide two through bolts at hinge stile cases.
 - ii. Strikes shall be adjustable.
 - iii. Cross bars shall be flat push type only without ability to chain adjacent doors shut.
 - c. Acceptable Manufacturers:
 - i. Corbin/Ruswin



5. Manufacturers and Products: Door Closers:
 - a. Types: Minimum projection overhead closers; do not use floor closers. All closers should be accessible in operating force and closing periods. Verify all interior closers shall be adjustable to 5 lb force, exterior recommended force per code. Mount closer to head and arm to door so as to install door closers in limiter function.
 - b. Do not specify overhead door holders/limiters
 - c. Features:
 - i. Through-bolts at all parts fastened to wood or metal doors.
 - ii. Adjustable spring power and adjustable back check.
 - iii. Manufacturer's standard sprayed color finishes; do not use plated finishes.
 - iv. Generally provide parallel arm closers. Closer arms shall not project into corridors or other student areas.
 - v. Cross bars shall be flat push type only.
 - d. Acceptable Manufacturers:
 - i. Corbin/Russwin
6. Manufacturers and Products: Kick Plates/Push Plates:
 - a. Types:
 - i. Stainless Steel (no plastic)
 - ii. Fastening: Apply with full threaded stainless steel self-tapping sheet metal screws finished to match plates. Do not apply kick plate with adhesive.
7. Manufacturers and Products: Door Holders
 - a. Types:
 - i. Exterior, pipe type.
 - ii. Match door hardware finish.
 - b. Application: Free from foot traffic.
 - c. Do not use overhead door holders/limiters.

08 80 00 Glazing

1. Use solar-control, Low-E, insulated glass units at exterior windows.
2. Entry Door Glass: insulated, clear glass, full tempered with horizontal tempering.
3. Use of reflective post-applied films is discouraged, reflective glass shall be manufactured as such.
4. Wire glass is not permitted.
5. Consider Triple pane.
6. Security glass/ballistic-resistive glass shall be used in entry vestibules.
7. Use reflective glazing in areas where classroom spaces and other places of gathering are visible from public spaces

CONSTRUCTION CRITERIA

1. Equipment above hard lid ceiling needs an access door within 24" of serviceable or replaceable parts-coordinate locations of serviceable or replaceable parts to reduce the number of access doors.
2. Discuss access door locations with maintenance personnel during DD and CD review.
3. Verify ability of storefront/curtain wall systems to allow replacement of glazing without destruction of storefront/curtainwall extrusions.
4. Provide 10% extra stock for all operable parts.

MAINTENANCE AND CUSTODIAL CRITERIA

1. Provide locations of opening to ensure ease of cleaning glass surfaces—no hidden glazing unless back-mirrored or blacked-out.

SUSTAINABILITY

1. Consider quality of light and control of natural light when designing window configuration, i.e. reduce glare, particularly where low sun angles will fall onto electronic white boards.
2. Consider shading and control of heat gain when designing the window configuration.

END OF SECTION

DIVISION 09

FINISHES (INTERIOR)

- .: Floors are to be a finish that is easily maintained with a minimum of cleaning agents (preferably water). Retro-plate, integral color concrete, natural rubber and linoleum are examples of acceptable flooring
- .: Carpet is not a preferred flooring but occasionally may be considered for applicable areas. Carpet tiles with low/no VOC are recommended. They are easily changed/replaced when damaged or stained
- .: Ceilings should be left open to structure whenever it is practical to provide learning opportunities, ease of maintenance and reduced finish cost
- .: As appropriate, walls shall be clad in acoustical and tackable material
- .: All paints, finishes and adhesives are to be low/no VOC compliant
- .: Compliance with air quality standards is a primary criteria in selecting finishes
- .: Durability of finishes also relates to the intrinsic aesthetic of material. Consider materials which will not become quickly dated that are simple, inherently beautiful, express the materiality of the building and encourage the concept of the "teaching building"

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PERFORMANCE CRITERIA

09 21 16 Gypsum Wall Board (GWB) Assemblies

1. Do not use gypsum board at exterior of building, including soffits.
2. Use cementitious Backer Board as substrate for ceramic tile and Reinforced Fiberglass Panels (RFP) in areas exposed to moisture, i.e., toilet rooms, kitchens, custodial closets and similar locations where walls are regularly wetted or washed down.
3. Use water-resistant (mold and mildew resistant) gypsum wall board in restrooms and other confined humid areas. Use nylon mesh tape rather than paper in these conditions.
4. Consider impact resistant Gypsum Wall Board at elementary corridors. Additional protection may be needed for secondary-level corridors (wainscot or like).
5. Require impact-resistant surfaces in gymnasiums where BISD schools and community programs have baseball and lacrosse indoors. Confirm adequate impact resistance of proposed materials with BISD during design, consider plywood backing.
6. Provide expansion joints in Gypsum Wall Board at 30' maximum and above door heads.
7. Gypsum Wall Board Finish: Finish interior Gypsum Wall Board by applying joint compounds in three (3) coats (not including prefill of openings in base), and sand between coats and after last coat:
 - a. Northwest Wall and Ceiling Bureau (NWCB) Level 2 at concealed drywall work which is indicated for drywall finishing or which requires finishing to only achieve fire-resistance rating, sound rating or to act as air or smoke barrier.
 - b. NWCB Level 4 typical
 - c. NWCB Level 5 at lobbies and corridors
8. When a wall (especially a long wall such as in a corridor) is perpendicular to a window consider the finish, sheen and color of the wall (i.e. the darker the color of the wall, more imperfections in the Gypsum Wall Board will be visible).

09 30 00 Tiling

1. Installation of tile including expansion joints in floor installations shall follow the "Tile Council of North America, Inc." current edition.
2. Extra Stock: Provide 5% or minimum of one carton of each type, shape, and color of tile used for extrastock.
3. Use epoxy grout in all locations of tiled walls; use silicone caulk to match grout at all inside corners, control joints and joints between dissimilar materials (consider sanded caulk to match adjacent grout texture).
4. At toilet rooms where tile walls are provided, install tile the full height of toilet partitions, on all walls.
5. Seal quarry tile, no sealer at ceramic tile.

09 51 00 Acoustical Ceilings

1. Refer to the Acoustic Standards
2. Ceiling Height:
 - a. Minimum classroom ceiling height shall be a minimum of 9' - 0" except as directed otherwise.
 - b. Minimum clear vertical distance from floor to lowest obstruction above shall be limited to 8'-0".
3. Ceiling Access: Where access to space above suspended ceiling is required, provide fully accessible ceiling system with no less than 6" clearance. Provide drop-down ladder or catwalk for accessing equipment that must be maintained and cannot be reached with an 8' ladder.
4. Do not use lay-in ceilings in gymnasiums. In corridors where ceiling height is ten feet or higher, lay-in ceilings can be used if holds down clips are used.
5. Direct glued ceiling tile should not be used.
6. Concealed spline ceilings should not be used.
7. Identify concealed locations of all utilities using BISD color-coded system.
8. Design Requirements:
 - a. Suspension system: At high moisture areas, use aluminum suspension system.
 - b. Tile and Panels: fiberglass.
 - c. Tech style acoustical ceiling by Hunter Douglas Contract is acceptable.
 - d. Kitchen and moist areas: use aluminum clad mineral ceiling panels, perforated where required for acoustical absorption.
 - e. Extra Stock: Furnish quantity of full size acoustical units and T-bar components equal to 2% of amount install, minimum of 2 carton of each type.



09 64 00 Wood Flooring

1. Factory-Finished Wood Flooring:
 - a. Description: Engineered wood flooring consisting of a 5 millimeter (1/4" +/-) sawn wood appearance/wear layer (oak or sim, as selected) laminated to a wood composition 9-ply substrate consisting of a marine-grade cross-laminated grade Baltic-birch veneer. Product shall be submitted for approval from same production run as that to be installed. Verify face is free of checking as this may be a sign of improperly-dried materials and leads to future stability issues. Use the American National Standard for Engineered Wood Flooring from the Hardwood Plywood & Veneer Association (HVPA) and/or recommendations of the National Wood Flooring Association (NWFA).
 - b. Underlayment/Moisture Control:
 - i. Moisture itself isn't necessarily a problem, it's how you handle (or don't handle) the moisture levels that causes problems. Installation of a vapor retarder reduces the potential for moisture or moisture-related problems, but does not guarantee to eliminate them. The key is tracking the water path that is being kept from permeating the floor. Know the manufacturer's allowed moisture content for the substrate.
 - ii. Install, at a minimum, per manufacturer's instructions.
 - iii. Semi-permeable over wood subfloors (perm 0.7 to 2.9); Impermeable over concrete substrates (perm of .15 or less).
 - iv. Ends and edges are sealed with manufacturer's recommended tape to provide consistent protection across entire barrier.
 - v. Sound Abatement: FIIC: 64 (Construction: 8" concrete, underlayment, 13 mm floating wood floor), FSTC: 59 (Construction: 8" concrete, underlayment, 13 mm floating wood floor).
 - c. Finish:
 - i. Oil Finish, consult with custodial team for most recent information on acceptable recoating practices in District and finish compatibility.
 - d. Provide expansion joints especially in consideration of the local marine environment and shut-down of mechanical systems during summer and winter for energy conservation purposes. Provide escutcheon plates at column bases and expansion joint covers.
 - e. Extra Stock: Furnish 10% extra of amount of install.
 - f. Acclimation: Consult manufacturer's recommendation for acclimation to space. Generally, engineered wood flooring should be placed only in environments where normal occupant conditions (68-72 degrees and 30-50% RH) are present for at least a week prior.
2. Gymnasium Floors:
 - a. Membrane: Provide impermeable (waterproof, perm less than .17) membrane over concrete floor, under wood framing system—can be a troweled or sprayed on system if recommended by flooring system manufacturer.
 - b. Flooring: Northern hard strip maple flooring 25/32" minimum thickness x 1 1/2" width, T & G, end-matched, minimum No.2 grade random length.
 - c. Mounting System: Double-layer 1/2" cross-banded plywood subfloor set 90 degrees to each other and overlapping seams, and set at 45 degrees to direction of flooring, or per flooring system manufacturer's recommendations or proprietary mounting system. All systems shall contain a cushioning "shock absorption" layer immediate to the concrete substrate—verify compatibility with vapor barrier.
 - d. Perimeter Molding: Ventilated cove rubber or manufacturer's metal base, mounted to wall. Thresholds are required to cover gaps.
 - e. Finish: Manufacturer's standard gymnasium finishing system, consisting of two coats sealer, and minimum two coats urethane finish. Include game marking lines to suit program requirements from the Ed Spec.
3. Stage Floor:
 - a. Flooring material at stage for middle and high school will be flat-black painted MDF panels.



09 65 00 Resilient Flooring

1. General:
 - a. All material shall be from a single run by a manufacturer.
 - b. Tile products are preferred over sheet goods.
 - c. Prefer products that do not require waxing.
 - d. Non-petroleum based rubber flooring is an appropriate material at an elementary school gym.
 - e. Extra Stock: Furnish replacement tile equal to at least 5% of installed square-footage for each color, minimum one carton per color.
2. Acceptable Materials:
 - a. Non-petroleum based rubber flooring (“Nora” or sim)
 - b. Linoleum
3. Rubber Base:
 - a. Because of damage from the floor cleaning equipment consider providing backing (plywood) behind the base.
4. Adhesives are a major concern. Low/no VOC products that meet LEED and WSSP protocols tend to be very moisture sensitive. Moisture in substrate (concrete structural and thin-radiant slabs) must meet (and preferably by well under) manufacturer’s recommendations for moisture content.

09 68 00 Carpeting – While not BISSD’s most preferred finish in most circumstances, it does have its place.

1. General: Colors shall be selected to minimize the showing of stains or wear patterns.
2. Areas that are appropriate for carpeting are as follows:
 - a. Building core administrative area
 - b. Library complex rooms
 - c. Regular classrooms
 - d. Computer rooms
 - e. Entry (as a permanent walk-off type installation)
3. Most other areas are not appropriate for carpeting.
4. Carpet tile is preferred.
5. Provide manufacturer’s standard fifteen (15) year warranty and lifetime warranty for backing. Provide special warranty, signed by Contractor, installer and manufacturer (carpet mill), agreeing to repair or replace defective materials and workmanship of carpeting work during (2) year warranty period following date of Substantial Completion.
6. Extra stock: Furnish 5% additional yardage of each carpet type required; extra yardage is over and above any overage provided by mill. Normal mill overage not to exceed 10% for fewer than 1000 yards, not to exceed 5% for over 1000 yards. Deliver to the Owner uncut in clearly marked dust-proof packages; store in a dry conditioned space easily accessible to maintenance crew (not in attic-type storage rooms).

09 83 00 Acoustical Wall Systems

1. Prefinish, factory or site assembled panels:
 - a. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E 84.
 - b. Panels to be mechanically fastened.
2. Acoustical Core:
 - a. Fiberglass board, 6.0 – 9.4 pcf density, 1 and 2 inch thickness; minimum NRC of 0.80 per ASTM C 423.
 - b. Use Athletic Impact Resistant cores in gymnasiums.
 - c. Use Abuse Resistant cores in all other locations.
3. Surface:
 - a. Fabric: “Fabricmate: Anchorage” or similar

09 90 00 Painting and Coating

1. Single Source Responsibility: Supply primers, intermediate, and finish coats for each paint and coating system from a single manufacturer, except as otherwise specified.
2. Product Listings: Acceptance based upon Approved Product List and as specified by this Section to make complete product line for each manufacturer. Where no product is listed for accepted manufacturer, verify with Architect before proceeding.



3. Surface Preparation: Conform to Architectural Painting Specification Manual, Society for Protective Coatings (SSPC), manufacturer's instructions, and work as needed to prepare substrates to be free of conditions that may impair adhesion and uniformity.
 - a. Remove bond breakers, dust, foreign matter, and surface irregularities.
 - b. Prepare to prevent bleed-through of substrate material.
4. Paint System Application: Conform to Master Painters Institute (MPI) Architectural Painting Specifications Manual, and manufacturer's instructions.
 - a. Paint Grade: Conform to Premium Grade, except as otherwise specified.
 - i. Minimum one primer coat and two finish coats, except as otherwise specified.
 - ii. Additional coats as necessary to cover with no holidays or other surface imperfections.
 - b. Dry film thickness (DFT) and wet film thickness (WFT), as instructed by manufacturer.
 - c. Finishes:
 - i. GL 6-7 "Gloss" MPI rating of 70+: utility areas, bathrooms, Nurses office, Locker Rooms and other areas in need of ease in wiping clean.
 - ii. GL 3-4 "Egg Shell" to "Satin-like" MPI rating of 10-35 at all other areas.
 - iii. GL 1-2 "Matte" and "Velvet" finishes with MPI ratings >5-10, are not recommended and may only be used in areas with a specific purpose for the finish, out of reach of users.

CONSTRUCTION CRITERIA

1. If gypsum wall board is being installed before building is enclosed and dry, while not a recommended process, use mold-resistant type gypsum wall board per ASTM G 21: "Certainteed M2Tech", "National Gypsum Gold Bond XP", or sim.
2. 09 83 00 Acoustical Wall Systems: Provide a mock-up for evaluation of application and workmanship.
3. 09 65 00 Resilient Flooring: Shuffle floor tile during installation so that finished floors will be reasonably free of abrupt changes in color and texture, and will present uniform overall appearance.

MAINTENANCE AND CUSTODIAL CRITERIA

1. Prefer to have one material in a classroom; if carpet is used in a classroom, resilient flooring is required at the wet area.

SUSTAINABILITY

1. Avoid use of VOC-emitting adhesives.
2. Use only products that will not impact the indoor air quality adversely.
3. Specify products that are locally made (within 500 miles) whenever possible.
4. 09 68 00 Carpet: Use PVC free backing.
5. 09 90 00 Painting and Coating: Volatile Organic Compounds (VOC) Emissions: Conform to Green Seal Standard, US Environmental Protection Agency (EPA), LEED and WSSP Protocol.
6. Use Green Seal Products for cleaning.
7. Durability, quality and robustness should be inherent in the finishes selected for any facility in the District. Especially in schools where the intended life is 75 years plus.
8. Durability also relates to the intrinsic aesthetic of materials: a trendy design will be out of date quickly and be in need of updating, while materials that are inherently beautiful, express the materiality of the building and encourage the concept of the "teaching building", will last the lifetime of the structure.

