SCHEMATIC DESIGN SPECIFICATIONS FOR

Maple Elementary School
Design Alternative E.4
Pre-Kindergarten through Grade 8

200 PARK STREET
EASTHAMPTON, MASSACHUSETTS

DATE: June 1, 2018

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10 PROJECT DESCRIPTION

1010 PROJECT SUMMARY

A. Summary of Work

1. The project includes construction of a new 3-story Pre-kindergarten through Grade 8 consolidated school at the existing White Brook Middle School property, located at 200 Park Street, Easthampton, MA. The proposed building will be approximately 178,000 gross square feet. A full description of the project is located in Section 4.1.2 of the Schematic Design Binder.

B. Alternates:

1. Add Alternate No1: Provide a new round-about, including road widening at the existing entrance drive to the school.

2. Add Alternate No. 2: Provide Green Roofs as indicated on the Contract Drawings.

3. Add Alternate No. 3: Construct a pre-engineered out building for storage of maintenance vehicles and equipment, and athletic equipment.

4. Add Alternate No. 4: Construct an 8-lane, 400 m running track, (5) tennis courts and grandstand seating at football field.

C. Proprietary Specifications:

1. No proprietary items have been requested or formally voted on as of the date of this submission.

D. Multiple Contract Summaries:

1. The Project will include the following Filed Sub0Bid categories and related specification sections:

   a. Masonry
   b. Metal Fabrications
   c. Waterproofing, Dampproofing and Caulking
   d. Roofing and Flashing
   e. Metal Windows
   f. Glass and Glazing
   g. Tiling
   h. Acoustical Ceilings
   i. Resilient Flooring
   j. Painting
   k. Fire Protection
   l. Plumbing
1020 PROJECT PROGRAM

A. The project program is described in Section 4.1.2 of the Schematic Design Binder.

1030 PROJECT CRITERIA:

A. Code Analysis: The building will be designed in accordance with the Massachusetts State Building Code, 9th Edition and all referenced standards, and the Massachusetts Architectural Access Board accessibility standards.

B. Sustainability Design Requirements: The project will be designed and constructed in accordance with requirements included in LEED V4 BD+C Schools. The District is pursuing a minimum goal of Certified, plus an energy efficiency level which exceeds the current Massachusetts Base Energy Code by 20 percent, in order to qualify for an additional 2 percent reimbursement from the MSBA High Efficiency Green School Program.

1. Refer to LEED Scorecard in the Schematic Design Binder.

1040 EXISTING CONDITIONS

A. Existing Conditions Assessment: Existing conditions are summarized in the Schematic Design Binder, with a more detailed description in the Preferred Schematic Report.

20 OWNER DEVELOPMENT:

2020 PERMITS

A. Zoning Permits: City of Easthampton, Planning Board – Site Plan Review.

B. Regulatory Permits:

1. DEP (Department of Environmental Protection):

2. Easthampton Conservation Commission:

   a. Preliminary Request for Determination of Applicability (RDA)

   b. Possible RDA or Notice of Intent

   c. Triggered by work within the 100 ft wetland buffer and or work within the 200 ft riverfront.

3. MA DOT:

   a. Highway access permit for roadwork and round-about
b. Show capacity to increase traffic flow at site.


2030 PROFESSIONAL SERVICES

A. The Design Team consists of the following:

   Architect: Caolo & Bieniek Associates, Inc.
   Early Education Design Consultant: Studio G Architects
   Educational Planner: New Vista
   Landscape Architect: The Berkshire Design Group
   Civil Engineer: Nitsch Engineering, Inc.
   Foodservice: Crabtree McGrath Associates, Inc.
   Structural Engineer: Johnson Structural Engineering, Inc.
   Fire Protection Engineer: Consulting Engineering Services, Inc. (CES, Inc.)
   Plumbing Engineer: CES, Inc.
   Mechanical Engineer: CES, Inc.
   Electrical, Security, Data, Technology, Communications: CES, Inc.
   Code/Accessibility: RW Sullivan Engineering
   Furniture, Fixtures and Equipment: Stefuura Associates
   Acoustical: Accentech

2080 BUDGET CONTINGENCIES

A. Refer to the Cost Estimates prepared by VJ Associates, Inc. and A.M. Fogarty in Section 4.1.2. of the Schematic Design Binder.

30 PROCUREMENT REQUIREMENTS

3010 PROJECT DELIVERY

A. Chapter 149, Design-Bid-Build. The project will be bid in accordance with the Massachusetts General Laws (MGL) Public Bidding Law, Chapter 149, Sections 44A to 44J inclusive, and applicable Section of the MCL Public Contract Law, Chapter 30 as amended.

B. Contractor and all Filed Trade Contractors shall be DCAMM certified and prequalified.

C. Time, Manner and Requirements for Submitting Sub-Bids:

   1. Sub-bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Public Agency at a time and place as stipulated in the “Instructions to Bidders”

   2. Each sub0bid submitted for work under this Section shall be on forms furnished by the Awarding Authority as required by Section 44F of Chapter 149 of the General Laws, as amended.
3. Sub-bids filed with the Awarding Authority shall be accompanied by a Bid Bond, Cash, Certified Check, Treasurer’s Check or Cashier’s Check issued by a responsible bank or trust company payable to the City of Easthampton in the amount of 5 percent of the sub-bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

3040 AVAILABLE PROJECT INFORMATION

A. Phase I Initial Site Investigation: Report provided in Appendix G of the Preliminary Design Program.

B. Existing Hazardous Material Information: Report provide in Appendix H of the Preliminary Design Program.

C. Geo-Technical Data: Report provided in Appendix C of the Preferred Schematic Report.

A SUBSTRUCTURE

A10 FOUNDATIONS

Design Intent: The foundation will be comprised of reinforced concrete foundation walls with continuous reinforced concrete footings and isolated reinforced concrete footings at column locations. Matt slabs are intended at two elevator hoistway locations. It is anticipated that the site will need to be preloaded to mitigate soil challenges presented with the layer of varved clay observed at the preliminary boring locations.

A1010 STANDARD FOUNDATIONS

A. All exterior footings shall be placed a minimum 48 inches below the lowest grade for frost protection and foundations at strip footings shall be poured to a minimum width of one foot wider than the wall they support.

B. All interior footings shall be placed a minimum of 24 inches below the surrounding floor slabs, with strip footings poured to a minimum width of 36 inches.

C. Isolated column footings shall be placed at a depth corresponding with their location, interior or exterior, and shall be poured to a minimum 36 inches square.

D. Cast In Place Concrete

1. Concrete Materials:
   a. All concrete to be normal weight.
   b. 28 day compressive strength to be 3000 psi for column and wall footings, and 4000 psi for all other concrete.
   c. Portland Cement: ASTM C150, Type I or Type II.
e. **Fly Ash:** ASTM C618, Class F. Cement replacement with fly ash is limited to 20% in weight.

f. **Air-entraining Admixture:** ASTM C260.

g. **Water-reducing Admixture:** Optional, ASTM C494, Type A, containing not more than 0.1% chloride ions.

h. **Water:** Drinkable

i. **Accelerator, Water-reducing Admixture:** ASTM C494, Type E, containing not more than 0.1% chloride ions.

j. **Retarder, Water-reducing Admixture:** ASTM C494, Type D, containing not more than 0.1% chloride ions.

k. **Superplasticizer:** High-range water reducer conforming to ASTM C494, Type F or Type G.

2. **Reinforcing Materials:**

   a. **Reinforcing Bars:** ASTM A615 including S1, Grade 60, Deformed.
   
   b. **Welded Wire Fabric:** ASTM A185.

3. **Accessories:**

   a. **Supports for reinforcement** shall be bolsters, chairs, spacers, and other devices that comply with CRSI standards.

   b. **Ties:** Black iron, plastic straps, or stainless steel. Supports and ties shall be non-staining where used within 3 inches of surfaces that will be exposed in the finished structure or where weathering during construction may stain exposed surfaces.

4. **Curing Materials:**

   a. **Absorptive Cover:** AASHTO M182, Class 2, 9-ounce burlap cloth.

   b. **Moisture Retaining Cover:** ASTM C171, Waterproof Paper, Polyethylene Film, or Polyethylene Coated Burlap.

   c. **Water:** Potable

5. **Concrete Mixtures:**

   a. **Design mixes** shall be established by either the laboratory trial batch or the field experience method as specified in ACI 301. The proposed mix shall be examined and approved by the Testing Laboratory before submission for approval.

E. **Thermal Insulation**

1. **Provide rigid thermal insulation board,** meeting requirements of ASTM C578, at vertical face of all perimeter foundation walls.

   a. **Provide Type IV extruded polystyrene board** with maximum flame spread and smoke developed indexes of 75 and 450 respectively

   b. **Thickness:** minimum 2 inches
c. Compressive Strength: Minimum 40 psi  
d. Depth: Extend insulation minimum 24 inches below slab at typical perimeter walls and 36 inches below slab at Pre-K and Kindergarten wing perimeter walls.  
e. R-Value: R-10 for typical perimeter walls and R-15 for Pre-K and Kindergarten wing perimeter walls

A1020  SPECIAL FOUNDATIONS

A. Site Preloading

1. The preload is primarily intended to pre-consolidate the underlying soft silt and clay. The final extent, depth, and duration of the site preload shall be determined by the geotechnical engineer based on the final column loads and the final site grade elevations.