END OF SECTION

DIVISION 10

SPECIALTIES (SIGNS, TOILET ACCESSORIES, ETC.)

- .: Whiteboards shall be selected to integrate with technology standards in effect at time of installation. High quality boards last longer and allow for multiple uses
 - .: Provide tackable surfaces wherever practical, both in and out of classrooms. Tack surface provides protection for wallboard surfaces.
 - .: Provide wall backing in order to allow for future flexibility and repositioning of wall specialties
 - .: Modular specialty wall finish items prove more serviceable over time as they can be removed and/or replaced more easily than continuous or custom finishes
-



PERFORMANCE CRITERIA

10 11 00 Visual Display Boards

1. Markerboards:
 - a. Porcelain enamel on steel, laminated to core. Boards need to be "Interactive Projector Ready" such as "Balt/Moeco Interactive Projector Board" or sim.
 - b. Heights of marker boards should be age appropriate, Standardize heights for kindergarten, elementary schools and middle/high schools.
 - c. Provide two teaching walls in a classroom; consider full height marker board in one location.
 - d. Provide a pen and pencil tray full width.
 - e. Consider a cork tack strip at top of boards.
2. Tackboards:
 - a. Composition cork:
 - i. Surface Burning Characteristics: Flame spread index of 25 maximum, and smoke developed index of 450 when tested in accordance with ASTM E 84.
 - b. Tackable surface:
 - i. Provide tackable backing.
 - ii. The system should receive push pin easily, the use of staples should not be required.
 - iii. Located 3' +/- above finish floor to minimize abuse issues.
 - iv. Products: "Fabricmate Anchorage" or sim.
3. Accessories:
 - a. Map Rail.
 - b. Flag Holders (coordinate with flag staff if flags are NIC).
 - c. Marker tray, aluminum, full length of chalkboard.
 - d. Mounting brackets: Concealed

10 20 00 Tackable Wall Systems

1. Tackable Wall Systems: Site-installed bulletin board material over tackable core and continuous perimeter and intermediate mounting extrusions applied directly to wall surface:
 - a. Track: Extruded polymer track system ("Fabricmate" or sim)
 - b. Exposed Surface:
 - i. Linoleum resilient tackable surface.
 - ii. Fabric wrap panels are not desirable due to difficulty of finding like material for future repair or replacement.
 - c. Frame: Brushed aluminum or integrated (frameless).
 - d. Mounting; Systems should be mechanically fastened, avoid adhesives.
2. Integral materials are preferred such as cork.

CONSTRUCTION CRITERIA

1. 10 11 00 Provide blocking in multiple locations for future marker boards or relocation of existing boards
2. 10 20 00 Provide an overage of fabric for the fabric wrapped panel and tools required to replace the fabric on the panels.

MAINTENANCE AND CUSTODIAL CRITERIA

1. 10 20 00 Consider materials that are repairable or systems that are easily replaceable.
2. 10 20 00 Consider the following when selecting a tackable wall system:
 - a. How it can be maintained.
 - b. How it can be replaced in the future.

SUSTAINABILITY

1. All adhesives and sealants employed in installation of tackable wall systems are low VOC ratings, meeting WSSP Protocol, LEED and GreenGuard requirements for use in classrooms.

END OF SECTION

DIVISION 11

EQUIPMENT (KITCHEN EQUIPMENT)

- ∴ Kitchen equipment to be standardized for ease of future replacement and selected for robust commercial construction
 - ∴ Type-I range hoods are to be installed in environments where full menu cooking is to take place. Type-II range hoods are not necessary in warming kitchens where there will be no cooking with oils or fats
 - ∴ Select kitchen equipment to meet Energy Star Certification
 - ∴ Consider ADA accessibility when designing kitchen equipment
 - ∴ Makeup air systems to be provided where exhaust hoods could draw vacuum, inviting air leakage and decreasing building performance
-



PERFORMANCE CRITERIA

11 30 00 Appliances

1. Design requirements for residential appliances (typical at staff rooms, and other residential kitchen-type environments):
 - a. Refrigerator: Standard size (30") for application; no integrated water dispensers or ice makers. Verify Energy Star Certification. ADA handles.
 - b. Undercounter Refrigerator: Standard size (24") for application, panels and box to match other appliances; no integrated water dispensers or ice makers. Verify Energy Star Certification.
 - c. Range/Oven/Microwave: Standard size (30") for application, standard all electric unit with coil-type burners, color to match other appliances; 1500 watt microwave above (to free counter space) with integral vent to outside (VTOS) with counter-weighted damper in line and SS screen at exterior vent hood.
 - d. Dishwasher: Standard size (24") for application, panel to match other appliances. Facilities with on-site-sewer systems shall have European-type dishwashers with filters, others to have food macerators. Stainless steel interiors and controls shall have "sanitary" mode to super-heat for disinfection.
 - e. Garbage disposal: in sink at facilities served by sewer only; "Waste King", "ISE" or sim.
2. Design requirements for commercial appliances:
 - a. Washer shall be commercial grade due to variable use ranging from clothing to cleaning rags, mops, etc.; washer shall not be connected to dryer.
 - b. Dryer shall be commercial grade due to variable use ranging from clothing to cleaning rags, mops, etc.; dryer shall not be connected to washer – stack units are acceptable if they are not integral and therefore allow off-site repair or replacement without the loss of use of the other.
 - c. Range/Hood/Makeup Air: Commercial Grade range to be used at Commercial Kitchen applications, consult the Ed Spec for requirements (Central Kitchens, Satellite "Lunch" Kitchens, Culinary Arts, Farm to Kitchen...). Hood are to be Stainless Steel and built to accommodate Btu output, verify fire suppression and type of system needed for application. CFM ratings at these types of appliances are typically high and will require make-up-air systems to prevent negative air pressure and possible air leaks and potential backdrafting.
3. Refer to Ed Spec for size requirements and room locations.

11 50 00 Projection Screens

1. Retractable projection screens are to be provided per the Ed Spec.

11 60 00 Stage Equipment

1. See the Ed Spec for requirements for each project.

11 66 00 Gymnasium Equipment

1. Basketball
 - a. Provide manual operation for raising and lowering basketball backboards in elementary gymnasiums, from 10' to 8' AFF. All backboards shall be rectangular. Use vibration-proof bolts (nylock or thread-lock liquid applied) at backboards.
 - b. To move backboards out of the way, either forward or sideways toward the roof, provide electric operation. Switches are to be hardwired. No remote control. Provide proprietary switches or time delay between up and down movements that allow the motor to stop turning before reversing direction. Provide for multiple fixture operation from one location.
 - c. Gymnasium wall mats are to be provided. 6' x 24" units are required behind each basketball backboard. Mats shall be 2" thick polyfoam with heavy gauge reinforced vinyl face and edges. All fasteners shall be smooth and installation shall be free of trip hazard.
 - d. When a rock climbing wall is installed, the mats shall be integral to the design and protect the wall from users and vice-versa when
2. Volleyball
 - a. Provide storage for poles and brackets. Provide recessed floor sleeves for volleyball standards.
3. Wrestling mat hoists
 - a. Provide enough lifts to support all mats required for the program.



4. Rockwalls
 - a. Rock climbing walls shall a "shotcrete" or similar finish on a plywood substrate, and be permanently affixed to building structure. Design per the Ed Spec ("Rockwerx" or sim).
 - b. Provide extra climbing holds, bolts and tools for future changes.
 - c. When a rock climbing wall is installed, the mats shall be integral to the design and protect the wall from users, and vice-versa, when not in use.

CONSTRUCTION CRITERIA

1. Provide appropriate footing detail for volleyball sleeves so as to prevent standards from spalling concrete from tight nets.
2. Consult the Ed Spec on what activities may take place in gymnasium. Baseball and lacrosse practice sometimes occur at BISD facilities--finish all surfaces to allow a high degree of demanding use. BISD to confirm practices allowable by PE, athletics, community use, and the parks department.

MAINTENANCE AND CUSTODIAL CRITERIA

1. Provide adequate storage space around washer/ dryer locations. Avoid stacking units if possible. Provide floor drain near the washer.

SUSTAINABILITY

1. Select energy star appliances or equivalent.
2. Select appliances that fit standard openings and will not require modification of surroundings.
3. Select appliances for durability, ease of use, maintenance, cleaning, and repair.

END OF SECTION

DIVISION 12

FURNISHINGS

- .: Provide quickly deployable “blackout” shades in classrooms for use in lockdown emergencies
 - .: To allow management of natural light, provide manual or electronically controlled mechanical shades with skylights and high bay windows
 - .: Horizontal “Venetian” style blinds are generally to be avoided as they are easily damaged and problematic to clean
 - .: Walk-off mats should be made flush with surrounding floor finish material and removable for cleaning. They should be made of rubber or metal materials for exterior applications and modified carpet material for interior spaces
 - .: Provide waste and recycling receptacles throughout inside and outside of facilities
 - .: Provide bike storage, preferably with some cover for protection
 - .: Provide metered electric car charging opportunities whenever possible
-



PERFORMANCE CRITERIA

12 20 33 Window Treatment

1. General: Orient computer monitors and electronic white boards so as to minimize reliance on window treatment. Pay particular attention to morning, low sun angles from late fall to early spring:
 - a. The District lock down policy requires opaque window treatment in circulation spaces, exterior and interior sides of classrooms, commons, and lobbies at eye level and below. Verify blinds can be closed quickly in the event of emergency.
 - b. For security purposes, identify gathering areas within larger spaces such as libraries and commons where visual privacy can be provided.
 - c. Provide sun control window treatment at exterior windows at all teaching spaces including transom and high-bay glazing.
 - d. Provide privacy window treatment at all re-lites into teaching spaces, administration spaces.
 - e. Provide opaque window treatment at media center and tech labs.
 - f. Window treatment should cover the entire window in the space, especially teaching spaces with southern exposure.
 - g. Window treatment should be easily operated; the cords should be easily accessible with adequate pulley mechanisms to facilitate easy opening and closing. Provide child-entanglement-proof cords.
 - h. Cord locations in relationship with light shelf should be closely studied.
2. Horizontal Blinds are discouraged in schools because they difficult to repair and clean. If provided, with BISD approval, blinds shall be minimum 1" wide. Baked-enamel finish (horizontal blinds are acceptable in administration areas):
 - a. Blind Material: Alloyed aluminum, polyester.
3. Roller Shades, Shade cloth fabric shades (Roller Shades are preferred in student areas, teaching spaces, commons, media center, administration, etc.):
 - a. Consider the transparency of the fabric and the orientation of the teaching space (north vs. south) when selecting the fabric. The ability to darken the teaching space for projection is required. A small percentage of opening permits more daylight than may be anticipated. The district has satisfactorily used "Hunter Douglas buckwheat RM0373" shades, "Iris MechoShades Thermoveil 700" and "Budget Blinds Roller Shade F1707 Putty".
 - b. Provide opaque "blackout" shades at Technology Labs.
 - c. Motorized shade operations at all public spaces and high windows. Ensure adequate access to motors and controls will be provided above the ceiling. A mock-up or site visit with installation similar is recommended.

12 48 00 Entrance Floor Mats

1. Performance Criteria:
 - a. Entry Mat Locations: Public entries, gymnasium lobbies, classrooms with outside doors, other public spaces, and service entries including kitchens and loading docks.
 - b. Exterior Entry Mats:
 - i. Purpose is to "walk off" or remove dirt, small gravel and other particulates from shoes prior to entering building.
 - ii. Locate under cover to protect from moisture.
 1. Most types of entry mats, including nylon, are not accepted for exterior use.
 2. Polypropylene floor mats will not deteriorate significantly but will absorb water.
 - iii. Preference is to design hard paved surfaces to remove dirt and particulates (the pervious concrete adjacent to the Wilkes commons entry seems to be doing a good job of this).
 - c. Interior Entry Mats: Purpose is to remove moisture, grass, fir needles, etc., from shoe soles prior to transitioning to finish flooring surfaces to reduce slipping hazards and tracking in debris:
 - i. Consider the flooring material adjacent to the walk off mat because students do not always stay on the walk-off mat – sometimes there isn't sufficient room for everyone during passing period; the flooring adjacent to the walk-off should not be slippery.
 - d. Recessed Entry Mats: Can be lifted out of depressed slab blockout and easily cleaned:
 - i. Preference is to have exterior entrance mats that do not require exterior drains.
 - ii. Requires aluminum frame set into concrete blockout at time of concrete placement.
 - iii. Blockout depth is based on that required for mat to flush out with finished floor surface.



- e. Flush Entry Mats:
 - i. Fully adhere to keep mat from slipping, except as otherwise directed by BISD.
 - ii. Include transitions strips at transitions to finish flooring.
- f. Travel Distance Needed to Dry Shoe Soles: 20 feet or about 15 human steps. Consider the traffic patterns, occupants do not only travel perpendicular to the entrance door, they also travel diagonally from the door, the walk off mat should extend beyond the edge of the door (10 to 12').
- g. Metal grates: walking on the grates in a direction parallel to the grates is very slippery and dangerous. Perpendicular travel over the grates cannot be assumed:
 - i. Finish on grills should not be slippery when travelled parallel to the grill direction. Metal grates can be sandblasted before installation (or an equivalent finish).
 - ii. Grills must meet ADA code requirements and should be high heel proof.
 - iii. Grills and frame must be able to carry the weight of a lift and other heavy equipment (5,000 lbs construction lifts for vertical access and 15,000 lbs if an articulating construction lift may be needed).
 - iv. Use machined, stainless steel fasteners to secure frame and grate to substrate.

12 93 00 Site Furnishings

- 1. General:
 - a. Consider skate boarding when selecting and designing site furnishings, avoid long straight edges.
- 2. Flagpole:
 - a. One per school, 26' height maximum (to allow easy access with a bucket truck); Flag pole lanyard bottom should provide with lockable metal box within the reach by custodian without the use of ladder.
 - b. No winches, provide a product with a simple pulley.
 - c. Aluminum pole.
- 3. Trash receptacles:
 - a. Permanent and vandal resistant.
 - b. Locations determined with BISD.
 - c. Make quantity of each receptacle clear in the contract.
 - d. Provide both trash and recycle containers, identify trash and recycle container with appropriate signage.
- 4. Bicycle Racks
 - a. Locate bicycle rack within sight lines by administrative staff for supervision.
 - b. Consider racks that may have an artistic expression or as a fixture related to the structure of the building.
 - c. Provide bike racks under cover, either by extension of building structure or free-standing and integral to the rack system.
 - d. Verify with local codes to determine the quantity of bike racks provided.
- 5. Motorcycle Parking: at high schools consider providing dedicated covered motorcycle parking.

CONSTRUCTION CRITERIA

- 1. NA

MAINTENANCE AND CUSTODIAL CRITERIA

- 1. Consider requirement for contractor to provide extra stock of specialty, custom roller shades/fabric.

SUSTAINABILITY

- 1. 12 20 00 Window Treatment: use PVC free fabrics.
- 2. 12 20 00 Window Treatment should be closely studied with daylighting strategies, consider reducing glare at the teaching walls.
- 3. 12 48 00 Entrance Mats: use sustainable products, cocoa mate, mats with 100 % recycled material content, recycled rubber tire tile.
- 4. Allocate parking close to entry for bicycles, car pools, electric cars, and motorbikes.
- 5. Consider supply of metered electric vehicle charging stations

END OF SECTION

DIVISION 13

SPECIAL CONSTRUCTION (GREENHOUSES, ETC...)

∴ NOT USED

DIVISION 14

CONVEYING EQUIPMENT (ELEVATORS)

- ∴ As elevators are costly to procure, install and maintain, facilities that do not require an elevator are preferred. Minimize the number of elevators used whenever possible
-



PERFORMANCE CRITERIA

14 20 00 Passenger Elevators

Generally, prefer designs that do not require elevators or only one. Maintenance, operation, certification and licensing costs (all general fund/maintenance dollars) of elevators have become prohibitive.

1. Elevator shall have a minimum weight capacity of 2500 lbs. Interior dimensions of the cab shall be a minimum of 51" x 68" (the cab should be large enough to carry a construction 'Genie' lift). Door size shall be a minimum of 42" x 84".
2. Ideally there should be only one elevator per building.
3. A "holeless" hydraulic elevator is acceptable at two-story installations.
4. Provide fixed ladder into elevator pit and adequate lighting.
5. Provide air conditioning at elevator machine room.
6. Elevator hall controls are to be key operated. The key shall match the building master key and/or be controlled by RFD card-reader system common to the building.
7. Furnish and install an emergency return unit. In the event of a loss of power, the elevator shall automatically return to the lowest landing and park with the doors open. Lighting shall remain adequate for normal maneuvering.
8. Verify location of fireman's service key box with BIFD.
9. Provide key box for state inspector in nearby building service area.
10. Interior Finishes:
 - a. Plastic Laminate.
 - b. Stainless Steel.
 - c. Resilient floor or carpet (consider the same material as adjacent corridor/lobby).
11. Provide freight drape and permanently-placed attachments.
12. Provide hand grab rails.
13. Manufacturers:
 - a. Otis Elevator Co.
 - b. Schindler Elevator Corp.