B. Matt Slabs shall be provided at two elevator hoistway locations.

1. Cast In Place Concrete

a. Concrete Materials:

1) All concrete to be normal weight.  
2) 28 day compressive strength to be 3000 psi for column and wall footings, and 4000 psi for all other concrete.  
3) Portland Cement: ASTM C150, Type I or Type II.  
4) Aggregate: Normalweight, ASTM C33.  
5) Fly Ash: ASTM C618, Class F. Cement replacement with fly ash is limited to 20% in weight.  
7) Water-reducing Admixture: Optional, ASTM C494, Type A, containing not more than 0.1% chloride ions.  
8) Water: Drinkable  
9) Accelerator, Water-reducing Admixture: ASTM C494, Type E, containing not more than 0.1% chloride ions.  
10) Retarder, Water-reducing Admixture: ASTM C494, Type D, containing not more than 0.1% chloride ions.  
11) Superplasticizer: High-range water reducer conforming to ASTM C494, Type F or Type G.

b. Reinforcing Materials:

1) Reinforcing Bars: ASTM A615 including S1, Grade 60, Deformed.  

c. Accessories:

1) Supports for reinforcement shall be bolsters, chairs, spacers, and other devices that comply with CRSI standards.
2) Ties: Black iron, plastic straps, or stainless steel. Supports and ties shall be non-staining where used within 3 inches of surfaces that will be exposed in the finished structure or where weathering during construction may stain exposed surfaces.

d. Curing Materials:

1) Absorptive Cover: AASHTO M182, Class 2, 9-ounce burlap cloth.
2) Moisture Retaining Cover: ASTM C171, Waterproof Paper, Polyethylene Film, or Polyethylene Coated Burlap.
3) Water: Potable.

e. Concrete Mixtures:

1) Design mixes shall be established by either the laboratory trial batch or the field experience method as specified in ACI 301. The proposed mix shall be examined and approved by the Testing Laboratory before submission for approval.

A40 SLABS ON GRADE

Design Intent: Typical first floor slabs are intended as minimum 4 inch thick concrete slabs on grade, reinforced with welded wire fabric. Slabs will be placed over a continuous vapor barrier and 2 inch thick, rigid insulation board on compacted structural fill. First floor slabs at learning classrooms and the activity room of the Early-Education (prekindergarten and kindergarten) wing will be heated.

A4010 STANDARD SLAB ON GRADE

A. Unless noted otherwise, all new concrete slabs shall be poured to a min. thickness of 5 inches and reinforced using welded wire fabric conforming to ASTM A-185 Standards.

B. Miscellaneous housekeeping pads shall be provided at 4 inches high for new mechanical equipment.

C. All new concrete slabs on grade shall be placed above a continuous vapor barrier, over a minimum 12 inches of compacted structural fill.

1. Vapor Barrier shall be non-woven, polyester-reinforced, polyethylene coated sheet; 10 mils. thick.

D. Cast In Place Concrete

1. Concrete Materials:

   a. All concrete to be normal weight.
   b. 28 day compressive strength to be 3000 psi for column and wall footings, and 4000 psi for all other concrete.
   c. Portland Cement: ASTM C150, Type I or Type II.
e. Fly Ash: ASTM C618, Class F. Cement replacement with fly ash is limited to 20% in weight.
g. Water-reducing Admixture: Optional, ASTM C494, Type A, containing not more than 0.1% chloride ions.
h. Water: Drinkable
i. Accelerator, Water-reducing Admixture: ASTM C494, Type E, containing not more than 0.1% chloride ions.
j. Retarder, Water-reducing Admixture: ASTM C494, Type D, containing not more than 0.1% chloride ions.
k. Superplasticizer: High-range water reducer conforming to ASTM C494, Type F or Type G.

2. Reinforcing Materials:
   a. Reinforcing Bars: ASTM A615 including S1, Grade 60, Deformed.

3. Accessories:
   a. Supports for reinforcement shall be bolsters, chairs, spacers, and other devices that comply with CRSI standards.
   b. Ties: Black iron, plastic straps, or stainless steel. Supports and ties shall be non-staining where used within 3 inches of surfaces that will be exposed in the finished structure or where weathering during construction may stain exposed surfaces.

4. Curing Materials:
   a. Absorptive Cover: AASHTO M182, Class 2, 9-ounce burlap cloth.
   b. Moisture Retaining Cover: ASTM C171, Waterproof Paper, Polyethylene Film, or Polyethylene Coated Burlap.
   c. Water: Potable.

5. Concrete Mixtures:
   a. Design mixes shall be established by either the laboratory trial batch or the field experience method as specified in ACI 301. The proposed mix shall be examined and approved by the Testing Laboratory before submission for approval.

E. Thermal Insulation

1. Provide rigid thermal insulation board, meeting requirements of ASTM C578, at vertical face of all perimeter foundation walls.
   a. Provide Type IV extruded polystyrene board with maximum flame spread and smoke developed indexes of 75 and 450 respectively
   b. Compressive Strength: Minimum 40 psi
   c. Thickness: Minimum 2 inches
d. R-Value: R-10 for typical perimeter walls and R-15 for Pre-K and Kindergarten wing perimeter walls

A20 BASEMENT CONSTRUCTION

No work in this section.

B SHELL

B10 SUPERSTRUCTURE

Design Intent: The upper floors will be constructed of concrete slabs on metal deck, reinforced with welded wire fabric (5 ½ inch total thickness) supported by steel beams spaced no more than 5’-6” on center, steel girder beams and steel columns. The roofs will be constructed of metal deck supported by steel joists spaced no more than 5’-0” on center, steel girder beams and steel columns. The accessible ‘green’ roofs alternatives will be constructed of concrete slabs on metal deck, reinforced with welded wire fabric (5 ½ inches total thickness) supported by steel beams spaced no more than 5’-0” on center, steel girder beams and steel columns. The lateral load system will be comprised of a combination of steel braced frames and steel moment frames.

B1010 FLOOR CONSTRUCTION

A. Structural Steel

1. Steel Components shall conform to requirements of the AISC. Materials shall meet the following specifications and standards:

   a. Structural Steel – W-Shapes ASTM A992 (Fy = 50ksi to 65 ksi)
   b. Structural Steel – Shapes other than W-Shapes, Plates and Bars: ASTM A572, Grade 50 (Fy = 50 ksi).
   c. Structural Steel - Column Base Plates: ASTM A36 (Fy = 36 ksi).
   d. Structural Tubing (HSS Section): ASTM A500, Grade B.
   e. Steel Pipe: ASTM A501 or ASTM A53, Types E or S.
   f. Anchor Rods: ASTM F1554, 3/4” diameter or larger, Grade 36 or 55.
   g. High Strength Bolts: ASTM A325, type N and slip-critical.
   h. Filler Metal for Welding: E70XX low hydrogen
   i. Shear Connectors: Headed studs conforming to ASTM A108, Grades 1015-1020, 3/4” diameter, minimum yield point of 50,000 psi, and minimum tensile strength of 60,000 psi.
   j. Primer Paint: Provide primer paint specified and scheduled in Section 09900.
   k. Galvanizing: Hot dip galvanize (2 oz. per square foot of surface) designated steel after fabrication in compliance with ASTM A123. Galvanizing shall be confirmed using Preece Test Method per ASTM A239. All steel exposed to weather, including relieving angles, shall be hot dip galvanized.
   l. Bearings shall have a safe working load capacity of 2000 psi at 60 degrees F. and a coefficient of friction not exceeding 0.1.
B. Steel Deck

1. Composite steel deck and steel roof deck shall conform to requirements of the Steel Deck Institute. Materials shall meet the following specifications and standards:
   a. Corrugated Composite Steel Floor Deck at raised slabs shall be 1 ½ inch deep and 20 gage thick, and shall conform to ASTM A653, Grade 33 or higher, with a minimum yield strength of 33,000 psi; Galvanized Coating: Shall conform to ASTM A653, coating class G60.
   b. Deck Accessories: Fabricate deck accessories of 18 gage minimum sheet steel, with galvanized coating. Provide following typical accessories and any additional accessories required by deck manufacturer’s steel deck system: cell closures for ends of steel deck at columns, walls, openings, perimeter conditions, and where deck changes direction, drain pans or sumps.
   d. Welding Materials: Conform to AWS Code and AWS filler metal specifications.

B1020 ROOF CONSTRUCTION

A. LEED-S V.4 Submittals shall be provided for all wood products, including printed statement of VOC content (wood and steel materials / associated coatings), Composite Wood Manufacturer’s product data for each composite wood product used indicating that bonding agent used contains no urea formaldehyde, Product certificates for all wood-based products certified by the Forest Stewardship Council (FSC) stating chain-of-custody (COC) number, Product certificates showing percentage by weight of Pre and Post-consumer recycled content of steel products. Include statement indicating cost for each material and the fraction by weight that is considered FSC certified.

1. Work of this Section contributes to LEED Credits MR.2 and IEQ.2

B. Steel Deck

1. Corrugated steel roof deck shall be 1 ½ inch deep and shall conform to ASTM A653 Grade 33 or higher, with a minimum yield strength of 33,000 psi, thickness shall be 20 gage minimum or as indicated in the drawings. Deck Profile Type B. Galvanized Coating shall conform to ASTM A653, class G60.

   a. 1 ½ inch deep corrugated roof deck shall be provided at typical roofs.

2. Corrugated steel, acoustic roof deck shall be 3 inch deep and shall conform to ASTM A653 Grade 33 or higher, with a minimum yield strength of 33,000 psi, thickness shall be 20 gage minimum or as indicated in the drawings. Deck Profile Type N. Galvanized Coating shall conform to ASTM A653, class G60.

   a. 3 inch deep corrugated, acoustic roof deck shall be provided at the following locations;
1) Gymatorium
2) Adaptive P.E.
3) Band/ Chorus/ Stage

C. Parapets

1. Parapets are not currently planned at the roof level.

B1080 STAIRS

A. LEED-S V.4 Submittals shall be provided for all wood products, including printed statement of VOC content (wood and steel materials / associated coatings), Composite Wood Manufacturer’s product data for each composite wood product used indicating that bonding agent used contains no urea formaldehyde, Product certificates for all wood-based products certified by the Forest Stewardship Council (FSC) stating chain-of-custody (COC) number, Product certificates showing percentage by weight of Pre and Post-consumer recycled content of steel products. Include statement indicating cost for each material and the fraction by weight that is considered FSC certified.

1. Work of this Section contributes to LEED Credits MR.3 and IEQ.2

B. INTERIOR STAIRS

1. General: Interior stairs serving the Band/ Chorus/ Stage space shall be formed and cast in-place of reinforced concrete.

2. Form Facing Materials: Exterior grade plywood panels, suitable for concrete forms, complying with DOC PS 1, High-Density Overlay, Class 1 or better.

3. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
   a. Formulate form-release agent with rust inhibitor for steel form-facing materials

4. Form Ties: Factory-fabricated, removable or snap-off material or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete in removal.
   a. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
   b. Furnish ties that, when removed, will leave holes not larger than 1 inch in diameter in concrete surface.

5. Steel Reinforcement:
   a. Reinforcing Bars: ASTM A 615/A615 M, Grade 60 deformed.
   b. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
6. Reinforcement Accessories.
   a. Bar Supports: Bolster, chairs, spacers and other devices for spacing, supporting and
      fastening reinforcing bars and welded wire fabric in place. Manufacture bar
      supports according to CRSI’s “Manual of Standard Practice” from steel wire, plastic,
      or precast concrete of fiber-reinforced concrete of greater compressive strength
      than concrete and as follows:

      1) For concrete surfaces exposed to view where legs of wire bar supports contact
      forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless steel bar
      supports.

   b. Joint Dowel Bars: Plain-steel bars, ASTM A 615/ A 615M, Grade 60. Cut bars true to
      length with ends square and free of burs.

7. Concrete Materials:
   a. Portland Cement: ASTM C 150, Type II
   b. Normal Weight Aggregate: ASTM C 33, uniformly graded, and as follows:

      1) Class: Moderate weathering region, but not less than 3M
      2) Nominal Maximum Aggregate Size: ¾ inch.
      3) Combined Aggregate Gradation: Well graded from coarsest to finest with not
         more than 18 percent and not less than 8 percent retained on an individual
         sieve, except that less than 8 percent may be retained on sieves finer than No.
         50

   c. Water: Potable and complying with ASTM C 94

8. Admixtures:
   a. General: Admixtures certified by manufacturer to contain not more than 0.1
      percent water-soluble chloride ions by mass of cementitious material and to be
      compatible with other admixtures and cementitious materials. Do not use
      admixtures containing calcium chloride.
   b. Air-Entraining Admixture: ASTM C 260
   c. Water-Reducing Admixture: ASTM C 94, Type A

9. Vapor Retarders:
   a. Nonwoven, polyester-reinforced, polyethylene coated sheet; 10 mils thick
   b. Three-ply, nylon or polyester-cord-reinforced, laminated, high density polyethylene
      sheet, 7.8 mils thick

10. Curing Materials:
    a. Water: Potable
11. Concrete Mixes:

   a. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases as follows:

      1) Proportion normal-weight concrete according to ACI 211.1 and ACI 301.

         a) Use a qualified independent testing agency for preparing and reporting mix designs from the laboratory trial mix basis
         b) Slab-On-Grade (Stairs): Proportion normal-weight concrete mix as follows:

      2) Compressive Strength (28 days): 4,000 psi
      3) Maximum Slump: 4 inches
      4) Air Entrainment: Do not air entrain concrete to trowel finished interior floors.

**B20 ENCLOSURE**

Design Intent: A combination of masonry veneer cavity wall, terracotta rainscreen and glazed curtain wall assemblies are planned for the building envelope. Except at gymnasiums and locker rooms, backup walls for masonry veneer will be framed with light-gauge studs. At gymnasium spaces and locker rooms backup walls are planned as concrete masonry units. Light-gauge steel framing will also be provided at terracotta rainscreens. Curtain wall assemblies will be aluminum framed, thermally broken and provided with insulated low-e glazing. All glass within 7'-0" of grade will be laminated for increased security. All educational spaces will have at least one window for views and where possible, additional windows for daylighting will be included.

**B2010 EXTERIOR WALLS**

A. LEED-S V4 Submittals shall be provided for all steel products, including printed statement of VOC content for steel materials / associated coatings, Product certificates showing percentage by weight of Pre and Post-consumer recycled content of steel products.

   1. Work of this Section contributes to LEED Credits MR.3 and IEQ.2

B. Cavity Walls:

   1. Typical exterior walls shall be non-bearing, brick-veneer cavity walls, over light gauge metal framing. From exterior face to interior, typical assemblies shall consist of:

      a. Modular face brick
      b. 2 inch air space
      c. 3 inch spray-applied, closed cell insulation
      d. 5/8 inch fiberglass mat sheathing
      e. 8 inch (varies) cold-formed metal framing
      f. Thermal insulation batts between studs
      g. Vapor Barrier
      h. 5/8 inch gypsum wall board
2. Modular Face Brick

   a. ASTM 216: 1,500 psi, Grade SW, Type FBA, with 5 percent maximum Initial Rate of Absorption and a 0.54 Maximum Saturation Coefficient after 24 hours.
   b. Provided galvanized, non-bearing steel lintels over all openings
   c. Relieving Angles: Provide continuous galvanized steel relieving angles at each floor level or as indicated.

3. Spray-Applied, Closed Cell Insulation

   a. Provide primary spray polyurethane foam building insulation shall be a spray-applied polyurethane foam material system which produces a seamless, monolithic and durable polyurethane closed cell foam insulation suitable for commercial insulating and air barrier applications. Insulation shall have the following physical properties:

      1) Air Leakage: Less than 0.004 CFM/ft² under pressure differential of 0.3 in w.g. (1.6 psf_ (0.02 L/m² at 75 Pa) per ASTM E 2178
      2) Tested to ASTM E 2357 for the air barrier assembly
      3) Meet ICC AC377 standards
      4) Vapor Permeance: Minimum 0.95 perms at 1 inch, 0.47 perms at 2 inches, per ASTM E96
      5) Aged R Value: Minimum >6.45/ inch at 1 inch, >6.2/ inch at 4 inches.
      6) Thermal Performance: Minimum R-7.5
      7) Nominal Density: 2.0 pounds per cubic foot
      8) Tested ASTM E 84 for FSI an SDI

4. Fiberglass Mat Sheathing

   a. Comply with ASTM C1177/C 1177M for fiberglass mat sheathing board with fiberglass mat laminated to both sides and with manufacturers standard edges.
   b. Core: 5/8 inch , Regular or Type X as indicated

5. Non-Load Bearing Cold Formed Metal Framing

   a. Provide manufacturers standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

      1) Minimum Base Metal Thickness: 0.0538 inch (1.37 mm)
      2) Flange Width: 1 5/8 inch

   b. Steel Track: Manufacturers standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges and as follows:

      1) Minimum Base Metal Thickness: 0.0538 inch (1.37 mm)
      2) Flange Width: 1 ¼ inches (32 mm)
c. Vertical Deflection Clips: Provide manufacturer’s standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

1) Single Deflection Track: Provide manufactures single, deep-leg, U-shaped steel track; unpunched, with unstiffened flange, of web depth to contain studs while allowing free vertical movement with flanges designed to support horizontal and lateral loads and transfer them to the primary structure.
2) Minimum Base-Metal thickness: 0.0538 inch (1.37 mm).
3) Flange Width: 1 inch plus the twice the design gap.

6. Thermal Insulation Batts:
   a. Un-faced, Glass-Fiber Blanket Insulation: ASTM C 6655, with maximum flame spread and smoke developed indexes of 25 and 50 respectively, per ASTM E 85, passing ASTM 136 for combustion characteristics.
   b. Thermal Performance: Minimum R-13
   c. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.

7. Vapor Barrier
   a. Two outer layers of polyethylene film, laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 25 lb. 1,000 sf, with maximum permeance rating of 0.0507 perm.
   b. Vapor Barrier Tape: Pressure sensitive tape as recommended by vapor barrier manufacturer, for sealing joints and penetrations in vapor barrier
   c. Vapor Barrier Fasteners: Pancake-head, self-tapping steel drill screws, with fender washers
   d. Sealants: Type I, Grade NS, Class 25, Use NT, related to exposure and Use O related to vapor-barrier related substrates, Nonsag, urethane sealant meeting requirements of ASTM C920
   e. Climate Zone: Vapor Barrier shall meet or exceed requirements of the Massachusetts State Building Code and Massachusetts State Energy Code for Climate Zone 5.

8. Gypsum Wall Board
   a. General: Complying with ASTM C 36/C 36M or ASTM C 1369/C 1369 CM, as applicable to type of gypsum board indicated and whichever is more stringent.
   b. Fire Resistant Type-X: Minimum 5/8 inch with long edges tapered.
      1) Application: All fire rated wall assemblies
   c. Flexible Type: Manufactured to bend to fit radii and to be more flexible than standard, regular-type gypsum board of same thickness.
      1) Application: All radius wall conditions. Build layers to match thickness of adjacent gypsum board panels.
2) Thickness: Maximum 1/4 inch  
3) Long Edges: Tapered  

d. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board of the same thickness.  
1) Application: All horizontal ceiling assemblies.  
2) Thickness: Minimum ½ inch  
3) Long Edges: Tapered  

e. Abuse Resistant:  
1) Application: All wall surfaces 4 feet above finish floor and below.  
2) Thickness: 5/8 inch  
3) Long Edges: Tapered  

9. Loose Lintels:  
   a. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M  
   b. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.  
   c. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.  
   d. Loose steel lintels in exterior walls shall be hot-dipped galvanized.  

10. Relieving Angles  
   a. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M  
   b. Provide continuous steel angle support for masonry veneer 30’-0” maximum above the foundation and at each floor level above the 30’-0” elevation.  
      1) Steel Shape: L8x6x1/2 (LLH)  
      2) Connection: Slotted at vertical leg  
   c. Relieving angles to be hot-dipped galvanized in exterior walls.  

C. Rain Screen Walls:  
   1. Exterior walls at first floor Early Education Win, third floor of middle school wing, and where indicated, shall be non-bearing, terracotta rain screen walls, over light gauge metal framing. From exterior face to interior, typical assemblies shall consist of:  
   a. Terracotta Panels: 18 inches wide by 5 feet long by 1 ½ inch thick panels (provide 3-color random pattern), clipped to manufacturer’s standard aluminum clip system, over extruded aluminum vertical supports, over aluminum z-girts.  
   b. 2 inch air space  
   c. 3 inch rigid mineral wool insulation board  
   d. Air/ vapor barrier
e. 5/8 inch fiberglass mat sheathing
f. 8 inch (varies) cold-formed metal framing
g. Thermal insulation batts between studs
h. Vapor Barrier
i. 5/8 inch gypsum wall board

2. Terracotta Panels – Rain Screen
   a. Pigmentation: Integral, surface applied color not acceptable
   b. Water Absorption: Test according to ASTM C 1167 using 24 hour submersion (separate sets of specimens, minimum 5 specimens each). Absorption by submersion shall not be less than 4 percent or exceed 7 percent average, 8 percent individual specimen.
   c. Freeze Thaw: Test according to ASTM 1167 for 100 cycles. No specimen shall crack, crumble or fracture.
   d. Efflorescence: Test according to ASTM 1167, Minimum 10 specimens. Specimens to be rated ‘non-efflorescence’.