CONSTRUCTION CRITERIA

1. Consider a 2-year maintenance contract by elevator provider.

MAINTENANCE AND CUSTODIAL CRITERIA

1. Provide lighting that is comparable and compatible with LED fixtures elsewhere in building.

SUSTAINABILITY

1. Consider elevator systems that uses biodegradable vegetable oil for system hydraulics.

END OF SECTION

DIVISION 21

FIRE SUPPRESSION

- .: Provide facilities that are fully protected by a fire suppression system
 - .: Exterior fire suppression locations are to be assessed for potential freezing conditions and made to be dry in such conditions
 - .: Main Distribution Frame (MDF), Intermediate Distribution Frame (IDF) and archive rooms are to be served by a dry chemical-type fire suppression system
-

DIVISION 22

PLUMBING

- .: Provide separation of wastewater outflow into greywater and blackwater, to accommodate future water recycling
 - .: Grease traps will be installed for ease of access and cleaning, which will prevent delayed maintenance
 - .: Grease traps may not be necessary in kitchens used only for warming, however, to provide for future change, accommodations for retrofit should be included in the design
 - .: Provide more than the minimum requirement for waste line cleanouts for ease of maintenance
 - .: Consider rainwater harvesting with flushing toilets
 - .: To preserve the integrity of facilities, provide gutters on building exteriors (as opposed to internal or built-in drain pathways) when practical
 - .: Copper or PEX are acceptable materials for plumbing lines
 - .: Do not use PVC or CPVC pipe materials
 - .: All fixtures, fittings and associated materials in the supply line must be lead free
 - .: Use high quality (hospital or commercial grade) chrome-plated brass fixtures with ceramic and fully-serviceable valves
 - .: Stainless steel drinking fountains are preferred for longevity and resistance to breakage
 - .: A dashboard may be considered in a central common space for students, staff and public to monitor building water usage
-

PERFORMANCE CRITERIA

GENERAL

1. Water Pressure:
 - a. Water pressures on Bainbridge Island may be inadequate to effectively supply the plumbing fixtures.
 - b. At the domestic water input to the building, a double detector valve assembly (DDVA) is preferred over a reduced pressure check valve (RPCV). The DDVA functions with less water pressure and will keep toilets flushing during a power outage. The RPCV has a relief valve, that under negative water pressure could cause the building to discharge all water held in the pipe to the relief valve. If a RPCV is installed, the relief valve needs adequate discharge to prevent flooding.
 - c. At the hydronic heat system water inlet, a RPCV is acceptable.
 - d. The site fire flow requirement will be higher than the building water flow requirements, civil engineers will need to address this issue.
 - e. The buildings pressure requirements may be higher than the site fire flow requirements, coordination required with civil engineers to ensure site fire flow requirements are sufficient for the building.
 - f. Basic filtration to be provided on incoming main.
 - g. Cold water pipework to be insulated inside the building to prevent heat gain.
2. Hot Water:
 - a. Natural gas is not available on Bainbridge Island, all current facilities have some sort of LPG system in place, whether for heating, domestic hot water, cooking or generator back-up systems.
 - b. Unions installed on temperature and pressure relief must be visible.
 - c. The fewer hot water tanks the better to minimize maintenance--should locate the tank next to the custodial closet.
 - d. Hot water distribution through a cartridge-type recirculating system is preferred. Local electric point of use water heaters can be used as a last resort in remodels with BISD approval, but are discouraged in new construction.
 - e. Solar thermal water systems should be used as a primary source of heating with the electric system as a backup.
 - f. "AO Smith" is a preferred manufacturer.
 - g. Control of the hot water tank(s) will utilize the DDC system. No onboard controls.
3. Wastewater Drainage:
 - a. Civil engineer to design for sewerage discharge; drain field or sewer.
 - b. Waste streams may need to be separated into greywater and blackwater, if not used now, there should be the ability to separate easily (simple retrofit) in future.
 - c. Check kitchen requirements for grease trap. Reheat-kitchens do not require grease traps, however, as all facilities need to be forward-thinking, all kitchens may be fully-functioning at some point during the building's life, provide at least ability to retrofit grease trap.
 - d. Clean outs to be located every 50', floor clean outs, while not preferred, are acceptable.
4. Storm Drainage:
 - a. Verify storm-event hold system: storm drain, rain garden, cistern, or detention tank.
 - b. External gutters and downspouts are to be used. No internally routed rainwater leaders.
 - c. Rainwater harvesting, with BISD approval, can be used.
 - d. Review gutter, scupper, leader, overflow scupper and downspout locations, details and assemblies with BISD staff.
5. Laboratories:
 - a. BHS and WMS will require acid resistant waste pipe work and an acid neutralization tank.
 - b. High schools and middle schools utilizing chemicals will require Emergency Drench Showers in accordance with ANSI Z358.1-2004 and emergency eyewash stations. Drench showers must provide a recessed trough approximately 3' x 3' x 1' with ADA grate type lid to catch water used during testing. Avoid galvanized pipe at shower and eye wash – use copper or stainless steel.
 - c. Neutralization & Dilution tanks are preferred at all laboratory sinks. Full access to all parts is required.
 - d. Electrofusion fittings are allowed (verify maintenance is trained and has access to EF equipment).
 - e. Emergency shut off valves for water and gas are required.
 - f. Fume hoods: consult the Ed Spec and BISD and equip with ventilation, water, gas, etc., as required.

6. Pipe Materials:
 - a. Waste – cast iron, copper, ABS, HDPE – No PVC.
 - b. Lab Waste – PP, HDPE – No PVC or CPVC.
 - c. Underslab drainage – Cast Iron, HDPE – No PVC.
 - d. Water distribution – Copper, crosslinked polyethylene (PEX) – No PVC.
 - e. Provide pipe angle water stops, loose key, ¼ turn, solid brass; “Brascraft G2” or sim.
7. Plumbing Fixtures:
 - a. Preferred fixtures: Made in USA, lead-free brass casting with polished-chrome finish. “Chicago MVP” or sim faucet with hot and cold push buttons and “Kohler Soho” or sim white lavatory.
 - b. Micro-pint flush and waterless urinals are preferred.
 - c. Composting toilets may be considered.
 - d. Mop sinks in janitors’ closets shall be standard, floor-mounted sinks with high integral walls on two or three sides (confirm with custodians and Ed Spec) or shall be recessed into slabs to prevent lifting buckets over the rim. Provide z-flashing at sink over cementitious backer board with FRP finish to maintain a water-tight envelope in an area highly susceptible to water damage.
 - e. Drinking fountains (preferred over water coolers): “Elkay Swirlflo” or sim at elementary and intermediate schools “Elkay Swirlflo ADA Bi Level” or sim at middle and high school. Retrofit bubblers to be “Chicago 748-665/MVP” or sim Elementary classrooms to have combined sink/drinking fountain.
 - f. Locate isolating valves for every toilet block or wet space in the adjacent corridor behind a labeled access door. Consider providing an accessible wet closet to access plumbing or a concealed access behind cabinetry in adjacent room.
 - g. Interior hose bibbs are to be located within custodial closets.
 - h. External hose bibbs to be located in conjunction with grounds, custodial and maintenance requirements. Provide freeze-proof type with keyed operation. Provide hose bibbs at roofs for cleaning—review locations with Maintenance team.
 - i. Locate the washer/dryer for efficient use, consider the types of articles to be cleaned. If no other option is preferred, locate W/D in main custodial room.
 - j. Washer and dryer shall be commercial grade. Stackable units are acceptable if they are not integrated. Provide floor drainage by either plumbing the washer pan to the waste line or providing a floor drain nearby.
 - k. Appliances may be connected with stainless steel reinforced flexible hoses if fitted with a hydraulic fuse.
 - l. Science rooms shall have no potable water sources, fixtures shall be clearly signed “Not for Drinking”.
 - m. Science rooms shall have combination Drench Shower/Eye Wash unit tied to potable water. “Bradley S1931EW”, or sim.

22 10 00 Plumbing Pumps:

- a. Closed-loop non-potable water circulation (radiant heat systems): Hot water recirculating pump: Inline centrifugal, bronze impeller, bronze or cast iron body. Manufacturers: Grundfos, Taco, Armstrong.
- b. Open-loop potable water circulation: Hot water recirculation pump: Inline centrifugal, stainless steel impeller, stainless steel body. Manufacturers: Grundfos, Taco, Armstrong.

22 11 13 Facility Water Distribution Piping:

- a. Domestic water: Type L hard copper above ground, Type K below ground.
- b. Domestic ball valves to be used for isolation up to 2” shall be resilient-seated, full port valves.
- c. Domestic gate valves shall be required for valves 2 ½” to 4”.
- d. Hydronic globe valves shall be used for throttling all systems up to 3”, butterfly valves 4” and above.
- e. Crane class 125 valves.

22 13 16 Sanitary Waste and Vent Piping:

- a. Waste piping: Cast iron, no-hub preferred above slab/grade. Vent piping: Cast iron (hub-type) or ABS.

CONSTRUCTION CRITERIA

1. Photograph and label installations that are located behind walls at the same time as the plumbing inspection.
2. Use central and satellite distribution panels to ease isolation of specific areas and fittings.

MAINTENANCE AND CUSTODIAL CRITERIA

1. Ensure that the surrounding area of all water sources are waterproof and that all devices have both a local isolation valve.

SUSTAINABILITY

1. A water meter showing local use is strongly encouraged as a teaching tool. Connection to the DDC system is preferred for maintenance monitoring. Connection to a convenient 'dashboard' display for student monitoring is routed through the DDC.

END OF SECTION

DIVISION 23

HEATING, VENTILATION AND AIR CONDITIONING

- .: Ground sourced heat exchange systems (geo-thermal) are the preferred source of heat for all educational facilities due to ease of maintenance and long term savings in operating costs
 - .: Facilities should be designed to limit the amount of mechanical ventilation required and should rely on passive means. Wherever possible the use of red light/green light system for manual ventilation should be employed
 - .: In-floor radiant (hydronic) heat is the preferred method of heat delivery as it provides a consistent, efficient, user-friendly and comfortable environment
 - .: Air conditioning is typically not provided
 - .: Dedicated air conditioning (mini split system) is to be provided to MDF and IDF closets
 - .: Air conditioning or mechanical cooling may be provided to administrative spaces
 - .: Provide for heat and energy recovery ventilation to lower heating loads
 - .: Provide Variable Frequency Drive (VFD) motors as well as vibration isolation. An acoustical engineer should be consulted
 - .: Consider using a centrally located building dashboard to monitor building systems in real time
 - .: Testing & balancing and commissioning are critical to successful building systems performance
 - .: Consider providing infrastructure for future add of solar hydronics
-



PERFORMANCE CRITERIA

1. Ground-source heat-exchange systems are preferred. Bainbridge Island is not supplied with natural gas-- gas-fired equipment must be LPG, and should be considered as a backup to more sustainable systems.
2. BISD expects the architect and design team to prioritize building design to minimize the need for heat, mechanical ventilation, and air conditioning through siting, landscape, and architectural means.
3. BISD provides air conditioning or mechanical cooling to tech labs, elevator machine rooms, and MDFs (equipment rooms) in order to meet code or remove heat generated by the equipment.
4. BISD may provide air conditioning or mechanical cooling to administration areas as staff is on site year-round.
5. BISD does not typically provide air conditioning to classrooms--utility costs compete with academic funding and academic calendar avoids majority of net cooling days. However, the energy-efficiency of geo-thermal systems and heat pumps will allow air conditioning or mechanical cooling to be provided at a significantly reduced cost over traditional chilled air systems, and may be provided to classrooms upon BISD approval.
6. Centralized boiler, chiller, heat pump and air handling systems are preferred over multiple systems distributed across a facility. Provide easy access for servicing equipment.
7. Modular plant equipment (such as smaller modular boilers or modular chillers and heat pumps) is preferred over large single-unit equipment.
8. Hydronic systems are preferred over single-stage resistance heat or heat pumps for comfort reasons. Avoid systems where the heat source cycles between 0% and 100%, where supply air temperature swings from hot to cold when the room thermostat is satisfied.
9. Provide dedicated exhaust for MDF/IDF rooms and electrical rooms.
10. For multi-zone systems, such as variable air volume (VAV) systems, consider providing separate air handling units for spaces with drastically different loads, to prevent simultaneous heating and cooling and to maximize supply temperature reset opportunities.
11. If fan coil units are included, provide units with internal vibration isolation, as well as vibration isolation in the structural mounting system.
12. Provide economizers and/or discharge air temperature monitoring to stabilize room temps and minimize cold air washing on indoor air quality (IAQ) system call.
13. Consider infrared CO₂ monitoring equipment.
14. Preferred/favorable system types:
 - a. Hydronic radiant floors.
 - b. Heat (HRV) and energy (ERV, humidity) recovery ventilation systems; plate-frame preferred (energy wheel where ERV is specified)
 - c. Ground loop heat exchange systems; horizontal is preferred due to lower initial cost (if practical and sufficient permanent open space is available short and long term), vertical wells are acceptable
 - d. Natural ventilation systems, particularly for classrooms – consider delivery air temperature and related comfort issues. Carefully consider control strategies of natural ventilation systems in order to ensure thermal comfort.
 - e. Mixed-mode (natural/mechanical) systems. Consider the “red light/green light” system for user manual operation of ventilation.
 - f. Displacement ventilation – for middle & high schools only
 - g. Variable Air Volume (VAV) systems are preferred over Constant Air Volume (CAV) systems.
15. General airside performance criteria:
 - a. Provide ports for portable magnahelic differential pressure monitoring (pressure gauge at minimum, prefer BAS signal optional) at filters.
 - b. Duct access doors: provide hinged type.
 - c. Equipment access: provide access that does not require tools to open.
 - d. In gymnasiums, locate return grilles at high level. Low level grilles are subject to damage.
 - e. Exposed ductwork is not preferred unless in an exposed structure condition. If exposed ductwork is provided, consider how it may be cleaned.
16. General hydronic system performance criteria:
 - a. Acceptable materials: steel (grooved or welded) only in conditions not embedded in concrete; copper (soldered only) only in conditions not embedded in concrete; cross-linked polyethylene embedded in concrete; single-piece loops (no buried joints). Verify material acceptability for use with propylene glycol or sim freeze protection fluids.



- b. If piping is located outdoors, provide propylene glycol for freeze protection (use no heat trace). If hydronic waste is discharged to a drain field, do not use propylene glycol. System must be a closed loop, physically isolated from potable water system.
- c. Consult with BISD regarding chemical (or non-chemical) water treatment.
- d. Provide Pressure-Temperature ports at all sensors
- 17. Provide variable frequency drive (VFD) for all large motors (10hp or greater). Consider use of VFDs for smaller motors if life-cycle payback and utility rates indicate significant utility savings to the district.
- 18. Building controls:
 - a. Provide building automation and control network (BACnet) system – one vendor per facility. Provide reporting/network connection to district central monitoring at maintenance facility office. Manufacturers: Alerton.
 - b. For on-site access to building automation system (BAS) interface, wireless is preferred (provide wireless access point for connection to the BAS).
 - c. Provide for monitoring of discharge air to stabilize room temps and minimize cold air washing on IAQ system call.
 - d. Thermostats – provide digital display and user adjustability with limited range of control. Indoor temperature set points (in heating mode) should be between 68 F and 72 F.
 - e. CO₂ sensing – locate in return duct or high on wall (out of range of students). Self-calibrating sensors preferred. Avoid sensors that require off-site calibration. Consider infrared detection systems.
 - f. Motorized actuators for windows and/or vents are acceptable.
 - g. Control valves – Belimo is preferred manufacturer.
 - h. Submetering is mandatory. Consider the use of educational tools, such as building dashboards.
 - i. Consider requiring a two (2) year digital data control (DDC) service contract following completion of all commissioning.
- 19. An acoustic engineer should evaluate mechanical systems for noise levels. Refer to acoustic design standards.

CONSTRUCTION CRITERIA

- 1. Verify that contract documents clearly require contractor to cooperate with and participate in building commissioning. Contractor shall provide all testing and balancing (TAB) and startup data to the commissioning agent.
- 2. Commissioning agent shall back-check 100% of the control devices after TAB & startup has been performed by the contractor. If 10% or more of those devices do not pass, the contractor shall be obligated to re-do their TAB & startup procedures. The contractor shall be financially responsible to pay for any further commissioning checks.
- 3. Commissioning agent, design engineer, and maintenance staff will review controls and control sequences once during design and again during construction, after equipment submittals have been approved.
- 4. Commissioning agent's contract shall include change-of-season testing to include shoulder seasons.
- 5. Contractor and commissioning agent shall comply with the district's control and TAB subcontractor performance standard.
- 6. Consider requiring commissioning agent to perform thermal scan of building envelope post-occupancy.
- 7. Commissioning agent and/or district representative should perform inspections of building envelope throughout building construction to verify sufficient insulation, sealing, etc.
- 8. Provide commissioning for all projects which install or upgrade/modify mechanical equipment and/or building control systems.
- 9. Mechanical engineer shall attend commissioning meetings during construction.

MAINTENANCE & CUSTODIAL CRITERIA

- 1. Mechanical mezzanines are preferred over roof-mounted equipment. Provide reasonable access for maintaining equipment including moving replacement parts into and out of equipment spaces. For mezzanines or basement spaces, elevator access is preferred; alternately, provide a hatch and lift system to allow maintenance staff to move equipment into and out of equipment spaces. Consider forklift access for on-grade access.



2. Access to mechanical space (including mezzanines and basement spaces) from outside the building is preferred.
3. Terminal units such as variable air volume (VAV) boxes shall be located in mechanical mezzanines or hallways (but not in front of doors). Do not locate terminal units such as VAV boxes within classrooms to avoid adding noise to the learning environment and to prevent disruption of class for equipment maintenance. Do not locate terminal units such as VAV boxes within toilet rooms to avoid conflict between maintenance and student hygiene.
4. Duct access doors shall be provided at all dampers to simplify duct cleaning.
5. Provide sufficient access for replacing equipment including large motors – consider doorway width, elevator access, etc.
6. Locate controls and control valves outside the classroom.
7. Provide inspection and training for Maintenance, regarding ground source heat loop.

SUSTAINABILITY

1. All HVAC systems need to be considered for system efficacy and low-energy-use. Conservation measures must be justified on a system-life-cycle basis.
2. Renewable energy systems should be considered.
3. Consider ground-source heat exchange systems when possible.
4. Consider all potential passive design solutions to mitigate heating, ventilating, and cooling and discuss with BISD.
5. Final acceptance of passive design solutions to be implemented shall be made by BISD.

END OF SECTION

DIVISION 26

ELECTRICAL

- .: Consider current campus-wide WiFi needs, as well as one-to-one electronic device use and charging station requirements
 - .: Research has proven the importance of clear, conversation-level speaking in educational delivery. Provide for assisted listening and voice enhanced systems in all classrooms
 - .: Floor electrical boxes are to be used only in very specific applications, as approved by the district. Alternative methods of electrical delivery are encouraged, such as overhead pull down reels
 - .: Research validates that natural daylighting improves student learning. Daylighting should therefore be optimized in all learning spaces
 - .: Use of occupancy sensors, light-harvesting sensors and lighting controls in conjunction with LED fixtures reduces energy costs, improves longevity and provides improved lighting conditions
 - .: Consider providing a building dashboard for real-time monitoring
 - .: Provide plug-and-play infrastructure to allow photo-voltaic panels to be installed in the future
 - .: Provide a backup generator system capable of powering a minimum of emergency egress lighting and critical items (refrigerators, MDF/IDF, waste pumps, etc). School facilities are often called on to be emergency shelters. Consider backup electrical that can power the facility in the event of major emergencies for a minimum of 96 hours
 - .: Surge protection will be provided to shield critical devices from fluctuating power feeds
 - .: Electrical systems are to be commissioned to verify system operation and ensure building efficiency
 - .: Install electrical systems above water systems as appropriate to avoid complications in case of water leakage
 - .: While passive ventilation methods are emphasized, ceiling fans are important to augment ventilation and provide individual room control. Verify that fan circuits are isolated from lighting circuits
-



PERFORMANCE CRITERIA

GENERAL

1. Consider each of the following during project programming phase:
 - a. Quantities, location and ability to allow future flexibility regarding outlets in classrooms and shared spaces.
 - b. Appropriate provisions for Audio Visual equipment—consult the Ed Spec for requirements.
 - c. Quantity and location of receptacles remote from building, in play spaces, traffic areas and other outdoor areas.
 - d. Provide for WiFi access points to provide full coverage throughout interior of building (exterior access per Ed Spec).
 - e. Interactive digital display systems/raceway support.
 - f. Assisted listening systems broadcasting on FM.
 - g. Enhanced sound systems, verify amplification can meet needs of space (eg: a Commons area can be loud and announcements can be drowned out).
2. Duplex receptacles shall be placed per code requirements, the Ed Spec and in the following locations:
 - a. GFI outlet outside each main entry.
 - b. One in each vestibule.
3. Floor boxes may be necessary, but should be avoided as possible:
 - a. Floor boxes tend to collect dirt, can be flooded during cleaning or emergency flooding events, are often in the wrong locations particularly over time, and because the conduit is commonly within the slab, they cannot be modified.
 - b. If there is no other way to provide power and data to support the program, the location of floor boxes must be designed to allow multiple layouts for student desks.
 - c. Floor boxes must be watertight and completely flush with the finish floor, both when in use and not. A keyed (tamperproof), steel, hinged cover with non-slip surface is strongly encouraged.
 - d. There shall be an extra conduit for power and an extra conduit for data with pull strings installed. The boxes must fit all cords within and be sized 50% larger than the original capacity for the installation of future cords.
4. Security:
 - a. Include rough-in for:
 - i. Card readers, electric strike and electric hinge at all main exterior entrance doors.
 - ii. Card readers, electric strike and electric hinge at entry vestibule secondary doors.
 - iii. Surveillance camera systems per security consultant and the Ed Spec.

COMMON ELECTRICAL WORK

1. Lighting Control:
 - a. Occupancy sensors:
 - i. Use of occupancy sensors throughout the building for automatic control is preferred, including classrooms, corridors, and offices. Kitchens should not employ occupancy sensors.
 - ii. Ceiling-mounted occupancy sensors are preferred in all but small janitor's closets, storage rooms, and other seldom-occupied spaces where wall-mounted devices are acceptable.
 - iii. Use DDC system (BACnet preferred) in public areas (commons, gymnasiums, traffic) and exterior environments to turn moderate lighting.
 - b. Auxiliary contacts within occupancy sensors should be tied to the BAS to allow the mechanical system to react to rooms that are unoccupied.
 - c. Classroom controls should provide manual on/off control of the front and the back of the room. Automatic daylight-harvesting controls should be employed.



LOW-VOLTAGE ELECTRICAL DISTRIBUTION

General:

1. Verify requirements for complying with the current NEC regarding GFCI and AFCI protected circuits.

SWITCHBOARDS AND PANELBOARDS

1. Identify available fault current and select equipment appropriately.
2. Series-rated equipment is not allowed.
3. All shall have main circuit breakers.
4. Future Growth:
 - a. Spares:
 - i. Branch circuit panelboards shall have a minimum of (4) spare 20A, 1P circuit breakers.
 - ii. Distribution panelboards and switchboards have no spare breaker requirements.
5. Spaces:
 - a. Branch circuit panelboards shall have unused breaker pole count equal to 33% of the number of circuits in use.
 - b. Distribution panelboards shall have unused physical space to increase the number of distribution circuit breakers by 50%.
 - c. Switchboards shall have unused physical space to increase the number of distribution circuit breakers by 25%.
6. Surface mounted in equipment rooms, flush mounted in other locations:
 - a. Panelboards shall not be used in locations accessible to students.
 - i. Distribution panelboards shall not be flush mounted.
 - b. Use of panelboard subfeeds is discouraged and should only be used with BISD permission.
 - c. Motor loads shall be kept electrically isolated from other loads and shall not share a panelboard with electronic (data-equipment serving) loads.

ELECTRICITY METERING

1. The system shall be scalable from main switchboard to branch circuit metering and be modular to allow the simple addition of meters in the future.
2. All panelboards 800A and greater shall have main meters.
3. The metering system shall be tied to the BAS for trending analysis.
4. Consider a building dashboard monitored in-house, preferably via DDC, rather than by 3d party.

POWER GENERATION

1. Photovoltaics (PV):
 - a. Power distribution equipment (panelboards and switchboards) should identify a connection point and plan for any sizing implications necessary to support the future addition of a photovoltaic power system. The size of PV system to be included in planning shall be a project-by-project decision, including the anticipated size and location of converter. Addition of PV should be "plug-and-play".
 - b. Provide adequate-sized conduit from each future array to main electrical panel.
 - c. Provide structural consideration for points of connection at locations for future arrays.
2. Packaged Emergency Generator Assembly:
 - a. Match fuel sources of other project requirements when possible.
 - b. 96 hours onsite storage required per NFPA 110.



- c. Loads should be considered on a project basis, but at a minimum shall include:
 - i. Emergency:
 1. Egress Lighting/Exit signs/Fire Alarm
 2. MDF/IDF/phone system (supported by the BISD's rack-mount UPS).
 3. Waste water pumps
 - ii. Optional Standby:
 1. Walk-in cooler
 2. Servers
 3. 20–35 footcandles in Commons.
- d. Include 25% spare capacity for future flexibility.
- e. Include provisions to connect a load bank for annual testing.
3. Transfer Switches
 - a. Switch positions shall be monitored by the BAS to allow remote monitoring of power supply mode.
 - b. Shall be tied to elevator controls to allow elevators to respond properly during generator testing.

ELECTRICAL PROTECTION

1. Transient Voltage Surge Suppressors shall be employed on all panelboards serving electronic loads. Electronic loads consist of classrooms, computer labs, offices, MDFs, IDFs, and libraries. The TVSS units shall be monitored for trouble condition by the BAS.

LIGHTING

1. Illuminating Engineering Society of North America (IESNA) standards for indoor lighting levels shall be followed, and light levels demonstrated for BISD approval.
2. All lighting shall be considered for location and room use. Provide ample lighting for task at hand.
3. Artificial lighting in classrooms shall be considered back up to natural lighting sources, use light-harvesting controls. Controls should allow room to be manually overridden for a set time.
4. Minimize quantity of lamp types on each project:
 - a. T5HO is BISD standard for gymnasium lighting. Use LED equivalent to standardize lamping.
 - b. 42-watt compact fluorescent is BISD previous standard for outdoor applications; new/replacement standard is same output in LED.
5. Exit signs:
 - a. BISD standard: LED exit sign with emergency battery power.

FIRE DETECTION AND ALARM

1. Horn-based systems are desired, the district has no plan to use speakers to provide other messages to the occupants.
2. A code-basis fire alarm system should be employed in the absence of other issues. Exceptions to this are:
 - a. Smoke detection should be provided in the MDF and IDF rooms.
 - b. Pull stations shall be provided at all exits.
 - c. System shall be addressable



CONSTRUCTION CRITERIA

1. General
 - a. Record Drawings shall reflect:
 - i. Route for any conduits concealed within horizontal construction elements (roof decks, concrete slabs).
 - ii. Route for exterior conduits; in buried non-metallic conduit include trace-tape regardless of content.
 - b. Commissioning:
 - i. Verify that contract documents clearly require contractor to cooperate with and participate in building commissioning.
 - ii. Commissioning agent, design engineer, and maintenance staff will review controls and control sequences once during design and again during construction, after equipment submittals have been approved.
 - c. Construction documents:
 - i. Roof-mounted conduit shall be detailed including specific locations between panels and devices, quantity and size of conduit, bridging over conduit paths too large to support workers on the roof, etc.
 - ii. Paths of all concealed conduit shall be rigorously noted during construction administration.
2. COMMON ELECTRICAL WORK
 - a. Low Voltage Power Wire & Cable:
 - i. 12 AWG conductors shall be solid copper unless noted otherwise.
 - ii. 10 AWG conductors may be solid or stranded copper, at the contractor's option.
 - iii. Conductors larger than 10 AWG shall be stranded.
 - iv. All conductors installed in flexible conduit and connected to vibration-creating equipment shall be stranded.
 - v. Aluminum conductors may be used if limited to 200 amps or larger and fitted with full compression lugs.
 - b. Raceways & Boxes
 - i. Installation of branch circuits below slab on grade should be avoided and only occur with specific approval from BISD.
 - ii. Branch circuit conduits are not allowed within concrete slabs without the specific approval by BISD.
 - iii. Conduit application.
 1. Interior conduit that is exposed and accessible (<8 ft AFF): intermediate metal conduit (IMC) or galvanized rigid conduit (GRC or RMC) with threaded couplings.
 2. Interior conduit that is exposed and inaccessible (>8ft AFF): electric metallic tube (EMT) with setscrew fittings.
 3. Interior conduit that is concealed: EMT with setscrew fittings.
 4. Exterior: GRC or RMC.
 - iv. RMC for elbows and risers below grade and all above grade.
 - v. Sch 40 PVC for straight runs below grade, with tracer wire.
 - vi. Shall be installed a minimum of 18" below finished grade, with identification tape installed 6" above the conduit.
 - vii. Application of Metal-Clad (MC) Cabling:
 1. Use of MC for homeruns is not acceptable.
 2. Use of MC acceptable only for terminal connections such as the following:
 - a. Single drops from an overhead J-box to single devices in stud walls.
 - b. For final connection from a J-box to a device, machine or lighting fixture.



- viii. Conduit within concrete walls shall be 1" minimum
- ix. Within concrete walls: Provide 25% additional conduit for future use. Provide stainless steel J-box covers.
- x. All empty conduits shall have pull string.
- xi. Floor and wall boxes shall be cast-in type (not poke-through type).
- c. Identification
 - i. Conduit shall be identified with colored tape at each end and at 20-foot centers along its length where visible.
 - ii. Boxes shall be painted.
 - iii. Conduit/box color coding scheme (inside building only; exterior color coding per Division 31):
 - 1. Emergency Power: Orange
 - 2. Fire Alarm: Red
 - 3. 480Y/277V: Yellow
 - 4. 208Y/120V: White
 - 5. ICT: Green
 - 6. Security: Blue
 - 7. AV: Green & Yellow
 - iv. Nameplates:
 - 1. Shall identify name of upstream panel/switchboard/transformer.
 - 2. Shall be applied to:
 - a. Switchboard main and branches.
 - b. Distribution panel main and branches.
 - c. Branch panelboards.
 - d. Disconnect switches.
 - e. Motor controllers.
- d. Low-Voltage Electrical Distribution
 - i. Switchboards and Panelboards
 - 1. Bottom-feed switchgear is preferred.
 - 2. All bussing shall be copper.
 - 3. Concentric knockouts are not allowed.
 - 4. A neutral bar and ground bar shall be provided and shall be mounted at opposite ends of the cabinet from the main cable termination. The assembly shall have an adequate number of terminals of sufficient size and shall have anti-turn solderless lugs.
 - 5. Branch circuit wiring shall be neatly laced and grouped, with grounds going to ground bus together, neutrals going to neutral bus together, etc.
 - 6. Minimum number of pole spaces in a branch panelboard shall be 30.
 - 7. Mount panelboards so highest circuit breaker is 78" above finished floor.
 - 8. Circuit Numbering.
 - 9. Distribution Panelboards and Switchboards shall number each circuit (regardless of whether it is a single-pole or three-pole load) in order: 1, 2, 3, and 4.
 - 10. Branch Circuit panelboards shall identify a 3-phase load with (3) circuit numbers: 1A – 13, 15, 17.
 - 11. Shall be kept clean at all times with no construction debris. Vacuumed out and wiped down cleat at the end of the project prior to turnover to BISSD.
 - 12. Room numbers referenced on final panel directories installed in panels shall reflect BISSD's final room numbers, not room numbers indicated on construction drawings.