3. Terracotta Fasteners, Clips and Anchor Channels: Provide stainless steel components to meet load requirements

4. Rain Screen Spacers: Use only silicone gaskets or sealants

5. Non-Ferrous Metals – Rain Screen:
   a. Aluminum Plate and Sheet: ASTM B 209 ASTM B209M), Alloy 6061 T6
   b. Aluminum Extrusions: ASTM B 221 (ASTM B 221) Alloy 6063 T6

6. Rain Screen Accessories: Corrosion resistant type capable of supporting cladding system and superimposed design loads; design to allow adjustments to system prior to being permanently fastened in place.

7. Bituminous Paint – Rain Screen: Cold applied mastic, SSPC Paint 12, compounded for 30 mil thickness per coat.

8. Rain Screen Support System Fastening Method: A complete, pre-engineered aluminum clip and sub-girt system complying with the following requirements:
   a. Pattern: Panels shall be installed in a running bond with a 1/3 offset. Pattern shall be provided in both horizontal and vertical direction, as indicated on the drawings.
   b. The panels are fastened at head grooves and base channels using aluminum clips
   c. The aluminum clip must be fastened to aluminum sub-frame in order to maintain an accurate gap.
   d. The replacement of damaged panels, particularly in the middle sections must be possible using simple methods and should not require specialized tools
   e. Under no circumstances shall it be possible to remove individual panels unless they are first destroyed.
9. Mineral Wool Rigid Insulation Board
   a. ASTM C 612, Type II, Unfaced with maximum flame spread and smoke developed
      indexes of 15 and zero respectively, per ASTM E 84, passing ASTM E 136 for
      combustion characteristics. Nominal density of 6 lb/ cu. ft.

10. Fluid Applied Air/ Vapor Barrier: Shall be capable of performing as a continuous vapor-
      retarding air barrier and as a liquid-water drainage plane flashed to discharge to the
      exterior incidental condensation or water penetration. Air-barrier assemblies shall be
      capable of accommodating substrate movement and of sealing substrate expansion and
      control joints, construction material changes, penetrations, tie-ins to installed
      waterproofing, and transitions at perimeter conditions without deterioration and air
      leakage exceeding specified limits. ICC-ES AC 212 Acceptance Criteria for Water-
      Resistive Coatings Used as Water-Resistive Barriers Over Exterior Sheathing.

   a. Water Vapor Transmission: 34 perms when tested in accordance with ASTM E96
      (wet cup)
   b. Tensile Bond: Minimum 15 psi or exceeds strength of substrate when tested in
      accordance with ASTM C297
   c. Surface Burning Characteristics: Class A Building Material when tested in accordance
      with ASTM E 84. Flame Spread: less than or equal to 25; Smoke Developed: less
      than or equal to 450.
   d. Total Solids: 65 to 75 percent by volume, ASTM D 2369
   e. Air Barrier Assembly Air Leakage: Maximum 0.04 cfm/sf of surface area at 1.57 lbf/sf
   f. Exterior Rain Screen Wall Assembly: Provide fluid-applied vapor retarding air barrier
      that has been tested and certified as part of an NFPA 285 approved assembly

11. Fiberglass Mat Sheathing
   a. Comply with ASTM C1177/C 1177M for fiberglass mat sheathing board with
      fiberglass mat laminated to both sides and with manufacturers standard edges.
   b. Core: 5/8 inch , Regular or Type X as indicated

12. Non-Load Bearing Cold Formed Metal Framing
   a. Provide manufacturers standard C-shaped steel studs, of web depths indicated,
      punched, with stiffened flanges, and as follows:
      1) Minimum Base Metal Thickness: 0.0538 inch (1.37 mm)
      2) Flange Width: 1 5/8 inch
   b. Steel Track: Manufacturers standard U-shaped steel track, of web depths indicated,
      unpunched, with unstiffened flanges and as follows:
      1) Minimum Base Metal Thickness: 0.0538 inch (1.37 mm)
      2) Flange Width: 1 ¼ inches (32 mm)
c. Vertical Deflection Clips: Provide manufacturer’s standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

1) Single Deflection Track: Provide manufactures single, deep-leg, U-shaped steel track; unpunched, with unstiffened flange, of web depth to contain studs while allowing free vertical movement with flanges designed to support horizontal and lateral loads and transfer them to the primary structure.

2) Minimum Base-Metal thickness: 0.0538 inch (1.37 mm).

3) Flange Width: 1 inch plus the twice the design gap.

13. Thermal Insulation Batts:

a. Un-faced, Glass-Fiber Blanket Insulation: ASTM C 6655, with maximum flame spread and smoke developed indexes of 25 and 50 respectfully, per ASTM E 85, passing ASTM 136 for combustion characteristics.

b. Thermal Performance: Minimum R-13

c. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.

14. Vapor Barrier

a. Two outer layers of polyethylene film, laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 25 lb. 1,000 sf, with maximum permeance rating of 0.0507 perm.

b. Vapor Barrier Tape: Pressure sensitive tape as recommended by vapor barrier manufacturer, for sealing joints and penetrations in vapor barrier

c. Vapor Barrier Fasteners: Pancake-head, self-tapping steel drill screws, with fender washers

d. Sealants: Type I, Grade NS, Class 25, Use NT, related to exposure and Use O related to vapor-barrier related substrates, Nonsag, urethane sealant meeting requirements of ASTM C920

e. Climate Zone: Vapor Barrier shall meet or exceed requirements of the Massachusetts State Building Code and Massachusetts State Energy Code for Climate Zone 5.

15. Gypsum Wall Board

a. General: Complying with ASTM C 36/C 36M or ASTM C 1369/C 1369 CM, as applicable to type of gypsum board indicated and whichever is more stringent.

b. Fire Resistant Type-X: Minimum 5/8 inch with long edges tapered.

1) Application: All fire rated wall assemblies

c. Flexible Type: Manufactured to bend to fit radii and to be more flexible than standard, regular-type gypsum board of same thickness.

1) Application: All radius wall conditions. Build layers to match thickness of adjacent gypsum board panels.
2) Thickness: Maximum 1/4 inch
3) Long Edges: Tapered

d. Abuse Resistant:

1) Application: All wall surfaces 4 feet above finish floor and below.
2) Thickness: 5/8 inch
3) Long Edges: Tapered

D. Balcony Knee Walls: Required as part of ‘Green Roof’ alternate only.

1. General: Balcony knee walls shall consist of terracotta cladding, over plywood sheathing. Sheathing shall be supported by continuous steel angles spanning between structural tube steel posts. Knee walls shall terminate with a continuous terracotta coping.

a. Structural Steel Posts: ASTM A 36/ A 36M

1) Section: H.S.S. 3x3x3/8. Provide 4”x8”x 3/8” base plate and ¼” closure plate at top of posts, typ.
2) Finish: Galvanized

b. Steel Angles: ASTM A 36/ A 36M

1) Section: L2x2x5/16
2) Finish: Galvanized
3) Weld angles between vertical posts, with vertical face of angle aligned flush with the face of post.

c. Plywood Sheathing: Either DOC PS1 or DOC PS2, unless otherwise indicated.

1) Thickness: ¾ inch.
2) Factory mark panels to indicate compliance with applicable standard.
3) Fire- Retardant-Treated (FRT) Plywood:

   a) Comply with performance requirements in AWPA C27.
   b) Use treatment that does not promote corrosion of metal fasteners.
   c) Use exterior type.
   d) Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material
   e) Identify fire-retardant-treated plywood with appropriate classification marking of UL, U.S. Testing Timber Products Inspection or another testing and inspecting agency acceptable to authorities having jurisdiction.
   f) Application: Treat all plywood sheathing at roof balcony guardrails

d. Plywood Wall Sheathing: Exterior, Structural 1 sheathing.

1) Span Rating: 32/16
B2020  EXTERIOR WINDOWS

A. LEED-S V.4 Submittals shall be provided for all wood, steel and sealant products, including printed statement of VOC content, Composite Wood Manufacturer’s product data for each composite wood product used indicating that bonding agent used contains no urea formaldehyde, Product certificates for all wood-based products certified by the Forest Stewardship Council (FSC) stating chain-of-custody (COC) number, Product certificates showing percentage by weight of Pre and Post-consumer recycled content of steel products. Include statement indicating cost for each material and the fraction by weight that is considered FSC certified.

1. Work of this Section contributes to LEED Credits MR.3 and IEQ.2

B. All exterior window, storefront and curtainwall systems shall be thermally improved, aluminum framed systems as indicated within the Drawings.

C. Wood blocking shall be pressure treated.

1. Preservative treatment shall be by pressure process; AWPA C2 (lumber) and AWPA C9 (plywood), except where lumber is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with organic boron (SBX).
2. Kiln dry treated wood to a maximum moisture content of 19 percent for lumber and 15 percent for plywood, following treatment process.

D. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber S4S unless otherwise indicated.
4. Provide dry lumber with 15 percent maximum moisture content at time of dressing for 2 inch nominal thickness or less, unless otherwise indicated.

E. Plywood Panels: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.

1. Thickness: As needed to comply with the requirements specified, but not less than thickness indicated.
2. Factory mark panels according to indicated standard.


a. Organic Finish: All exposed areas of aluminum windows and components shall be provided with a high-performance 70 percent fluoropolymer finish, AA-M12-C42-R1X. Color as selected by architect from manufacturer’s full range of options.

2. Hardware: Provide as follows:

a. Locking Handles shall be cam type and manufactured from a white bronze alloy with a US26D brushed finish. Provide locks on ventilators at 40 inches on center, maximum.

3. Weather Stripping shall be Santropene or equal.

4. Thermal Barrier shall be provided as follows:

a. All exterior shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.

b. The thermal barrier shall be 2 thermal struts, consisting of glass reinforced polyamide nylon, mechanically crimped in raceways extruded in the exterior and interior extrusions.

c. Poured and debridged urethane thermal barriers shall not be permitted.

d. Thermal break shall be 6 mm minimum.