- e. Wiring Devices
 - i. All duplex receptacles shall be 20A minimum.
- f. Overcurrent Devices
 - i. All circuit breakers shall be bolt-on type.
 - ii. Circuit breakers in branch panelboards serving lighting loads shall have switching duty (SWD-marked) breakers.
 - iii. Shunt trip breakers (where utilized) shall have 120V coils.
- 3. Lighting
 - a. Any lighting control system shall run through the BACnet DDC system.
 - b. Ballasts shall be electronic and dimming controllable.
 - c. Standard correlated color temperature (CCT) range for lamps is 3500K-4100K.
 - d. Standard color rendering index (CRI) minimum is 80 and shall be higher in art display lighting.
- 4. Fire Detection and Alarm
 - a. Pull stations should not have vandal covers.

MAINTENANCE & CUSTODIAL CRITERIA

- 1. Low-Voltage Electrical Distribution
 - a. For switchboards and panelboards, Square D is a preferred vendor in order to minimize the District's stock of spare parts. Other vendors will be considered. Acceptable alternate vendors are GE, Eaton, and Siemens.
 - b. For wiring devices (switches, receptacles), Hubbell, Lutron and Leviton are preferred to minimize District's stock of spare parts.
 - c. For motor controllers, Square D is preferred to minimize District's stock of spare parts.
 - d. For variable frequency drives, Schneider Altivar is preferred to minimize District's stock of spare parts.
- 2. Fire Detection and Alarm
 - a. Selection of fire alarm manufacturer shall be reviewed and approved by BISD per project. Goal is to standardize equipment and monitoring across District.

SUSTAINABILITY

- 1. Lighting
 - a. All LED lighting to minimize amount of electrical load.
 - b. Provide light-harvesting controls to minimize on-time of fixtures.
 - c. At a minimum, provide "plug-and-play" capability for future solar array for both hot-water and power supply.
 - d. Fluorescent lamps shall be low-mercury type where available.
 - e. Optimize use of passive systems to minimize need for electric fans, heating and other systems.

END OF SECTION

DIVISION 27

COMMUNICATIONS

- .: Structured Cabling Systems (SCS) shall be capable of supporting current technology and provide flexibility in supporting future technological needs
 - .: Redundancy of systems provides a more robust and dependable network
 - .: SCS shall support Voice Over Internet Protocol (VOIP), data processing, high definition video, building management systems and fire/security
 - .: As technology evolves rapidly, all projects need to provide a variety of technology options prior to commencement of design
 - .: Providing "As-Built" documentation is critical to long term maintenance and future SCS upgrades
-



PERFORMANCE CRITERIA

1.0 Introduction & Overview

The objective of this document is to define the minimum Technology Standards of the Structured Cabling System (SCS) for the Information Technology Department of the Bainbridge Island School District (BISD). The development of these physical infrastructure requirements shall support both current and future technologies and provide fundamental concepts and design intents that are to be incorporated into all BISD IT projects. As every buildings' design and installation requires individual accommodations due to various design criteria and customer needs this document is meant to represent BISD's minimum requirements and standards from which the design of new construction and installation should be derived. As new technologies evolve or emerge, the need for a balanced and redundant SCS system to provide these high data rates will become more critical. All new SCS installations for the BISD must meet or exceed all requirements of the ANSI/TIA/EIA/568B specification.

To provide for flexibility and sustainability of the network infrastructure, create network runs that are easily accessed from overhead spaces and avoid subterranean runs.

Retrofit projects will consider these new standards and be encouraged to apply them when feasible. BISD IT staff will work with the design team and/ or contractor to coordinate these standards to fit the existing conditions, budget, and district goals.

It is expected that the SCS designed and installed shall incorporate all features and facilities listed in this specification standard. In addition to recommendations in this standard, all applicable codes and standards mentioned in this document shall be adhered to and incorporated into each project.

The SCS system shall support analog and digital voice (VoIP) applications, data, local area networks (LAN), video and low voltage devices for building controls and management on a common or converged cabling platform. The applications that shall be supported include, but are not limited to:

- A. Voice Applications such as VoIP and teleconferencing;
- B. Data Processing such as Data Communications, Ethernet 10Mbps and 100Mbps, Fiber Distributed Data Interface (FDDI), Gigabit Ethernet and 10Gigabit Ethernet;
- C. Hi-definition video applications such as Digital Video, Video Conferencing, and video streaming;
- D. Building Management Services (BMS) such as Heating Ventilation and Air-Conditioning (HVAC), Low Voltage Devices such as equipment sensors, etc., wall clocks, energy monitoring and control, lighting, fire life safety, fire sensors, smoke detection, motion detection, public address, paging systems etc., and
- E. Security per BISD directions.

The SCS system shall with minimum components provide maximum capacity and functionality; be flexible and capable of including new facilities or technologies as they become required or available. Each design or project will need to have various issues addressed prior to the design commencing, these may include;

- A. Needs assessment to determine the systems and networks to be supported,
- B. Material and equipment layouts,
- C. Support of different types of building architectures and environments,
- D. The number of data, voice, video and security locations including mission critical or special data applications, and
- E. Complete site surveys, site visits and walk-throughs, and in-depth work sessions with the Architect.

Technology infrastructure shall be provided as follows:

- A. AP drops in all work areas and classrooms,
- B. High-strength APs in gymnasiums and commons,
- C. Infrastructure for AP connectivity directly outside administration and entry areas,
- D. Consider infrastructure for AP connectivity in PE and athletic fields,
- E. Two data drops per shared learning areas spaced to allow connectivity throughout the area,
- F. Four data drops per classroom, and
- G. Two teaching station locations in each classroom.

2. Glossary and Definitions

Below are some of the industry abbreviations and definitions used throughout this document.

2.1 Glossary

ANSI	American National Standards Institute
AFF	Above finished floor
ANSI	American National Standards Institute
ASTM	American Society of Testing and Materials
AWG	American Wire Gauge
BCS	Backbone Cabling System
BICSI	Building Industry Consulting Services International
BISD	Bainbridge Island School District
EIA	Electronics Industries Association
EF	Entrance Facility
EMI	Electromagnetic Interference
ER	Equipment Room (see MDF)
FCC	Federal Communications Commission
FOTP	Fiber Optic Termination Panel
ICEA	Insulated Cable Engineers Association
IDF	Intermediate Distribution Facility
IEEE	Institute of Electrical and electronics Engineers
ISO	International Organization for Standardization
ITS	Information Technology Services
MDF	Main Distribution Facility
NEC	National Electric Code
NEMA	National Electrical Manufacturer's Association
NESC	National Electrical Safety Code
NRTL	National Recognized Testing Laboratories
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
SCS	Structured Cabling System
TDMM	Telecommunications Distribution Methods Manual
TGB	Telecommunications Ground Bus bar
TIA	Telecommunications Industry Association
TMGB	Telecommunications Main Ground Bus bar
TR	Telecommunications Room (see IDF)
UFBC	Uniform Fire Prevention and Building Code
UL	Underwriters Laboratories, Inc.
WO	WorkOutlet

2.2 Definitions

Architect: The architect of record.

As Directed: As directed by the Architect, the Engineer of record and/ or BISD.

Backbone Cabling: Cable and connecting hardware that comprise the main and intermediate cross- connects, as well as cable runs that extend between telecommunications closets, MDFs and entrance facilities.

Bonding: The permanent joining of metallic parts to form an electrically conductive path that will assure electrical continuity and the capacity to conduct safely any current likely to be imposed on it.

Cable Hanger: A metal, most often steel, cable support device shaped (section view) similar to the letter J; alternately, a fabric strap. The device is available in different sizes supporting different quantities of cables, and is also available with different attachment hardware to be supported by different methods (e.g. wire support, beam flange clip, etc.) Sometimes referred to as a J-Hook.

Channel: The horizontal cable, patch cords and connectors that complete a transmission path between a work area outlet and a connecting block/patch panel to application specific equipment. The "Channel" does include patch cords at both ends of the horizontal station cable.

Connect: Shall mean make final electrical or optical connections for a complete operating piece of equipment.

Contractor: The individual, partnership or corporation to whom the Contract for the Telecommunications work has been awarded.

Cross-Connection: A connection scheme between cabling runs, subsystems and equipment using patch cords or jumpers that attach to connecting hardware on each end.

Demarcation Point: A point where operational control or ownership changes.

EMI: Electromagnetic Interference, the interference in the signal transmission or reception caused by electromagnetic radiation generated by other equipment or cabling.

Engineer: The Engineer of record.

Entrance Facility: The space within a building where telecommunications service is connected to the building's communication infrastructure.

Equal: Shall be of the same quality, appearance and utility to that specified, as determined by the BISD's Representative.

Contractor bears the burden of proof or equality.

Equipment Room: Also known as the MDF in BISD terminology. A centralized space for telecommunications equipment that serves the occupants of the building or multiple buildings in a campus environment. An Equipment Room (ER) is considered distinct from a IDF because it serves a building or campus as opposed to serving a floor.

Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces below raised floor, spaces above ceilings, unexcavated spaces, crawlspaces and tunnels.

Firestop: A material, device or assembly of parts installed in a cable pathway at a fire rated wall or floor penetration to prevent passage of flame, smoke or gases through the rated barrier.

Furnish: To supply all materials, labor, equipment, testing apparatus, controls, tests, accessories and all other items customarily required for the proper and complete application.

Horizontal Cabling: The cabling between and including the telecommunications outlet and the horizontal cross-connect.

IDF: An enclosed space for housing telecommunications equipment, cable terminations, and cross connect cabling used to serve work areas located on the same floor. Also called the Telecommunications Room by some IT professionals.

Install: To join, unite, fasten, link, attach, set-up or otherwise connect together, complete, tested and ready for normal satisfactory operation.

Interconnection: A connection scheme that provides direct access to the cabling infrastructure and the ability to make cabling system changes using equipment cords.

ISP:

J-Hook: Another name for a Cable Hanger.

MDF: This is the BISD preferred term for the main distribution facility - a centralized space for telecommunications equipment that serves the occupants of the building or multiple buildings in a campus environment. MDF is also called an Equipment Room with IT industry.

Patch Panel: Connecting hardware that typically provides means to connect horizontal or backbone cables to an arrangement of fixed connectors that may be accessed using patch cords or equipment cords to form cross-connections or interconnections.

Pathway: A facility (i.e. conduit or cable tray) for the placement and protection of telecommunications cable. Same as raceway or ducting.

Permanent Link: The horizontal cable and connectors that complete a transmission path between a work area outlet and a connecting block/patch panel in the TR. Does not include patch cords.

Plenum: A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system within a building.

Provide: Shall mean furnish and install complete with all details and ready for use.

Submit: Submit to the Architect and/or the Engineer for review.

Telecommunications Room (TR): The BISD preferred term is the IDF (intermediate distribution facility) - an enclosed space for housing telecommunications equipment, cable terminations, and cross connect cabling used to serve work areas located on the same floor. The TR is the typical location of the horizontal cross-connect and is considered distinct from an MDF because it serves a single floor or partial floor versus serving an entire building or campus. See MDF, Equipment Room or ER.

Work Outlet: A fixed connecting device where the horizontal cable(s) terminates. The Work Outlet (WO) provides the interface to the work area cabling.

2.3 Standards & Codes

References and regulations, codes and standards mean the latest edition, amendment and revisions to the regulations, codes and standards in effect on the date of the Contract Documents.

All work and materials shall conform to and be installed, inspected and tested in accordance with the governing rules and regulations of federal, state, and local government agencies.

Installation, materials, equipment and workmanship shall conform to the specifications and drawings and all applicable provisions of the following regulations, codes and standards including all applicable addendum: Americans with Disabilities Act

ANSI/TIA/EIA

- A. TIA/EIA 526 Set Measurement of Optical Power Loss of Installed Fiber Cable Plant Standard
- B. ANSI/TIA/EIA-568B "Commercial Building Telecommunications Cabling Standard"
- C. ANSI/TIA/EIA-569B "Commercial Building Standard for Telecommunications Pathways and Spaces".
- D. ANSI/TIA/EIA-606A "Administration Standard for Telecommunications Infrastructure of Commercial Buildings".
- E. ANSI-J-STD-607A "Commercial Building Grounding/Bonding Requirements".
- F. ANSI/NFPA 70 National Electrical Code
- G. ANSI/EIA RS-310-C Racks, Panels and Associated Equipment
- H. ANSI/IEEE Std. 1100 Recommended Practice for Powering and Grounding Sensitive Electronic Equipment in Industrial and Commercial Power Systems.

ASTM International Standards:

- A. ASTM B3 Standard Specification for Soft or Annealed Copper Wire.
- B. ASTM B258 Standard Specification for Standard Nominal Diameters and Cross-Sectional Areas of AWG Sized of solid Round Wires Used as Electrical Conductors.
- C. ASTM D4565 Standard Test Methods for Physical and Environmental Performance Properties of Insulations and jackets for Telecommunications Wire and Cable.
- D. ASTM A 123 Specification for Zinc (hot Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strip
- E. ASTM 525 General Requirements for Steel Sheet, Zinc-Coated Galvanized by the Hot-Dip Process
- F. ASTM A 510 Specifications for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel.

BICSI Telecommunications Distribution Methods Manuals, current editions

FCC Title 47 Telecommunications

FCC Part 15 Radio Frequency Devices

FCC Part 68 Connection of Terminal Equipment to the Telephone Network

IEEE Standards

- A. 802.3u 100 BASE-TX, 100 BASE-T4, and 100 BASE-FX
- B. 802.3z 1000 BASE-X
- C. 802.3ab 1000 BASE-T
- D. 802.3ae 10GBASE-SR, 10GBASE-LR, 10GBASE-ER, 10GBASE-SW, 10GBASE-LW, 10GBASE-EW
- E. 802.3af Power over Ethernet
- F. 802.3an 10GBASE-T
- G. 81, Section 9.02 "Guide for measuring Earth resistivity, Ground Impedance and Earth Surface potentials of a Grounding System."

Insulated Cable Engineers Association (ICEA)

- A. ANSI/ICEA S-90-661-2000 Individually Unshielded Twisted Pair Indoor Cable for use in Communication Wiring Systems.
- B. ANSI/NECA/BICSI 568-2001 Installing Commercial Building Telecommunications Cabling National Electrical Code (NEC) current edition

ISO/EIC 11801 International Organization for Standardization

NEMA Standards VE 1-1998 Metallic Cable Tray Systems

NEMA Standards VE 2-2000 Cable Tray Installation Guidelines

NFPA

- A. National Electric Code (NEC) (NFPA 70)
- B. National Life Safety Code (NFPA 101)
- C. Protection of Electronic Computer/Data Processing Equipment (NFPA 75)

OSHA Standards 29 CFR 1926 and 1910

TIA/EIA 758 Customer Owned Outside Plant Telecommunications Cabling Standard.

Underwriters Laboratories, Inc. (UL)

- A. UL 444 Communications Cables
- B. UL 467 Grounding and Bonding Equipment

All applicable State and Local codes and all other authorities having jurisdiction.

3. Telecommunication Infrastructure

3.1 Entrance Facility

The Entrance Facility (EF) consists of the Telecommunications and ISP Service Entrance to the building(s). This includes the entrance point through the building wall and continuing to the entrance room or space. The EF may contain the backbone pathways that link other buildings in a campus environment. Antenna entrances may also constitute part of the EF.

The EF best serves BISD if it is a separate space. For security of the District's infrastructure, the EF needs an exterior door for vendor access. The EF should be located to facilitate bringing conduit into the space. If the EF must be included in the MDF, the MDF must be increased in size to properly accommodate all services and space requirements for both functions per the BISD District Standards for Communications.

The EF provides the necessary wall and rack space for incoming Backbone fiber and copper cabling to be terminated in accordance with NEC Article 800 Section 800-50 exception No.3. The incoming building cable shall be terminated and protected on a listed primary protector within 50 feet of entering the building.

A number of factors such as security concerns, quantity and type of equipment and incoming Backbone cables, types of cables to terminate, physical location within the building and the size of the building or campus shall be discussed with BISD. For new construction, a separate EF shall be provided if at all possible.

Listed below are additional design criteria for the EF:

- A. All walls shall be covered with ¾" d x 4'w x 8'h Fire Rated A/C grade plywood. The plywood shall be mounted with the A side mounted out and painted with two coats of fire retardant paint with the one Fire Stamp per plywood sheet left visible for the inspector.
- B. Lighting shall be a minimum of fifty (50) foot candles measured 3 feet above finished floor (AFF).
- C. No ceiling is required nor desired in the EF.