5. Typical Insulating Glass (IG-1): Typical at all exterior glazing locations, except where safety glass is required by code and/or security glass is indicated. Acceptable manufacturers include, but are not limited to, the following:

a. General: 1 inch thick insulating glass consisting of ¼ inch, Class 2 – tinted, Annealed float glass, low e coating on the No. 2 surface, Exterior lite; ¼ inch, Class 1 Annealed float glass, Interior lite and argon-filled.

b. 1” VRE 7-65 by Viracon.

1) Low E-Coating, #2 surface
2) Visible Light Transmittance: 45 percent
3) Reflectance Visible Light 18 percent
4) U-Value (Winter): 0.25
5) Solar Heat Gain Coefficient: 0.24
6) Tint: Gray

c. 1” Solarban 70XL, by Vitro Architectural Glass

1) Low E Coating, #2 Surface
2) Visible Light Transmittance: 64 percent
3) Reflectance Visible Light: 18 percent
4) U-Value (Winter) 0.24
5) Solar Heat Gain Coefficient: 0.27
6) Tint: Gray
6. Insulating Safety Glass (IG-2): Typical at all exterior glazing locations where safety glass is required by code, except where security glass is indicated. Acceptable manufacturers include, but are not limited to, the following:

a. General: 1 inch thick insulating safety glass consisting of ¼ inch, Class 2 – tinted, Annealed float glass, low e coating on the No. 2 surface, Exterior lite; ¼ inch, Class 1, Fully tempered float glass, Interior lite and argon-filled.

b. 1” VRE 7-65 by Viracon.
   1) Low E-Coating, #2 surface
   2) Visible Light Transmittance: 45 percent
   3) Reflectance Visible Light: 18 percent
   4) U-Value (Winter): 0.25
   5) Solar Heat Gain Coefficient: 0.24
   6) Tint: Gray

c. 1” Solarban 70XL, by Vitro Architectural Glass
   1) Low E Coating, #2 Surface
   2) Visible Light Transmittance: 64 percent
   3) Reflectance Visible Light: 18 percent
   4) U-Value (Winter): 0.24
   5) Solar Heat Gain Coefficient: 0.27
   6) Tint: Gray

7. Insulating Security Glass (IG-3): Typical at all exterior glazing locations within 7 vertical feet above adjacent grade. Acceptable manufacturers include, but are not limited to, the following:

a. General: 15/16 inch thick insulating laminated glass consisting of ¼ inch, Class 2 – tinted, Fully tempered float glass, low e coating on the No. 2 surface, Exterior lite; ¼ inch, Class 1, Annealed float glass, 0.060 inch clear PVB inner layer, ¼ inch, Class 1, Annealed float glass Interior lite and argon-filled.

b. 1 5/8” VUE1-50 Insulating Laminated by Viracon.
   1) Low-E coating, #2 Surface
   2) Visible Light Transmittance: 46 percent.
   3) Reflectance Visible Light: 11 percent.
   4) U Value (Winter): 0.28
   5) Solar Heat Gain Coefficient: 0.25.
   6) Tint color: Gray

c. 1 5/8” Solarban 70 XL Insulating Laminated by PPG Industries.
   1) Low-E Coating, #2 Surface
   2) Visible Light Transmittance: 64 percent
3) Reflectance Visible Light: 18 percent
4) U Value (Winter): 0.24.
5) Heat Gain Coefficient: 0.27.
6) Tint Color: Gray.

8. Spacers: Glazing spacers shall be warm edge.
9. All adhesives, sealants, paints and coatings applied on site and fall within the weatherproofing system must have VOC contents less than the limits established by LEED criteria.
10. Compressible Filler: Shall be closed cell polyethylene foam rope joint backing material between window members and surrounding construction. Do not use vinyl foam degradable materials or paper.
11. Perimeter Weather Seals: Provide Single-Component Neutral-Curing Silicone Sealant. Available products include, but are not limited to the following:
   a. Dow Corning Corporation; 790
   b. GE Silicones, SilPruf LM SCS2700
   c. Tremco, Spectrem 1
   d. Pecora Corporation, 864.

12. Spacers: Glazing spacers shall be warm edge.
13. All adhesives, sealants, paints and coatings applied on site and fall within the weatherproofing system must have VOC contents less than the limits established by LEED criteria.

G. Aluminum Storefront: To establish a standard of quality, products shall be based on EFCO 403-I Thermal Flush Glazed Screw Spline Storefront system. Equal products shall be acceptable.

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
   a. Sheet and Plate: ASTM B 209.
   b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
   d. Structural Profiles: ASTM B 308/B 308M.
   e. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M

2. Organic Finish: All exposed areas of aluminum windows and components shall be provided with a high-performance 70 percent fluoropolymer finish, AA-M12-C42-R1X. Color as selected by architect from manufacturer’s full range of options.

3. Steel Reinforcement: With manufacturer’s standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
   a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

4. All adhesives, sealants, paints and coatings applied on site and fall within the weatherproofing system must have VOC contents less than the limits listed in Section 018113 MA-CHPS® Product Requirements.

5. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
   a. Construction: Thermal-break required at all exterior locations.

6. Thermal Barrier: Barrier material shall be poured in place, two part polyurethane. A non-structural barrier will not be accepted. Thermal break to be 6 mm minimum.

7. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum brackets and reinforcements that are compatible with adjacent materials. Provide non-staining, nonferrous shims for aligning system components.

8. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-MA-CHPSing fasteners and accessories compatible with adjacent materials.
   a. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
   b. Reinforce members as required to receive fastener threads.
   c. Do not use exposed fasteners except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.

9. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

10. Flashing: Manufacturer's standard corrosion-resistant, nonstaining, flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.

11. Framing System Gaskets and Sealants and Joint Fillers: Manufacturer's standard recommended by manufacturer for joint type.

12. Bituminous Paint: Cold applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mmil. Thickness per coat.

13. Aluminum Cladding: Prefinished 0.032 inch aluminum cladding to be custom shaped and installed at locations indicated on the drawings. Cladding to be installed with corrosive resistant concealed fasteners.

14. Perimeter Weather Seals: Provide Single-Component Neutral-Curing Silicone Sealant. Available products include, but are not limited to the following:
   a. Dow Corning Corporation; 790
   b. GE Silicones, SilPruf LM SCS2700
   c. Tremco, Spectrem 1
   d. Pecora Corporation, 864.
15. Windows to be factory glazed by the window manufacturer acceding to the following:

16. Typical Insulating Glass (IG-1): Typical at all exterior glazing locations, except where safety glass is required by code and/or security glass is indicated. Acceptable manufacturers include, but are not limited to, the following:

a. General: 1 inch thick insulating glass consisting of ¼ inch, Class 2 – tinted, Annealed float glass, low e coating on the No. 2 surface, Exterior lite; ¼ inch, Class 1 Annealed float glass, Interior lite and argon-filled.

b. 1” VRE 7-65 by Viracon.
   1) Low E-Coating, #2 surface
   2) Visible Light Transmittance: 45 percent
   3) Reflectance Visible Light: 18 percent
   4) U-Value (Winter): 0.25
   5) Solar Heat Gain Coefficient: 0.24
   6) Tint: Gray

c. 1” Solarban 70XL, by Vitro Architectural Glass
   1) Low E Coating, #2 Surface
   2) Visible Light Transmittance: 64 percent
   3) Reflectance Visible Light: 18 percent
   4) U-Value (Winter): 0.24
   5) Solar Heat Gain Coefficient: 0.27
   6) Tint: Gray

17. Insulating Safety Glass (IG-2) Typical at all exterior glazing locations where safety glass is required by code, except where security glass is indicated. Acceptable manufacturers include, but are not limited to, the following:

a. General: 1 inch thick insulating safety glass consisting of ¼ inch, Class 2 – tinted, Annealed float glass, low e coating on the No. 2 surface, Exterior lite; ¼ inch, Class 1 Annealed float glass, Interior lite and argon-filled.

b. 1” VRE 7-65 by Viracon.
   1) Low E-Coating, #2 surface
   2) Visible Light Transmittance: 45 percent
   3) Reflectance Visible Light: 18 percent
   4) U-Value (Winter): 0.25
   5) Solar Heat Gain Coefficient: 0.24
   6) Tint: Gray

c. 1” Solarban 70XL, by Vitro Architectural Glass
   1) Low E Coating, #2 Surface
2) Visible Light Transmittance: 64 percent
3) Reflectance Visible Light: 18 percent
4) U-Value (Winter) 0.24
5) Solar Heat Gain Coefficient: 0.27
6) Tint: Gray

18. Insulating Security Glass (IG-3): Typical at all exterior glazing locations within 7 vertical feet above adjacent grade. Acceptable manufacturers include, but are not limited to, the following:

a. General: 1 5/16 inch thick insulating laminated glass consisting of ¼ inch, Class 2 – tinted, Fully tempered float glass, low e coating on the No. 2 surface, Exterior lite; ¼ inch, Class 1, Annealed float glass, 0.060 inch clear PVB inner layer, ¼ inch, Class 1, Annealed float glass Interior lite and argon-filled.

b. 1 5/8” VUE1-50 Insulating Laminated by Viracon.

1) Low-E coating, #2 Surface
2) Visible Light Transmittance: 46 percent.
3) Reflectance Visible Light: 11 percent.
4) U Value (Winter): 0.28
5) Solar Heat Gain Coefficient: 0.25.
6) Tint color: Gray

c. 1 5/8” Solarban 70 XL Insulating Laminated by PPG Industries.

1) Low-E Coating, #2 Surface
2) Visible Light Transmittance: 64 percent
3) Reflectance Visible Light: 18 percent
4) U Value (Winter): 0.24.
5) Heat Gain Coefficient: 0.27.
6) Tint Color: Gray.

19. Glazing Gaskets: Manufacturer’s standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers that maintain uniform pressure and watertight seal. Glazing gaskets shall be fabricated from an elastomer of type and hardness recommended by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.

20. Spacers and Setting Blocks Gaskets and Bond Breakers: Manufacturer’s standard permanent, non-migrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements. Spaces must be warm-edge.

21. Compression Type Glazing Strips and Weatherstripping: Unless otherwise indicated, and at manufacturer’s option, provide compressible stripping for glazing and weatherstripping such as molded EPDM or neoprene gaskets complying with ASTM D 2000 Designation 2BC415 to 3BC620, or molded PVC gaskets complying with ASTM D
2287, or molded expanded EPDM or neoprene gaskets complying with ASTM C509, Grade 4.

a. Weatherstripping shall be replaceable.