- D. The EF door shall be a minimum of 36 inches wide and 84 inches high and fitted with a lock as well as swing out of the room. The EF shall also be accessible by either a public hallway or space or open to the outside of the building, the EF shall not be accessible through any other trades space.
- E. The EF floors, walls and ceilings shall be sealed or treated to eliminate dust or particulates. All finishes shall be light in color.
- F. The EF shall receive a minimum of one (1) 23" w x 7' h two post equipment rack to be used for Service Provider equipment installation and backbone cabling terminations.
- G. The EF shall receive a minimum of one (1) 19" w x 7' h two post equipment racks to be used for Service Provider equipment installation and backbone cabling terminations. All racks shall be bolted to the concrete slab using a minimum 5/8" wedge anchors or appropriate hardware for proper seismic bracing.
- H. The following minimum rack clearances shall be adhered to. A minimum of three feet from the front of the rack rail to the nearest wall or obstruction, a minimum of three feet from the back of the rack rail to the nearest wall or obstruction, a minimum of three feet from the side of the rack at the end of the row to the nearest wall or obstruction. One side of the rack can be located next to a wall but must have a clearance of 6 inches.
- I. Ladder rack 12 inches in width shall be designed to encircle the room parameter as well as the length of the room directly above the two post equipment racks. Appropriate radius drops, waterfalls and other accessories shall be designed to protect the cabling from stress and improper bending.
- J. Electrical: A minimum of two dedicated 20AMP, 110V AC duplex electrical outlets, each on separate circuits, shall be provided at each equipment rack for rack mounted hardware. In addition, each wall shall receive duplex convenience outlets at 6 foot intervals around the perimeter walls, these outlets shall be mounted at a height of 6" on center (OC) above the finished floor. All electrical wiring shall be contained in a metallic raceway mounted at the bottom back of the equipment racks; the raceway shall be fed using a conduit from the adjacent wall or from above. Emergency power and power backup shall be considered on a site by site basis.
- K. The quantity and location of convenience outlets shall be provided so as to preclude use of any extension cords as they are a safety hazard.
- L. A proper Telecommunications Grounding Bus bar shall be provided per ANSI-JSTD-607A.
- M. Additional requirements and standards such as ANSI/TIA/EIA-569B contain fire-stopping, miscellaneous pathways, telecommunications recommendations of separation from less than 480V power lines. Further information of entrance rooms can be found in ANSI/TIA/EIA-569B and the BICSI Telecommunications Distribution Methods Manuals.
- N. Should the EF be located adjacent to a parking area the EF shall be protected using some type of barrier system in front of the wall of concern.
- O. Pathway and cabling exists to extend the EF services to the MDF
- P. No fire sprinklers should be located inside the EF.

3.2 MDF – Main Distribution Facility

The MDF, like the EF, is a space for telecommunications equipment and cabling terminations. Where the EF is a space for Service Provider equipment and OSP cable terminations, the MDF is a centralized space for telecommunications equipment such as a PBX computing and network equipment that services occupants of the building or campus.

The location of the MDF is very important and will be determined based on consultation between BISD Technology Department staff and the architect. It must be close to the main vertical backbone pathway and IDF stack. It must avoid locations adjacent to programs that would be sensitive to noise and vibration generated by the MDF such as focus rooms or special needs rooms. The MDF needs a dedicated entry from a public space. Special consideration to separation from electrical power supply transformers, motors and generators, x-ray equipment, radio or radar transmitters and induction sealing devices shall be given. The MDF must avoid locations that are restricted by building components such as elevators, core walls or other fixed building elements that would limit expansion at a future date

The MDF shall house equipment directly related to the telecommunications systems and its environment support systems. The MDF may also house other systems such as Fire Alarm Control Panels, Security, Intercom, CATV, CCTV and similar system panels. The size of the MDF shall be increased as the number of systems grows. Equipment not used or related to the support of the MDF such as piping, ductwork, pneumatic tubing, etc. shall not pass through or be installed in the MDF.

The minimum size of an MDF shall be approximately 150 square feet, however in certain instances when the site is very small the MDF may contain the EF function. If the MDF is being considered as a Disaster Recovery site additional space may be required. Requirements and standards such as ANSI/TIA/EIA-569B contain fire-stopping, miscellaneous pathways, and recommendations for separation from less than 480V power lines. Further information about MDFs can be found in ANSI/TIA/EIA-569B and the BICSI Telecommunications Distribution Methods Manuals.

A number of factors such as security concerns, quantity and type of equipment and quantity of ISP backbone cables, types of cables to terminate, physical location within the building and the size of the building or campus shall be discussed with BISD. Listed below are additional design criteria for the MDF:

- A. All walls shall be covered with $\frac{3}{4}$ "d x 4'w x 8'h Fire Rated A/C grade plywood. The plywood shall be mounted with the A side mounted out and painted with two coats of fire retardant paint with one Fire Stamp per plywood sheet left visible for the inspector.
- B. Lighting shall be a minimum of fifty (50) foot candles measured 3 feet above finished floor (AFF).
- C. No ceiling is required nor desired in the MDF.
- D. The MDF door shall be a minimum of 36 inches wide and 96 inches high and fitted with a lock as well as swing out of the room. The MDF shall also be accessible by either a public hallway or space or open to the outside of the building, the EF shall not be accessible through any other program or utility space.
- E. The MDF floors, walls and ceilings shall be sealed or treated to eliminate dust or particulates. All finishes shall be light in color.
- F. The EF shall receive a minimum of one (1) Server Cabinet and three (3) 19" w x 7' h two post equipment racks to be used for BISD equipment installation and backbone cabling terminations. All racks shall be bolted to the concrete slab using a minimum 5/8" wedge anchors or appropriate hardware for proper seismic bracing.
- G. The following minimum rack clearances shall be adhered to. A minimum of three feet from the front of the rack rail to the nearest wall or obstruction, a minimum of three feet from the back of the rack rail to the nearest wall or obstruction, a minimum of three feet from the side of the rack at the end of the row to the nearest wall or obstruction. One side of the rack can be located next to a wall but must have a clearance of 6 inches.
- H. Ladder rack 12 inches in width shall be designed to encircle the room parameter as well as the length of the room directly above the two post equipment racks. Appropriate radius drops, waterfalls and other accessories shall be designed to protect the cabling from stress and improper bending.
- I. Electrical: A minimum of one dedicated 30AMP, 208V/220V AC duplex electrical outlets, each on separate circuits, shall be provided at each server cabinet or equipment rack. In addition, each wall shall receive duplex convenience outlets at 6 foot intervals around the parameter walls, these outlets shall be mounted at a height of 6" on center (OC) above the finished floor. All electrical wiring shall be contained in a metallic raceway mounted at the bottom back of the equipment racks; the raceway shall be fed using a conduit from the adjacent wall or from above.
- J. The quantity and location of convenience outlets shall be provided so as to preclude use of any extension cords as they are a safety hazard. Emergency power and power backup for equipment, lighting, and air conditioning shall be considered on a site by site basis.
- K. A 4' x 8' wall space shall be reserved for future equipment and expansion.
- L. A proper Telecommunications Grounding Bus bar (TGB) shall be provided per ANSI-JSTD-607A.
- M. The MDF will be a temperature and humidity controlled environment and will require adequate infrastructure (ducting, power, space) to house an HVAC system capable of keeping the space at 70 degrees.
- N. No fire sprinklers should be located inside the MDF.

3.3 IDF

The IDF provides a variety of different functions for the Structured Cabling System (SCS) such as termination space for both wall and rack termination blocks for backbone copper and fiber cabling but the primary purpose of the IDF is the termination point for the Horizontal SCS on compatible connecting hardware. The IDF is typically Floor-Serving and Floor-to-Floor. The cross connection of backbone and horizontal cable using jumper or patch cords allows a flexible system extending various services to work areas and other areas of the building. The location of the IDF will be determined based on consultation between the BISD Technology Department staff and the architect.

A number of factors such as security concerns, quantity and type of equipment and quantity of ISP backbone cables, types of cables to terminate, physical location within the building and the size of the building or campus shall be discussed with BISS. On floors that have distance or layout considerations multiple IDFs may be required or as desired by BISS IT to facilitate their work with the systems.

Listed below are additional design criteria for the IDF:

- A. All walls shall be covered with ¾" d x 4' w x 8' h Fire Rated A/C grade plywood. The plywood shall be mounted with the A side mounted out and painted with two coats of fire retardant paint with the Fire Stamp left visible for the inspector.
- B. Lighting shall be a minimum of fifty (50) foot candles measured 3 feet above finished floor (AFF).
- C. No ceiling is required nor desired in the IDF.
- D. The IDF door shall be a minimum of 36 inches wide and 96 inches high and fitted with a lock as well as swing out of the room. The IDF shall also be accessible by either a public hallway or space or open to the outside of the building, the IDF shall not be accessible through any other trades space.
- E. The IDF floors, walls and ceilings shall be sealed or treated to eliminate dust or particulates. All finishes shall be light in color.
- F. The IDF shall receive a minimum of three (3) 19" w x 7' h two post equipment racks to be used for Service Provider equipment installation and backbone cabling terminations. All racks shall be bolted to the concrete slab using a minimum 5/8" wedge anchors or appropriate hardware for proper seismic bracing.
- G. The following minimum rack clearances shall be adhered to. A minimum of three feet from the front of the rack rail to the nearest wall or obstruction, a minimum of three feet from the back of the rack rail to the nearest wall or obstruction, a minimum of three feet from the side of the rack at the end of the row to the nearest wall or obstruction. One side of the rack can be located next to a wall but must have a clearance of 6 inches.
- H. Ladder rack 12 inches in width shall be designed to encircle the room parameter as well as the length of the room directly above the two post equipment racks. Appropriate radius drops, waterfalls and other accessories shall be designed to protect the cabling from stress and improper bending.
- I. A 4' x 8' wall space shall be reserved for future expansion.
- J. Electrical: A minimum of one dedicated 30AMP, 208V/220V AC duplex electrical outlets prefer NEMA L5-30, and one 20 amp, 110V AC duplex electrical outlet, each on separate circuits, shall be provided at each equipment rack for rack mounted hardware. In addition, each wall shall receive duplex convenience outlets at 6 foot intervals around the perimeter walls, these outlets shall be mounted at a height of 6" on center (OC) above the finished floor. All electrical wiring shall be contained in a metallic raceway mounted at the bottom back of the equipment racks; the raceway shall be fed using a conduit from the adjacent wall or from above. Emergency power and power backup shall be considered on a site by site basis.
- K. The quantity and location of convenience outlets shall be provided so as to preclude use of any extension cords as they are a safety hazard.
- L. A proper Telecommunications Grounding Bus bar (TGB) shall be provided per ANSI-JSTD-607A.
- M. The IDF will be a temperature and humidity controlled environment and will require adequate infrastructure (ducting, power, space) to house an HVAC system capable of keeping the space at 70 degrees.
- N. No fire sprinklers should be located inside the IDF.

Additional requirements and standards such as ANSI/TIA/EIA-569B contain fire-stopping, miscellaneous pathways, telecommunications recommendations of separation from less than 480V power lines. Further information of IDFs can be found in ANSI/TIA/EIA-569B and the BICSI Telecommunications Distribution Methods Manuals.

4. Physical Pathways

4.1 General Requirements

Pathways shall be designed and installed to meet applicable local and national building and electrical codes or regulations. Grounding/Earthing and Bonding or pathways shall comply with applicable codes and regulations as well as ANSI/EIA/TIA-607. Below are some general guidelines that the design location for the physical infrastructure shall incorporate. Prior to placing any cable pathways or cable, the contractor shall survey the site to determine that the design location is compatible with the job conditions and that there are no obstructions that will interfere with the safe and satisfactory placement of the cables.

- A. Pathways shall not have exposed sharp edges that may come into contact with telecommunications cables.
- B. The number of cables placed in any pathway shall not exceed manufacturer's specifications, nor will the geometric shape of a cable be adversely affected.
- C. Conduit and cable tray fill shall not exceed 40% and will allow for 25% future expansion in new installations.
- D. All pathways will be left with a pull string with a minimum tensile strength of 200lbs and have measurement markings a minimum of every 12 inches.
- E. All conduits shall be capped and sealed 3 inches above the finished floor using appropriate plugs, sealer or other applications appropriate for the prevention of rodents, water and gases from entering.

4.2 Outside Plant (OSP) Pathway

Outside Plant (OSP) pathways for the purposes of BISD projects shall mainly be provisioned using a combination of underground Maintenance Holes, Vaults, Pull Boxes and Hand Holes connected via underground conduits. Other methods such as Direct Buried or Aerial may be given consideration through discussion with BISD.

Maintenance Holes or Vaults are used when the number of conduits in the OSP SCS system is five (5) or more or there is a need for splicing or terminations. Hand Holes or Pull Boxes are used in the OSP SCS System when four (4) or fewer conduits are required and there is no requirement for splicing or the termination of cables.

In determining the total number of pathways required the designer shall consider the following:

- A. Type and use of building
- B. Growth
- C. Difficulty of adding pathways in the future.
- D. Alternate entrance possibilities.
- E. Type and size of cables likely to be installed

The OSP conduits serve as the pathway for Service Providers to bring voice/data and broadband circuits to the facility, as such there shall be a minimum of two (2) 4" conduits from the Buildings' Entrance Facility (EF) to within five feet of the property line or a designated Service Provider's Maintenance Hole or Hand Hole.

All carriers and telecommunications service providers involved in providing service to the building shall be contracted to establish their requirements and explore alternatives for delivering service. The location of other utilities, such as electrical, water, gas and sewer shall be considered in the site selection of the Entrance Facilities (EF).

4.3 Inside Plant (ISP) Pathways

4.3.1 Horizontal ISP Pathways

Pathways shall not be located in elevator shafts, or in any other location prohibited by code.

Properly installed firestop systems shall be installed to prevent or retard the spread of fire, smoke, water and gases through the building. This requirement applies to openings designed for telecommunications use that may or may not be penetrated by cables or raceways. Any work performed in rated areas of the building will preserve said rating upon completion of work. Labeling of the penetration is required and includes labeling of those penetrations that are reentered and were not labeled. After firestopping is complete, including labeling, the technician will take a digital photo that clearly shows the firestop as well as the label.

If stub up conduits are used in the Work Area walls; a minimum of 1 ¼" conduit will be utilized. If string and ring is utilized, any sharp holes for cable to pass through will be grommeted. All back boxes shall be Double Gang with a minimum depth of 2 1/8 inches.

Cable tray or wire basket tray shall be used as the Main Cable Pathway in all new installations or for cable pathways that have more than fifty cables in a single cable path. A minimum size cable tray or wire basket tray shall be 6 inches wide by 6 inches deep and sized appropriately for the cable fill percentages listed above.

J-Hooks, Saddle Bags or similar cable support shall be used as Secondary Cable supports for less than fifty cables coming off the Primary Cable Path (Cable Tray or Wire Basket Tray). The minimum spacing for secondary cable supports shall be no less than every four feet.

Horizontal penetrations and pathways shall be achieved using either two-inch and four-inch conduits, sleeves or EZ-PATH type penetrations. Conduits shall be sized appropriately for the number of cables to avoid filling more than 40% plus 25% future/spare.

When using pathways incorporated into furniture or partitions, pathways will comply with all applicable codes and regulations, be independent of electrical pathways, and at a minimum be divided by a metal divider or partition.

Ladder Rack shall only be used inside the EF, MDF and IDFs for seismic bracing and not as a primary pathway for the routing of cabling and patch cords. Ladder Rack shall not be used in the Horizontal SCS system for the purposes of cable distribution.

Prior to installation the contractor shall submit to BISSD and A/E a Cable Routing Diagram showing all Primary and Secondary cable pathways.

4.3.2 Vertical ISP Pathways

Vertical ISP pathways shall be achieved using a number of four-inch conduits or EZ-PATH type penetrations sized appropriately for the numbers and types of cable plus 50% future/spare. Copper and Fiber cabling shall be housed in its own Vertical pathways.

In order to accommodate satellite and other roof mounted hardware and equipment each building shall have accommodations for two four-inch conduits from the building's highest floor IDF to the Roof. The engineer shall coordinate the location of this equipment and conduits with BISSD and A/E.

5.0 Grounding & Bonding

5.1 General Requirements

The overall purpose of the Telecommunications Bonding infrastructure is to equalize potentials between metallic surfaces predominantly in an event of lighting, AC electrical faults, electromagnetic induction or electrostatic discharge. Bonding within the telecommunications infrastructure is achieved so that voltages that are equalized between equipment within the EF, MDF, IDF and other telecommunications spaces.