22. Doors: Manufacturer’s standard thermal, wide style aluminum doors with insulated glazing matching glazing of the adjacent storefront panels. Exterior doors to be include insulated glazing.

a. Door Construction: Mechanical clip fastening, SIGMA deep penetration plus welds and 1-1/8 inch long fillet welds inside and outside of all four corners. Glazing stops shall be hook-in type and EPDM glazing gaskets reinforced with non-stretchable cord.

23. Doors: Provide heavy-duty units in sizes and types listed and as recommended by entrance system and hardware manufacturers for entrances and uses indicated. Doors to be operated manually or by the use of an automatic opening device. Provide units with all accessories as required for a complete installation as detailed.

a. All doors shall be machined with templates from the manufacturer of specified hardware. Doors shall be internally reinforced for specified hardware before core is formed in door.

b. Doors are to be shipped with hardware and glazing installed except for door closers and holders that may be field installed.

c. All door glazing shall be tempered.

24. Hinges: Continuous Geared Hinges

25. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.


a. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.

27. Weather Sweeps: Manufacturer’s standard exterior-door bottom sweep with concealed fasteners on mounting strip.

28. Silencers: BHMA A156.16, Grade 1.

29. Thresholds: Raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch (13 mm). Provide all anchors and clips, coordinated with pivots and closers. All thresholds to comply with ADA and MAAB requirements.


30. Finger Guards: Manufacturer’s standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

H. Aluminum Curtain Wall: To establish a standard of quality, products shall be based on EFCO 5500X Thermal outside glazed curtain wall. Equal products shall be acceptable.
1. Aluminum: Extruded aluminum shall be 6063-T6 alloy and temper
   a. Organic Finish: All exposed areas of aluminum windows and components shall be provided with a high-performance 70 percent fluoropolymer finish, AA-M12-C42-R1X. Color as selected by architect from manufacturer’s full range of options

2. Glass: Ship open to receive insulated glazing system specified:
   a. Typical Insulating Glass (IG-1): Typical at all exterior glazing locations, except where safety glass is required by code and/or security glass is indicated. Acceptable manufacturers include, but are not limited to, the following:
      1) General: 1 inch thick insulating glass consisting of ¼ inch, Class 2 – tinted, Annealed float glass, low e coating on the No. 2 surface, Exterior lite; ¼ inch, Class 1 Annealed float glass, Interior lite and argon-filled.
      2) 1” VRE 7-65 by Viracon.
         a) Low E-Coating, #2 surface
         b) Visible Light Transmittance: 45 percent
         c) Reflectance Visible Light 18 percent
         d) U-Value (Winter): 0.25
         e) Solar Heat Gain Coefficient: 0.24
         f) Tint: Gray
      1) 1” Solarban 70XL, by Vitro Architectural Glass
         a) Low E Coating, #2 Surface
         b) Visible Light Transmittance: 64 percent
         c) Reflectance Visible Light: 18 percent
         d) U-Value (Winter) 0.24
         e) Solar Heat Gain Coefficient: 0.27
         f) Tint: Gray
   b. Insulating Safety Glass (IG-2) Typical at all exterior glazing locations where safety glass is required by code, except where security glass is indicated Acceptable manufacturers include, but are not limited to, the following:
      1) General: 1 inch thick insulating safety glass consisting of ¼ inch, Class 2 – tinted, Annealed float glass, low e coating on the No. 2 surface, Exterior lite; ¼ inch, Class 1, Fully tempered float glass, Interior lite and argon-filled.
      2) 1” VRE 7-65 by Viracon.
         a) Low E-Coating, #2 surface
         b) Visible Light Transmittance: 45 percent
         c) Reflectance Visible Light 18 percent
         d) U-Value (Winter): 0.25
         e) Solar Heat Gain Coefficient: 0.24
f) Tint: Gray

3) 1" Solarban 70XL, by Vitro Architectural Glass
   a) Low E Coating, #2 Surface
   b) Visible Light Transmittance: 64 percent
   c) Reflectance Visible Light: 18 percent
   d) U-Value (Winter) 0.24
   e) Solar Heat Gain Coefficient: 0.27
   f) Tint: Gray

c. Insulating Security Glass (IG-3): Typical at all exterior glazing locations within 7 vertical feet above adjacent grade. Acceptable manufacturers include, but are not limited to, the following:

1) General: 15/16 inch thick insulating laminated glass consisting of ¼ inch, Class 2 – tinted, Fully tempered float glass, low e coating on the No. 2 surface, Exterior lite; ¼ inch, Class 1, Annealed float glass, 0.060 inch clear PVB inner layer, ¼ inch, Class 1, Annealed float glass Interior lite and argon-filled.
   a) Low-E coating, #2 Surface
   b) Visible Light Transmittance: 46 percent.
   c) Reflectance Visible Light: 11 percent.
   d) U Value (Winter): 0.28 
   e) Solar Heat Gain Coefficient: 0.25.
   f) Tint color: Gray

2) 1 5\5/8” VUE1-50 Insulating Laminated by Viracon.
   a) Low-E coating, #2 Surface
   b) Visible Light Transmittance: 46 percent.
   c) Reflectance Visible Light: 11 percent.
   d) U Value (Winter): 0.28 
   e) Solar Heat Gain Coefficient: 0.25.
   f) Tint color: Gray

3) 1 5/8” Solarban 70 XL Insulating Laminated by PPG Industries.
   a) Low-E Coating, #2 Surface
   b) Visible Light Transmittance: 64 percent
   c) Reflectance Visible Light: 18 percent
   d) U Value (Winter): 0.24.
   e) Heat Gain Coefficient: 0.27.
   f) Tint Color: Gray.

3. Anchors
   a. Perimeter and floor line anchors shall be aluminum or steel. All steel anchors shall be properly insulated from the aluminum.

4. Thermal Barrier
   a. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal
barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.

b. The thermal barrier shall be thermal struts, consisting of glass reinforced polyamide nylon, mechanically crimped in raceways extruded in the exterior and interior extrusions.

c. Poured and debridged urethane thermal barriers shall not be permitted.

5. Perimeter Weather Seals: Provide Single-Component Neutral-Curing Silicone Sealant. Available products include, but are not limited to the following:

   a. Dow Corning Corporation; 790
   b. GE Silicones, SilPruf LM SCS2700
   c. Tremco, Spectrem 1
   d. Pecora Corporation, 864.

I. Special Glazing Conditions:

   1. All first floor glazing within 7'-0" of grade shall be laminated

B2030  EXTERIOR DOORS & GRILLES

A. LEED-S V.4 Submittals shall be provided for all wood, steel and sealant products, including printed statement of VOC content, Composite Wood Manufacturer’s product data for each composite wood product used indicating that bonding agent used contains no urea formaldehyde, Product certificates for all wood-based products certified by the Forest Stewardship Council (FSC) stating chain-of-custody (COC) number, Product certificates showing percentage by weight of Pre and Post-consumer recycled content of steel products. Include statement indicating cost for each material and the fraction by weight that is considered FSC certified.

   1. Work of this Section contributes to LEED Credits MR.3 and IEQ.2.

B. Wood blocking at openings shall be pressure treated.

   1. Preservative treatment shall be by pressure process; AWPA C2 (lumber) and AWPA C9 (plywood), except where lumber is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with organic boron (SBX).
   2. Kiln dry treated wood to a maximum moisture content of 19 percent for lumber and 15 percent for plywood, following treatment process.

C. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review

   1. Factory mark each piece of lumber with grade stamp of grading agency.
   2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber S4S unless otherwise indicated.
4. Provide dry lumber with 15 percent maximum moisture content at time of dressing for 2 inch nominal thickness or less, unless otherwise indicated.

D. Plywood Panels: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.
   1. Thickness: As needed to comply with the requirements specified, but not less than thickness indicated.
   2. Factory mark panels according to indicated standard.

E. Steel Doors: Thermally Rated (insulated) steel doors shall be provided with a minimum R-Value of 4.0 deg F x H x s.f./Btu when tested in accordance with ASTM C 1363. Fabricate from metallic-coated steel sheet.
   1. Design: Flush Panel.
   2. Core Construction: Manufacture’s standard kraft-paper honeycomb, polystyrene, polyurethane, mineral-board, or vertical steel stiffener core that produces doors complying with ANSI A250.8.
   3. Top and Bottom Edges: closed with flush or inverted 0.042 inch thick end closures or channels of same material as face sheets.

F. Steel Frames: Fabricate from 0.53 inch metallic-coated steel sheet.
   1. Fabricate frames with mitered or coped and welded face corners.
   2. Provide Thermal Break
      a. Dow Corning Corporation; 790
      b. GE Silicons; SilPruf LM SCS2700
      c. Tremco; Spectrem 1
      d. Pecora Corporation; 864

G. Hardware:
   1. Single Doors:
      a. (1) ea. Continuous hinge.
      b. (1) ea. Panic Device
      c. (2) ea. Mortise cylinder – mortise as required.
      d. (1) ea. Surface closer.
      e. (1) ea. Kick plate.
      f. (1) set Weather seals
      g. (1) ea. Sweep
      h. (1) ea. ADA compliant aluminum threshold
      i. Provide intercom/ camera/ buzzer unit at primary elementary and middle school office entrance.
3. Double Doors:
   a. (2) ea. Continuous hinge
   b. (1) ea. Removable mullion
   c. (2) ea. Panic device
   d. (4) ea. Mortise cylinder – mortise as required
   e. (1) ea. Astragal
   f. (2) ea. Surface closer
   g. (2) ea. Kick plate
   h. (1) set Weather seals
   i. (2) ea. Sweeps
   j. (1) ea. ADA compliant aluminum threshold
   k. Provide automatic openers at interior and exterior vestibule doors at the primary elementary and middle school entrances
   l. Provide electronic access control at designated locations

J. Exterior doors and frames shall be factory primed for field painting.

K. Exterior Grilles: Provide aluminum, architectural-style grilles and louvers with for mechanical systems.
   1) Louver-Profile: Provide self-draining assemblies with weather-proof profile at louver blades.
   2) Finish: Polyvinylidene Fluoride (PVDF) Coating: AA-C12C42R1x (Chemical Finish cleaned with inhibited chemicals, Chemical Finish: chemical conversion coating, acid-chromate-fluoride-phosphate pretreatment, Organic Coating, as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
      a) Organic Coating: resin containing 70 percent fluoropolymer, thermosetting.
      b) Quality Standard: Conforming to AAMA 2605-02, including 10 years Florida exposure and 4,000 hours humidity tests
      c) Pretreatment: Five stage, zinc chromate conversion coating.
      d) Application: Electrostatic spray and oven bake
      e) Coating Quantity: Minimum one primer coat and one color coat
      f) Dry Film Thickness: Minimum 1.2 mils on exposed surfaces, except inside corners and channels
      g) Color and Gloss: As selected by Architect from manufacturer’s full range of color and gloss options.

B30 ROOFING

Design Intent: Typical roof assemblies shall provide an average R-value not less than R-30. Under the base bid, all roofs shall consist of an 80 mil. reinforced single-ply PVC membrane, fully adhered to rigid insulation boards, over a continuous vapor barrier on steel roof deck. A ‘Green Roof’ bid alternate is planned for low roof areas, accessible from the second and third floors, where indicated on the drawings. Typical green roof assemblies will consist of a growing medium, over a prefabricated drainage mat, over a 60 mil. PVC waterproofing membrane, loose
laid above a continuous slip sheet on XPS insulation boards. Insulation shall be installed over a continuous vapor barrier on 5/8 inch fiberglass reinforced gypsum sheathing, on steel roof deck.

**B3010 ROOF COVERINGS**

A. LEED-S V.4 Submittals shall be provided for products with high SRI value and for products with recycled content. Provide documentation indicating SRI value and color of the roofing membrane for compliance with LEED reflectivity requirements. Provide documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.

1. Work of this Section contributes to LEED Credits SS.5 and MR.3.

B. Unless noted otherwise, roofs shall be provided as fully adhered pvc single-ply roofing systems.

C. Provide pvc sheet complying with ASTM D 4434-96 “Standard for Polyvinyl Chloride Sheet Roofing”, Type II, Grade 1, fiber reinforced as follows:

1. Available products which may be incorporated into the work include, but are not limited to, the following:
   a. Sarnafil, Inc.
   b. Carlisle
   c. Equal products.

2. Thickness: 80 mil (1.5 mm), nominal.

3. Color of Membrane: (Off-white compliant with LEED-S V.4 reflectivity standards established in Sustainable Sites Credit SS.5). Non-Energy Star rated products will not be accepted.

4. Physical Properties:

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<thead>
<tr>
<th>Parameter:</th>
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<th>Minimum</th>
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<tr>
<td>Tearing Resistance, min. lbf.</td>
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Schematic Design Specifications

h. Low Temperature Bend (-40 deg. F) D-2136 Pass
i. Accelerated Weathering Test ((Xenon arc) D-2565 10,000 hours
   Cracking (7x magnification) - None
   Discoloration (by observation) - Negligible
   Crazing (7x magnification) - None
j. Linear Dimensional Change D-1204 0.02%
k. Weight Change After Immersion in Water, max. D-570 2.5%
l. Static Puncture Resistance, 33 lbf D-5602 Pass
m. Dynamic Puncture Resistance, 7.3 ft-lbf D-5635 Pass

D. Sheet Flashing: Manufacturer’s standard fiberglass reinforced sheet flashing of same material, type, reinforcement, thickness, and color as pvc membrane.

E. Bonding Adhesive: Manufacturer’s standard bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.

F. Metal Termination Bars: Manufacturer’s standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

G. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, aluminum tape and other accessories.

I. Substrate Board: Water resistant, silicone treated, gypsum core with embedded fiberglass mats on top and bottom of the board meeting requirements of ASTM C 1117 / C 1177M-99.

J. Vapor Retarder: 32 mil. (0.8 mm) thick self-adhesive vapor composed of SBS modified bitumen. Top layer shall be a high density polyethylene grid laminated between two layers of polyethylene film. A silicone release plastic film shall cover the self-adhesive back.

1. Breaking Strength, MD/XD: 64/88 lbf/in. ASTM D 5147
2. Ultimate Elongation, MD/XD: 52 / 24%. ASTM D 5147
4. Static Puncture: 90 lbs ASTM D5602
5. Tear Resistance, MD/XD: 84 / 90 lbf. ASTM D5601
7. Peel Strength: 8 lbf/in ASTM D 903
8. Water Absorption < 0.1% ASTM D 5147
9. Water Vapor Permeance (perms) 0.017 ASTM E-96
   (procedure B)
10. Air Permeability 1.14 10-3 ft3/min. sq.ft.ASTM D-1970 (75pa)
K. Roof Insulation: Provide preformed roof insulation boards that comply with requirements and referenced standards. Insulation boards shall be a maximum of 4’ 0” x 4’ 0” x the thickness indicated. Insulation shall be installed in a minimum of 2 layers with staggered joints. Boards shall be polyisocyanurate, Type II, felt or glass-fiber mat facer on both major surfaces, complying with ASTM C 1289.

1. Tapered insulation boards shall be provided as needed to match slopes or create crickets around new rooftop equipment. Provide factory-tapered insulation boards fabricated to a slope of ¼ inch per 12 inches unless noted otherwise.

L. Walkways: Provide heat-weldable, sand coated walkway produced from 60 mil (1.5 mm) thick fiberglass reinforced membrane, double coated with Number 0 Silica Sand, and manufacturer’s recommended adhesive. Walkways shall be provided in 26 inch, 36 inch, and 78 inch wide sheets, and arranged to provide 26 inch wide access from point of roof access to all new mechanical rooftop equipment. Walkways shall be provided to all access door / service locations on large units and around perimeter of small units and fans. Protection shall be extended to 78 inches at service locations to protect roofing membrane from tools.

M. Ships Ladders: Vertical access between roof levels shall be provided where indicated by aluminum ship ladder

1. General: Aluminum Ships Ladders shall be provided where indicated, with a capacity of 1,000 lb total load without failure, and as follows:

   a. Ladder Incline: 60 – 75 degrees
   b. Ladder Stringers: 5 inch by 2 inch by 3/16 inch extruded 6005 T6 aluminum channel
   c. Ladder Treads: 5 3/16 inch by 1 1/8 inch by 1/8 inch extruded 6005 T6 aluminum with serrated slip resistance surface standard. 1 ¼ inch by 1 ¼ inch angle welded to underside of treads. Treads shall be welded and bolted to stringer with ¼ inch stainless steel bolts.
   d. Ladder Mounting Brackets: Provide brackets on both sides as follows:

      1) Floor Brackets: 2 inch by 3 inch by ¼ inch aluminum angle
      2) Top Brackets: 4 ¾ inch by 5 inch by ¼ inch aluminum angle

   e. Ladder Handrails: Provide handrails at both sides as follows:

      1) 1 ¼ inch, schedule 40 600r T5 aluminum pipe provided with internal aluminum fittings.

   f. Platforms:

      1) Surface: Platforms 9 sf or less shall be made of standard tread material. Platforms greater than 9 sf shall have a bar grating surface.
      2) Toe Boards: 5 inch by 1 1/4 inch 6005 T6 aluminum
      3) Handrails: 1 ¾ inch, schedule 40 7005 T5 aluminum pipe with internal fittings

   g. Finishes: Standard mill finish
Alternate Vegetated Roofs: Where indicated, an alternate vegetated roofing system shall be provided as follows:

1. General: To establish a minimum standard of quality, vegetated roof shall be based on the Sika Sarnafil Intensive vegetated roofing assembly.

2. Assembly Make-Up: From deck to vegetated surface, roof layers shall include:

a. Steel Roof Deck

   1) Acceptable Manufacturers:

      a) Canam Steel Corp.
      b) Consolidated Systems, Inc.
      c) United Steel Deck, Inc.

   2) Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with “SDI Specifications and Commentary for Steel Roof Deck” in SDI Publication No. 30, and with the following:

      a) Galvanized Steel Sheet: ASTM A 653/ A 653M, Structural Steel (SS), Grade G60 Zinc coating.
      b) Deck Profile and Profile Depth: 1-1/2”, Type B.
      c) Design Uncoated Steel Thickness: 20 gauge.
      d) Span Condition: As indicated.
      e) Side Laps: Overlapped or interlocking seam at Contractor’s option.

   3) Steel Deck Accessories:

      a) General: Provide manufacturer’s standard accessory materials for deck that comply with requirements indicated.
      b) Mechanical Fasteners: Corrosion Resistant, low-velocity, power-acted or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
      c) Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon steel screws, No. 10 minimum diameter.
      d) Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
      e) Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359 inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
      f) Pour Stops Adjacent to Exterior Cladding: Steel angles, minimum yield strength of 33,000 psi, suitable for attachment of cladding anchors.
      g) Column Closures, End Closures, Z-Closures and Cover Plates: Steel sheet, of same material finish and thickness as deck, unless otherwise indicated.
      h) Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0747 inch thick, with factory punched hole of 3/8 inch diameter.
i) Galvanizing Repair Paint: ASTM A 780. Interior, field applied paint shall have a VOC content of 250 g/L or less, when calculated according to 40 CFR 59, Subpart D (EPA Method 24)

j) Repair Paint: Manufacturer’s standard rust-inhibitive primer of same color as primer. Interior, field-applied paint shall have a VOC content of 250 of less, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

4) Thermal Barrier Substrate Board: Water resistant, silicone treated, gypsum core with embedded fiberglass mats on the tip and bottom of the board meeting requirements of ASTM C 1117/ C1117M-99

   a) To establish a minimum standard of quality specifications are based on Densdeck, as manufactured by Tremco. Equal produces accepted.
   b) Dimensions: 4 ft by 8 ft by 5/8 inch

5) Insulation Board: Extruded polystyrene boards (XPS). Comply with ASTM C578, for Type V XPS, with minimum compressive strength of 100 psi.

   a) Fire Resistance: Flame Spread and Smoke Developed Indexes of 25 and 45 respectively, per ASTM E84.
   b) Profile and Thickness: Provide standard boards at thickness required to meet stated R-Values. Provide tapered boards as necessary.