The telecommunications Grounding and Bonding Systems consists of the following distinct parts:

- A. Telecommunications Main Ground Bus Bar (TMGB)
- B. Telecommunications Ground Bus Bar (TGB)
- C. Bonding Conductors (TBB, TBC)
- D. Connecting Hardware
- E. Testing and Labeling

The telecommunications Grounding and Bonding design shall adhere to the recommendation in TIA/EIA 607 – Commercial Building Grounding and Bonding Requirements for Telecommunications.

The design shall provide grounding, surge protection and lightning protection of the telecommunications system in accordance with the latest version of Grounding, Bonding and Electrical Protection chapter of the BICSI TDM Manual, TIA/EIA 607 and NFPA 70. All grounding shall comply with ANSI-J-STD-607-A.

5.1.1 Telecommunications Main Ground Bus Bar (TMGB)

The TMGB serves as a dedicated extension and provides a central ground attachment point for all telecommunications bonding backbones, equipment and the building's electrode system. The TMGB is the primary point of connection for grounding non-current carrying devices in the MDF and the primary bonding point for the building TBB to support other TGBs throughout the building.

The TMGB shall be electron tin-plated, pre-drilled copper bus bar with holes for use with standard sized lugs, have a minimum dimension of .25 inches thick by 4 inches wide and 20 inches in length. It must be listed by an NRTL. The TMGB shall have Hole patterns on the bus bar to accommodate two-hole lugs per the recommendation of BICSI and ANSI J-STD-607-A standards. The TMGB shall be electrically isolated from the wall or other mounting surfaces.

5.1.2 Telecommunications Ground Bus Bar (TGB)

The TGB Bar performs as a point of attachment used on non-active hardware in the IDF rooms and other telecommunications spaces throughout the building.

The TMGB shall be electron tin-plated, pre-drilled copper bus bar with holes for use with standard sized lugs, have a minimum dimension of .25 inches thick by 2 inches wide and 20 inches in length. It must be listed by an NRTL. The TMGB shall have Hole patterns on the bus bar to accommodate two-hole lugs per the recommendation of BICSI and ANSI J-STD-607-A standards. The TMGB shall be electrically isolated from the wall or other mounting surfaces.

5.1.3 Telecommunications Bonding Conductor and Telecommunications Bonding Backbone (TBC and TBB)

The TBB is a bonding conductor intended to equalize potentials between IDFs on multiple floors of a building with an ultimate connection to the TMGB. The TBC is a conductor that interconnects the TBB with the TMGB/TGB.

All bonding conductors shall be listed by a nationally recognized laboratory (NRTL), a minimum conductor size of 6 AWG, stranded copper conductors calculated so that no more than 40V can be present along its entire length and have a green insulation.

5.1.4 Connecting Hardware

The connections of all the bonding conductors for the telecommunications equipment and the TBB to the TMGB shall utilize exothermic welding or listed compression two hole lugs, or other irreversible compression type connections.

5.1.5 Testing and Labeling

The designer shall require that tests be performed to evaluate the bonding connection between the telecommunications bus bars and the AC grounding electrode system. This testing shall be performed after the cabling and grounding infrastructure are installed but prior to either final approval or the cabling plant or equipment installation. Refer to BICSI TDMM, Chapter 8, Recommended Testing Procedures and Criteria.

The labeling of the grounding and bonding systems shall conform to ANSI/TIA/EIA 606-A, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings as it relates to a ground system and any fire-stopping systems used to support the ground system. Unless agreed on or direction by the BISD, in writing, all annexes to the ANSI/TIA/EIA 606-A standard shall be followed.

Refer to ANSI/TIA/EIA 606 for labeling requirements.

6.0 Structured Cabling System

6.1 Backbone Cabling System

The function of the Backbone Cabling System is to provide both intra and inter connections for telecommunications services. Inter connections provide connections between the Service Providers or Campus Network Services to the Building(s) being served. Intra connections provide connections between the EF and MDF as well as the MDF and IDFs within the building itself. In accordance with TIA/EIA-568B the backbone cabling consists of the backbone cables, intermediate and main cross-connects, mechanical termination and patch cords or jumpers used for backbone to backbone cross-connection.

The Backbone Cabling System shall use the conventional hierarchical star topology as illustrated by Diagram 2 wherein each horizontal cross connect in a TR is cabled to a main cross-connect or an intermediate cross-connect then to a main cross-connect. Such cabling is in addition to the connections for the basic star topology.

6.1.1 Cable Media Types

In accordance with ANSI/TIA/EIA 568-B, recognized Backbone Cabling System cable media types are listed below and may be used individually or in combination:

- A. 100 Ohm Unshielded Twisted Pair (UTP)
- B. 50/125 um Laser Optimized Fiber Optic Cable
- C. 9/125 um Singlemode Fiber Optic Cable
- D. 75 Ohm Coaxial Cable

All intra and inter building BCS cables shall meet the appropriate NEC flame and smoke specifications. These include NEC Article 800 for copper cables and Article 770 for fiber optics. All cables shall meet or exceed the electrical specifications of ANSI/TIA/EIA 568B in addition all 100 Ohm UTP/ScTP (screened 100 Ohm twisted pair).

The standard BCS inter-building cables shall be designed as follows:

Service Provider or Campus Backbone to EF:

- A. (1) 24-Strand 50um Multimode LOF cable
- B. (2) RG-11 coaxial cables

These requirements shall be designed with the area's SP and BISD representative. The standard BCS intra-building cables shall be designed as follows:

EF to MDF

- A. (1) 100-pair category-3 UTP cable
- B. (1) 12-Strand 50 um Multimode LOF cable
- C. (2) RG-11 Coaxial Cables – run to MDF, IDF, and library

MDF to Each IDF

- A. (1) 50-pair category-3 UTP cable
- B. (1) 24-Strand 50 um Multimode LOF cable
- C. (2) RG-11 Coaxial Cables – run to MDF, IDF, and library

6.1.2 Connectivity Hardware

The fiber optic BCS cables which run to the EF, MDF and IDFs shall be terminated in rack mounted Fiber Optic Termination Panels (FOTP). The FOTPs shall be loaded with the appropriate number of multimode and single mode LC adapter panels. All BCS fiber optic strands shall be terminated using multimode and single mode LC type connectors. All FOTPs shall be installed at the top of the same equipment rack. An additional 12RU of rack space shall be reserved for BISD provided Network Hardware below the FOTPs.

The 100 Ohm UTP BCS cables which run to the EF, MDF and IDFs shall be terminated in rack mounted RJ 45 Patch Panels. These RJ 45 Patch Panels shall be sized to accommodate the designed numbers of pairs plus 50% - 100% spare. All 100 Ohm UTP BCS OSP cables which terminate in the EF shall be fully protected using appropriate surge protectors and modules adhering to local regulations.

6.2 Horizontal Structured Cabling System

The function of the Horizontal Structured Cabling System (SCS) is to provide connectivity from the IDF to the Work Area for various voice, data and broadband services. The SCS cabling is the cabling from the Work Outlet to the IDF and includes the horizontal cabling, telecommunications Work Outlet (WO) and cable termination and cross connect hardware at both the WO and IDF.

6.2.1 Cable Media Types

In accordance with ANSI/TIA/EIA 568-B, recognized Backbone Cabling System cable media types are listed below and may be used individually or in combination:

- A. 100 Ohm Unshielded Twisted Pair (UTP)
- B. 2-Strand 50/125 um Laser Optimized Fiber Optic Cable (OM3 & OM4)
- C. 75 Ohm Coaxial Cable
- D. Hybrid cables are allowed if they meet the required specifications

The maximum horizontal cable length from the termination point of the cable at the WO to the same at the IDF is 90 meters (295 feet) regardless of media type and only one transition point may be allowed in the horizontal cable run. All fiber optic cabling shall perform at 10Gbs and shall be designed (OM3 or OM4) accordingly.

No splices for Fiber Optic in the BCS or SCS shall be allowed if the distance is less than 300 meters. To help visually identify the systems being used, the jacket color of the horizontal copper cabling shall be as follows:

- A. Network – Blue
- B. Wireless – White
- C. Fire – Red
- D. BMS/Analog/Elevator – Green

See the attached BISD Work Outlet Standard for outlet quantities and requirements for the various room types and spaces. All WOs shall be located within three feet of an electrical outlet and be mounted at 18 inches above finished floor and be readily accessible (i.e. not blocked by furniture). In addition, all terminations shall use the 568B wiring pin-out. Some spaces may require customized outlet locations.

All Horizontal SCS cables shall meet the appropriate NEC flame and smoke specifications. These include NEC Article 800 for copper cables and Article 770 for fiber optics. All cables shall meet or exceed the electrical specifications of ANSI/TIA/EIA.

SCS pathways and spaces that run parallel to or share space with electric power or lighting equipment which is less than or equal to 480 Vrms shall be installed with a minimum clearance of 18 inches.

6.2.2 Connectivity Hardware

All SCS connectivity hardware shall meet or exceed ANSI/TIA/EIA-568-B Category-6 requirements.

All Network, Wireless, Fire Alarm Control Panel, BMS, Analog, Elevator and other cabling shall terminate in rack mounted 48-port modular patch panels using color coded jacks as stated below.

When terminating the horizontal SCS cables in the MDF and IDFs all cables shall be terminated on modular 48-port patch panels using 8-pin 8-conductor modular information outlets with the following color coding scheme:

- A. Network – Blue (Terminated on their own patch panels)
- B. Wireless – White(Terminated on their own patch panels)
- C. Fire – Red (Terminated on their own patch panel with BMS/Analog/Elevator)
- D. BMS/Analog/Elevator – Green (Terminated on their own patch panel with Fire)

The standard length of the work outlet patch cord that connects WO area equipment to the WO shall be 10 feet. In addition, the maximum length of the IDF side patch cord shall be 7 feet.

7.0 User Connectivity

Wireless cabling shall be provided to all classroom spaces with 100 ohm unshielded twisted pair Cat-6. Locate drop within 4' – 8' radius from the interior door to the classroom. Terminate two ports in a double-gang box. Wireless Cabling in other spaces such as gymnasiums, cafeterias, libraries, external walls, auditoriums, conference rooms, and offices shall be determined by BISD Technology Department staff in conjunction with the architect and take into consideration sustainability, flexibility, and scalability.

Each classroom shall be hard-wired with four, student ports, minimum, per classroom – locations shall be determined via the Educational Specifications or through discussion with BISD Technology Department staff. Three hardware ports shall be located in the primary teaching station. A secondary teaching station shall be equipped with power and data as needed to allow flexibility, sustainability and scalability. Audio and video connectivity to the presentation station shall be present at both teaching locations and allow for flexibility of design to incorporate future technologies.

All other administrative spaces and rooms, gymnasiums, cafeterias and commons, libraries, and other public spaces shall be equipped with power and data based on consultation with BISD Technology Department staff and the architect.

All data ports and electrical outlets should be easily accessible and free from obstructions.

7.0 Labeling & Administration

7.1 General Requirements

All components of the SCS shall be labeled using a BISD approved label scheme. All components of the SCS include but are not limited to the following:

- A. Equipment Racks and Cabinets
- B. Copper and Fiber Backbone and Riser cables
- C. Inner-ducts and conduits
- D. Fiber Optic and Copper Termination panels and Termination Blocks
- E. Horizontal cabling
- F. Work Outlets
- G. Patch Cables (Both ends)

The labeling shall be software based and all labels shall be computer printed. The use of hand written labels is not permitted anywhere in the BISD SCS. The labeling scheme used shall meet all the requirements of a class 3 facility as defined by ANSI/TIA/EIA 606-A, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.

8.0 Testing & Certification

All fiber optic and copper cables shall be fully tested using a BISD approved tester before handover to the BISD. All test results shall be provided in both hard copy and electronic format. All horizontal cables shall be tested to the Permanent Link model to meet EIA/TIA-568-B Category-6 parameters. All Riser or Backbone copper pairs shall be tested for continuity and polarity.

All optical fibers shall be tested for polarity, attenuation and length in both directions at 850 and 1300 nm for multimode fiber and at 1310 and 1550 for single mode fiber. Utilize EIA/TIA-526-14 Method A and include patch panel couplings in testing. Individual connector loss shall not exceed .65 db for multimode connectors and .6 db for single mode connectors. The acceptable attenuation values shall be determined using the link attenuation equation:
Link Attenuation = Cable + Connector + Splice Attenuation.

The contractor shall provide a full Manufacturer's 20-Year Warranty for the SCS installation.

9.0 As-Built Documentation

Red-line As-Built drawings will be reviewed by the engineer on a monthly basis as part of the payment application approval process. At Substantial Completion, as-built drawings shall be submitted to the engineer for final approval. Drawings will show pathways, and detailed labeling at the EF, MDF and IDF locations. The Contractor shall submit the drawings in electronic format.

Construction Criteria:

- A. Location of equipment, devices, and pathways shall be identified on the 65% construction documents for BISD review and approval. Contractor shall submit pathways for approval, based on the design, prior to installation.
- B. Resolution of pathways will be coordinated prior to construction so as to avoid additional construction costs and delays.

END OF SECTION

DIVISION 28

ELECTRONIC SAFETY AND SECURITY

∴ IN PROGRESS

DIVISION 31

EARTHWORK

- .: To limit disturbance to surrounding property, construction activity should be limited to assembly of parts and pieces manufactured off site wherever practical
 - .: Establish and implement a vegetative buffer and tree protection plan prior to start of construction
 - .: Salvage and reuse lumber that has been removed as a consequence of the project, whenever practical
 - .: To help minimize effect to budget and the environment, design projects that minimize excavation and export of materials as well as import of fill materials.
 - .: Bio-retention and rain gardens should be used as landscape elements to help mitigate Washington State Dept. of Ecology's Low Impact Development requirements (LID) whenever practical
 - .: Provide irrigation for sports fields
 - .: Design landscapes that meet city requirements, beautify the site and limit the need for landscape maintenance
-



PERFORMANCE CRITERIA

1. Construction activity on the site should, as much as possible and practical, be limited to the assembly of parts and pieces manufactured off site. Maximize the amount of native soils that can remain in place; stockpiling is preferred over export/import processes.
2. Establish a tree protection plan and erect fencing before commencement of construction.
3. Whenever possible stockpile existing native biomaterial for reuse in planting beds.
 - a. Test for soil quality: identify sieve size, nutrient and toxicity levels.
 - b. Existing sod can be rototilled into existing soil on site and included in stockpile.
 - c. Grub and dispose of all vegetation prior to rough-grading so as to keep stockpile clean.
 - d. Ideal stockpile has side slopes of 2:1, Control for erosion and weeds. Bainbridge Island has large amounts of invasives such as blackberry, scotch broom, horsetail, and nettles.
 - e. Stockpile and reuse onsite tree and vegetative chippings for future re-use by BISSD.
4. Soils and subgrade preparation:
 - a. Follow WSSP Storm water Credit (aka DOE BMP T5.13 and Soils for salmon post construction soil management): rip 10" - 12" into Subgrade and fully incorporate 3" of compost to create appropriate subgrade mix.
 - b. Planting soils added shall be rototilled into prepared Subgrade mix.
5. Erosion control: planning for erosion control is necessary if permeable pavement and/or raingardens/bioretention systems are to be used.
 - a. Consider using jute mats, compost blankets and compost berms for erosion control. Reuse for subgrade preparation (see above).
6. Storm water soils: identify soils with high permeability:
 - a. Use those soils for low impact development (LID) storm water facilities (raingardens, bioretention, permeable pavement).
7. Grading:
 - a. Prior to fine-grading, confirm capability for rough-grading will allow a 7'-0" mower deck to remain in contact with the ground at all points without digging into grade.
 - b. Lawns: minimum 2% not greater than 4:1 for mowing safety
 - c. Planted slopes: maximum 3:1.
 - d. Slopes steeper than 3:1 slopes require erosion control matting or other erosion control measures such as erosion control groundcovers.
 - e. Raingardens/Bioretention: 2-5% side slope to flat bottom.
 - f. Bioswales/vegetated swales: 2-5 % side slope
 - g. ADA parking, ramps and access: follow ADA/IBC requirements; use care to provide a "like experience" for those with mobility impairments.
 - h. Paved areas:
 - i. Asphalt – minimum 2%
 - ii. Concrete pavement – minimum 2% unless under roof overhangs, in which case 1% is acceptable.
 - iii. Parking areas – maximum 5% cross slope (non-ADA parking), driveways maximum 12%.
8. Grading for sports fields:
 - a. 2% for grass fields, minimum 10' wide crown at center
 - i. Subgrade ripping required under all grass fields
 - b. Follow national federation of high school associations (NFHS) guidelines for sports field grading:
 - i. 1% max for tennis courts
 - ii. 1% cross slope for synthetic track; longitudinal slope: level
9. Sub-grade utilities
 - a. All irrigation piping, conduits and other materials installed sub-grade shall be noted in an as-built drawing.



- b. Provide trace wire for all non-metallic pipe material.
 - i. Use copper clad steel (CCS) wire, color coded per APWA guidelines below:
 - 1. Electricity Red
 - 2. Gas Yellow
 - 3. Communication Orange
 - 4. Water (potable) Blue
 - 5. Sewer Green
 - ii. Place in same orientation for all pipes (3 o'clock) and tape at 8'-10' intervals
 - iii. Ground one end minimum, and prefer both ends.

CONSTRUCTION CRITERIA

- 1. Protect and maintain benchmarks and survey control points from disturbance during construction.
- 2. Clearly identify all vegetative and treed areas to be protected. Identify all significant trees within the site including buffers. Protective fencing to be in place prior to construction start.

MAINTENANCE AND CUSTODIAL CRITERIA

- 1. Design teams should minimize the need for landscape maintenance activities such as weedeating, weeding, leaf removal, walkways, etc.

SUSTAINABILITY

- 1. Whenever possible balance cut and fill strategies to limit amount of import/export.
- 2. Separate recyclable materials produced during site clearing from other non-recyclable materials.
- 3. Salvage and reuse lumber and large rocks from site whenever possible.

END OF SECTION

DIVISION 32

EXTERIOR IMPROVEMENTS

- .: Provide concrete mowstrips centered under fencing for ease of maintenance
 - .: Metal edging helps differentiate planting areas and holds landscape materials in place
 - .: Fence all playgrounds to separate from adjacent uses. Interior fencing should be at 4' height and perimeter fencing at 6' height
 - .: Fencing shall be visually attractive and/or black to lessen visual impact
 - .: Provide temporary irrigation to planting areas to establish plants for two to three years. Use plants naturally resistant to adverse conditions of the northwest
 - .: Select low maintenance plants
 - .: Drought tolerant lawns should be installed with irrigation and under-drained for sports fields
 - .: Provide "As-Built" drawings of all irrigation systems and provide locator tape to assist with maintenance work
 - .: All plants should be installed with a two-year warranty and replaced if dead or dying
 - .: Minimize use of impervious surfaces to decrease maintenance and costs
 - .: Consider stormwater catchment for use in irrigation where practical
 - .: Provide irrigation for sports fields
-



PERFORMANCE CRITERIA

1. Asphalt paving
 - a. Road and parking paving: asphalt concrete
 - b. Driveway: asphalt concrete per requirements of COBI and anticipated loads per BISD.
 - c. Parking Areas: asphalt concrete, pervious/porous asphalt with approval by BISD.
 - d. Bus Parking Area: thick asphalt concrete for heavy loads, may be pervious/porous with BISD approval; verify resistance to "guttering" from repeated use.
 - e. Fire lanes: asphalt paving per WSDOT standards or geo-block pavers to support local fire department loads with approval by the BISD.
2. Concrete Paving
 - a. Sidewalks/Curbs:
 - i. Provide broom finish on all exterior concrete pavements. Other finish surfaces per BISD approval.
 - ii. Joints: Provide for contraction and isolation in accordance with Portland Cement Association (PCA) requirements; provide contraction and construction joints in concrete pavement areas not to exceed 120 sq. Ft. or 20'-0" OC. Indicate type and location on plans. Isolation joints should only be used to isolate vertical elements from pavement systems. Contraction and/or construction joints should be primarily used. Standard practice of laying sidewalks with 15' OC. "expansion joints" has been proven to allow tripping hazards. Through joints (construction) and contraction joints (formed, cut or scored 1/3 depth of slab) have proven to be more effective. Where expansion or isolation joints are required, fully fill the gap with an organic filler – no caulk.
 - iii. The pedestrian bus-loading zone shall be at least a minimum of eight (8) feet wide.
 - iv. Locate sidewalks along natural pathways from the site to the entrance/exit doors. Anticipate student traffic patterns.
 - v. Curbs: painted per local fire marshal requirements. Provide integral color at fire lane curbs to eliminate the need for future repainting. Slope sides on driveway side to facilitate leaf blowing.
3. Outdoor Plan Areas:
 - a. Design of outdoor areas should discourage skateboarding activities.
 - b. Identify standard paved play striping (hopscotch, tether ball, running strips, basketball, etc. for elementary schools per the Educational Specifications).
4. Edging:
 - a. Mow Strips: Provide minimum 12" wide concrete mow strip "curb", broom finish, centered under fencing where there is lawn on either side of fence. Provide 12" concrete mow strips at building perimeters adjacent to lawn areas. (Pea gravel is not an acceptable alternate).
 - b. Planter Edging: Provide a strip of steel edging approximately 8" tall x 12 gage embedded, and staked to maintain shape, location, and to connect the ends of strip together.
5. Playground Protective Surfacing
 - a. Safety: Surfacing material shall conform to the recommendation of the U.S. Consumer Product Safety Commission, "Handbook for Public Playground Safety" (HPPS).
 - b. Composition: Solid or granular. If a bonding agent is an integral part of the product, it shall be identified and shall be non-toxic.
 - c. Dimension: Tiles shall be uniform and standard to the manufacturer. A poured material would be difficult to repair, so tiles are preferred.
 - d. Thickness: Shall be determined by the critical height requirement of the equipment, the surfacing material is placed under and around.
 - e. Color: lighter color tiles are recommended – black materials get hot and contribute heat island effects.
 - f. Additional stock: Provide 10% additional material to BISD.
 - g. Surfacing material shall provide for drainage under the material.
6. Fencing (general)
 - a. All playground areas will be fenced to separate from adjacent uses within site and at perimeter (parking, nature, neighbors).
 - b. Typical playground perimeter fencing shall be four (4) feet unless otherwise directed by BISD or per zoning code. Typical site perimeter shall be six (6) feet. Consult the Ed Spec for other specific needs.



6. Chain Link Fences and Gates

1. Black vinyl 9-gage fabric. Black vinyl finish for all components; all galvanized material. Top and bottom bars are required unless approved by BISD. Provide protective cap at top of outfield fences at baseball and fastpitch facilities.
2. All wire fabric edges are to be hemmed.
3. Perimeter fence without top or bottom rail (WSDOT standard) – tension wire only – may be used in areas of less intense use with BISD approval.
4. Tension bars shall be used at all fabric vertical terminal edges.
5. Internal fencing for childcare shall be four (4) feet high.
6. At fences that may otherwise not have bottom rail, consider bottom rail at potential shortcut paths or sloped areas, preventing children from crawling or tunneling under fence.
7. Consider location of fences close to buildings; fences should not be used for climbing into windows and onto roofs.
8. Tennis courts and backstop requirements shall be established in the Ed Spec for each site.
9. Gate sizes must be carefully coordinated with size of post, footing, hardware, and ease of use. Maximum six (6) foot leaf. For larger openings, pair gates and provide drop-pin. All gates shall have the ability to be locked.
10. Use of site-restricting materials (plastic or metal slats) is not recommended. Use may be allowed in special circumstances with BISD approval.
11. Wind stops may be required at certain locations (tennis courts). Suggested products: “CI-Fabrics Permatex” or sim vinyl mesh 9oz in dark green, provide seam and grommets at mid-panel at large panels per manufacturer recommendations. Use commercial-grade zip-ties to attach and provide 10% material reserve for future repair of ties. Attach panels to inside of courts.

7. Irrigation

1. Install irrigation systems in landscaping areas to establish and maintain new plants and trees.
2. Design intent of landscape should be once the landscape plants and trees are established irrigation is shut off. Irrigation should be left in place for use during hot and dry summers.
3. Consider installation of quick couplers and use of soaker hoses with timers at remote or drought resistant areas.
4. Provide gravity drains for winterization where possible. Provide uphill port for compressed air winterization/line clearing.
5. Specify heads, valves, time clock, etc. of one manufacturer per site. Preferred manufacturers: “Hunter” or “Toro”.
6. Provide isolation valves as determined by landscape architect and BISD.
7. Warranty: Irrigation system shall be warranted for two (2) years from the date of Substantial Completion.
 - a. During the warranty period, the Contractor shall be available within three days’ notice to make required repairs to the system. If leak cannot be isolated, then contractor shall be available within 24 hours’ notice.
 - b. Return to the job site at the beginning of the first winter season on or about November 15th to perform a general inspection of the system each year of the warranty.
 - c. Return in spring after the first winter season on or about April 15th for system check and if necessary restore system for spring and summer operation each year of the warranty.
 - d. Mainlines shall be pressure tested at 150 P.S.I. for twenty (20) continuous minutes.
8. Provide CCS trace wire on all lines which do not share trench with a control wire. Attach to pipe at 3 o’clock position at 8’-10’ intervals and ground at each end.
9. Supply color coded marking tape in trench 6” above mainlines.
8. Color coded tracer tape, set in trench at 6” above mainlines, may be used in lieu of trace wire. Suggested manufacturer: “Christy’s Detectable Marking Tape”
9. Pipe Bedding: Irrigation lines shall be backfilled with native material or imported fill which is free of stones, sticks, debris, etc, in excess of ½” in any dimension. Provide 2” bedding below and 4” above pipe.
10. Pop-up Shrub Heads: Recommend Marlex or equal street ells and flexible pipe not to exceed 18” inlength.



11. Install sleeves in all locations where piping and control wiring pass under paved areas and curbs or through walls. Extend sleeve 12 inches beyond edge of paving, curb or wall if possible. All piping beneath pavements shall be schedule 40 PVC inside Schedule 40 sleeves.
 12. Provide two control wires per main line, separated to maintain operation if one line is broken. Provide 24" expansion loop every 100 feet of wire. Allow 24" of extra wire at controller and each valve. Do not tape wires to mainline.
 13. Provide approved, legible map of irrigation zones and valve schedule, laminated, and installed near controller cover.
 14. Provide threaded unions at each automatic control valve at both sides of the automatic valve.
 13. Install the controller indoors with a separate exterior entry.
 14. Irrigation booster pump may be necessary for athletic fields.
 15. Provide a remote control for the irrigation system to facilitate one-man sprinkler operation.
 16. Provide a rain sensor to automatically shut off the irrigation system when raining.
 17. Provide cast brass master-valve.
8. Planting
1. Avoid clumping of vegetation that will create hiding places, both for people and items, near the building.
 2. Avoid plantings that will obscure views across play areas, parking lots or sidewalks.
 3. Lawns/Grass
 - a. Lawn area slope minimum of 2%, in limited conditions slope may approach 25%, however, this poses issues for mowability and grounds crew safety.
 - b. Ground cover planting is recommended on slopes steeper than 25%.
 - c. Avoid abrupt changes in grade. 30"+ changes in grade are not preferred, however if they occur, there must be a means of protection or lack of access for users.
 - d. Playfields: Provide combination of hard and grass areas as determined by the Ed Spec.
 - e. Lawn areas should be laid out with long curves or angles which permit mowing with a riding mower.
 - f. Create no lawn area narrower than 15' wide.
 - g. Avoid obstacles in lawn and playground areas.
 - h. Provide undersurface drainage where soil conditions and/or level or use warrants it.
 4. Site Related Retaining Walls: Faces of retaining walls shall be battered minimum ½" per foot of height, to avoid appearance of listing (for rockeries and unit masonry block walls). Provide footing drains at base of walls and 12" drain rock in filter fabric behind walls 12" from top of wall. Provide 12" topsoil above drain rock for landscaping. Design surface to discourage graffiti and/or provide graffiti-resistant sealers.
 5. Banks with a slope greater than 1:3 shall be planted with (non-invasive) vine or shrub type ground cover. Banks filled to a slope greater than 1:2 or steeper shall have a retaining wall with a guard system where walls exceed 29" finish grade-finish grade. Consider adding landscaping to slopes cut from native soil to 1:2 in lieu of retaining wall.
 6. Plants should comply with the following:
 - a. Plants should be drought-resistant.
 - b. Select plants which are readily available and are common/native to Northwest landscape.
 - c. Plants should be low maintenance or maintenance free.
 - d. Generally, avoid plants that have toxic berries, are sharp or attract insect.
 - e. Select plants that are native and have sharps adjacent to areas where access is discouraged.
 7. Grass lawn and play fields shall have a two year plant establishment and warranty.
 8. Planting Material:
 - a. Lawns (or drought tolerant mixes): 60% improved turf-type perennial Ryegrass (of two different varieties), 25% red creeping fescue, 15% improved Bluegrass. Rate: 7-10 lbs. /1,000 sqft.
 - b. Playfields: Consider sun exposure and soil conditions. Recommended Rate: 7-10 lbs. /1,000 sqft.
 - c. Low maintenance lawn areas – mow at 4" high – consider seed mixes that incorporate native grasses and non-invasive wildflowers.
 - d. Poa Supina may be considered for dryer, shaded areas (tree covered areas, north facing protected areas, etc...)



9. Minimum 6" of topsoil in lawn areas.
10. Shrub beds shall be weed free before substantial completion (defined and coordinated with the plant establishment and warranty).
11. Shrub beds in parking lot islands and in areas anticipated to receive high levels of construction impact; create a loose growing media of at least 12" depth.

CONSTRUCTION CRITERIA

1. Upon completion of the installation of the irrigation system, present the following:
 - a. Zone by zone system demonstration.
 - b. Location of major system components.
 - c. Winterization and maintenance procedures.
 - d. Procedures for setting the controller.
 - e. Laminated Zone Map and Controller Schedule.
2. Performance Demonstration: It shall be demonstrated (full scale, in-place percolation test) to BISD that the sports fields and playfields meet the drainage criteria established by the Architect.
3. Include BISD Insect and Pest Management (IPM) criteria in the landscaping specifications. Require contractor to provide a signed submittal of the IPM noting all requirements.
4. Ensure any imported material (dirt, backfill, topsoil, etc...) is clean (no trash) and free of invasive bio-matter (horse-tails, ragweed, etc...).

MAINTENANCE AND CUSTODIAL CRITERIA

1. Provide lawn areas that conform to the district's turning radius of its mowing equipment.
2. Design landscape areas that will minimize need for weed-eating and weeding.
3. Specify type of trash and recycling receptacles preferred by BISD and note locations for contractor installation. Receptacles shall be easily accessed and lids shall allow for easy removal of garbage bags.
4. Include two-year Plant Establishment and Maintenance Warranty in contract.

SUSTAINABILITY

1. Use pervious paving and other alternative paving materials (grass-crete, etc...) that reduce impervious surfaces and limit amount of heat gain (light colors reflect sunlight)..
2. Use native planting and plant material that once established does not require irrigation.
3. Use plants that require little in way of fertilizers and other additives (native plants require less).
4. Build siting should consider orientation of planting areas and sunlight exposure.
5. Consider use of stormwater catchment for irrigation purposes.

END OF SECTION

DIVISION 33

UTILITIES

- .: Provide "As-Built" documents of all utilities on site and all tie-ins off site
 - .: Coordinate architectural, civil, structural and mechanical with local utility providers
 - .: Consider multi-modal systems for future utility delivery
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PERFORMANCE CRITERIA

GENERAL

- 1) Reference:
 - a) Standard Specifications for Roads, Bridges, and Municipal Construction, WSDOT, current edition.
 - b) Local jurisdiction, standard specifications for municipal public works construction and standard plans.
- 2) Coordinate architectural, civil, structural, and mechanical drawings for pipe and accessory locations, elevations, inverts, etc....
- 3) Coordinate the location of the stormwater system, foundations, subsurface utility plumbing locations, and locations of municipal sewage and discharge point.
- 4) Illustrate, by direction arrows, pipe and accessory inverts, rim and invert elevations, the flow of the pipe network to the discharge point; the slope of the piping shall not be less than 1 percent (1%). Locate cleanouts at accessible locations. Consider accessibility of vacuum equipment.
- 5) Catch basins are to be round and lockable.

CONSTRUCTION CRITERIA

1. Provide as-built documents for all underground work.

MAINTENANCE AND CUSTODIAL CRITERIA

1. N/A

SUSTAINABILITY

1. Consider future multi-modal systems for utility delivery.

END OF SECTION

DIVISION XX

SAFETY AND SECURITY

∴ In progress

DIVISION XX

ATHLETICS/FIELDS

∴ In progress