6) Separation Sheet: 9 oz/ yd² geotextile fabric, composed of 100 percent recycled polypropylene fibers tightly knit together.

   a) Basis of Design: To establish a minimum standard of quality, specifications are based on Sarnafelt NWP Separation Layer as manufactured by Sika Sarnafil. Equal products accepted.

7) Single-Ply Roof Membrane: 60 mil PVC membrane shall be loose laid over separation sheet.

   a) Basis of Design: To establish a minimum standard of quality, specifications are based on the G476 Waterproofing Membrane, as manufactured by Sika Sarnafil. Equal products accepted.

   b) Typical Physical Properties:

<table>
<thead>
<tr>
<th>Properties</th>
<th>ASTM Method</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Thickness, mil</td>
<td>D751</td>
<td>60</td>
</tr>
<tr>
<td>Reinforcing Material</td>
<td></td>
<td>Fiberglass</td>
</tr>
<tr>
<td>Weight, psf (kg/m²)</td>
<td></td>
<td>0.39 (1.93)</td>
</tr>
<tr>
<td>Breaking Strength, psf/in (N)</td>
<td>D751</td>
<td>92 (409)</td>
</tr>
<tr>
<td>Elongation at Break, %MD &amp; CMD</td>
<td>D751</td>
<td>255 &amp; 240</td>
</tr>
<tr>
<td>Seam Strength, % Original</td>
<td>D751</td>
<td>90</td>
</tr>
<tr>
<td>Retention of Properties After Aging:</td>
<td>D3045</td>
<td>--</td>
</tr>
<tr>
<td>Tensile Strength, % Original</td>
<td>D751</td>
<td>95</td>
</tr>
</tbody>
</table>
Elongation, % Original  D751  95
Tearing Resistance, lbf (N)  D1004  17 (76)
Low Temp. Bend, -40° F  D2136  Pass
Linear Dimensional Change, %  D1204  0.01
Weight Change after Immersion in Water, %  D570  2.5
Static Puncture Resistance  D5602  Pass
Dynamic Puncture Resistance, ft-lbf (J)  D5635  Pass

C) Color: Top, Orange; Bottom, Dark Gray

8) Drainage Composite: Prefabricated composite panel with a 0.40 inch profile designed to provide continuous free flow of water in horizontal applications.

a) Basis of Design: To establish a minimum standard of quality, specifications are based on Drainage Panel 900 as manufactured by Sika Sarnafil. Equal products accepted.

b) Composition: High impact resistant polypropylene core and woven monofilament fabric.

c) Technical Data:

<table>
<thead>
<tr>
<th>Core</th>
<th>ASTM Method</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Compressive Strength</td>
<td>D1621</td>
<td>21,000 psf</td>
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<tr>
<td>Thickness</td>
<td>D 1777</td>
<td>0.40 in</td>
</tr>
<tr>
<td>Flow</td>
<td>D4716</td>
<td>21 gpm/ft width</td>
</tr>
</tbody>
</table>

Fabric

| Flow                                      | D4491       | 145 gpm/ft² |
| Puncture                                  | D 4833      | 100 lbs     |
| Apparent Opening Size (EOS)               | D 4751      | 40 US Sieve |
| Grab Tensile                              | D 4632      | 365 lbs     |

Drainage Panel

| Weight                                    | --          | 0.39 psf   |
| VOC Content                               |             | 0 g/L      |

9) Growth Medium: Anticipated depth over 6 inches (15 cm), as indicated to support native, drought-tolerant, wind-resistant vegetation and medium foot traffic.

B3020    ROOF OPENINGS

A. Not applicable. Roof Access will be by man-door from second floor. Ships Ladder Access will be provided to various roof levels.
C INTERIORS

C10 INTERIOR CONSTRUCTION

Design Intent:  Typical Interior partitions are intended as non-load bearing light gauge steel framed, gypsum board assemblies providing a minimum STC rating of 35. At gymnasium and locker room areas, interior partitions will consist of reinforced concrete masonry units. Specialty partitions include solid plastic privacy partitions at toilet rooms, cubicle curtains the nurse’s suite resting area, an 81 ft wide by 28 ft high vertical folding wall to separate the middle school and elementary school P.E. teaching stations in the gym, and two operable partitions to isolate the Band/ Chorus/ Stage from flanking Gymatorium and Adaptive PE spaces. Typical interior doors shall be 1 3/4 inch thick, custom grade solid core wood with maple veneers and a premium transparent finish. Where indicated, interior windows shall be provided with hollow metal frames, factory primed for field painting. Interior vestibules at the elementary and middle school entrances shall be provided as bullet resistant, aluminum framed assemblies, with a Level 3 UL rating.

C1010 Partitions

A. Toilet Compartments

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Santana Products, Inc.
b. Accurate Partitions Corporation.
c. Comtec Industries, Compression Polymers Group.

2. Materials: Provide materials that have been selected for surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are unacceptable.

3. Solid-Plastic, Polymer Resin: High-density polyethylene (HDPE) with homogenous color throughout. Provide material not less than 1 inch thick with seamless construction and eased edges in color and pattern as follows:

a. Color and Pattern: Two colors and patterns, per building, as selected by Architect from manufacturer’s full range of colors and patterns.

4. Full-Height (Continuous) Brackets: Manufacturer’s standard design for attaching panels and screens to walls and pilasters of the following material:


5. Hardware and Accessories: Heavy-duty operating hardware and accessories of the following material:


7. Anchorages and Fasteners: Manufacturer’s standard exposed fasteners of stainless steel or with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

8. Cross Brace: Provide high-density polyethylene (HDPE) with homogenous color throughout, 4” high brace with stainless steel connection brackets at each end. Provide material not less than 1 inch thick with seamless construction and eased edges in color and pattern chosen by the architect.

9. Toilet Compartment Fabrication

a. General: Provide standard doors, panels, screens, and pilasters fabricated for compartment system. Provide units with cutouts and drilled holes to receive compartment-mounted hardware, accessories, and grab bars, as indicated.

b. Solid-Plastic, Polymer-Resin Compartments: Provide aluminum heat-sink strips at exposed bottom edges of HDPE units to prevent burning.

c. Continuous Wall Brackets: Minimum of 54” long, 1/8” thick aluminum brackets with bright dipped anodized finish. ¾” dia. Typical screw holes a min. of four on each bracket at a min. of 13” on center.

d. Pilasters shall be mounted and secured to the ceiling structure by hardware supplied by manufacturer. Pilaster sleeves shall be 4 inches (102 mm) high stainless steel (type 304, 20 gauge) secured to the top of the pilaster with a stainless steel tamper resistant Torx head sex bolt.

e. Doors: Unless otherwise indicated, provide 1” thick 24-inch- wide in-swinging doors for standard toilet compartments and 36-inch- wide out-swinging doors with a minimum 32-inch- wide clear opening for compartments indicated to be handicapped accessible.

1) Integral Hinge System: Top pin assembly to have a nylon pin and stainless steel roll pin. Bottom pin assembly to have a nylon cam with stainless steel insert and stainless steel roll pin.

2) Latch and Strike: Latch to be anodized aluminum with bright-dip finish and special tuff coat finish on slide bolt. 3/8” X 1 ½” slot cut out of door at latch center designed for emergency access. Strike to be 6” aluminum with a bright dipped anodized finish.

3) Coat Hook: Manufacturer’s combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.

4) Wall Bumper: Manufacturer’s standard rubber-tipped bumpers at out-swinging doors.

5) Door Pull: Manufacturer’s standard unit that complies with accessibility requirements of authorities having jurisdiction at out-swinging doors. Provide units on both sides of doors at each stall.

10. Toilet Compartment Stainless Steel Finishes
a. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

1) Remove or blend tool and die marks and stretch lines into finish.
2) Grind and polish surfaces to produce uniform, directional textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

b. Finish: Manufacturer's standard No. 3 or No. 4 directional polish.

c. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

d. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

B. Cubicle Curtains and Track

1. Curtains: Provide curtains with the following characteristics:

a. Launderable to a temperature of not less than 160 deg F.

b. Flame resistant and identical to those that have passed NFPA 701 when tested by a testing and inspecting agency acceptable to authorities having jurisdiction.

1) Identify fabrics with appropriate markings of a qualified testing agency.

c. Cubicle Curtain Fabric: Curtain manufacturer's standard, 100 percent polyester; inherently and permanently flame resistant, stain resistant, and antimicrobial.

1) Cubicle Curtain Fabric: Curtain manufacturer's standard, 100 percent polyester; inherently and permanently flame resistant, stain resistant, and antimicrobial.

d. Curtain Grommets: Two-piece, rolled-edge, rustproof, nickel-plated brass; spaced not more than 6 inches o.c.; machined into top hem.

e. Mesh Top: Not less than 20-inch-high mesh top of No. 50 nylon mesh

2. Curtain Support Systems:

a. Acceptable curtain support system may be provided from the following or equal. Basis of design is Clikeze System by InPro Corporation:

1) InPro Corporation
2) A.R. Nelson Co.
3) Salsbury Industries

b. Extruded Aluminum Curtain Track: Not less than 1 ¼ inches wide by 1 1/8 inch high, with manufacturer’s standard wall thickness.

1) Curved Track: Factory-fabricated, 12-inch-radius bends.
2) Finish: Satin anodized.
Easthampton Maple Elementary School
Design Alternative E.4; Pre-K Through Grade 8
Schematic Design Specifications

Curtain Track Accessories: Fabricate splices, end caps, connectors, end stops, coupling and joining sleeves, wall flanges, brackets, ceiling clips, and other accessories from same material and with same finish as track.

1) End Stop: Removable with carrier hook

3. Curtain Fabrication:
   a. Width: Equal to track length from which curtain is hung plus 10 percent added fullness, but not less than 12 inches added fullness.
   b. Length: Equal to floor-to-ceiling height, minus depth of track and carrier at top, and minus clearance above the finished floor as follows:
   c. Cubicle Curtains: 12 inches.
   d. Mesh Top: Top hem of mesh not less than 1 inch and not more than 1-1/2 inches wide, triple thickness, reinforced with integral web, and double lockstitched. Double lockstitch bottom of mesh directly to 1/2-inch triple thickness, top hem of curtain fabric.
   e. Bottom Hem: Not less than 1 inch and not more than 1-1/2 inches wide, double thickness and double lockstitched.
   f. Side Hems: Not less than 1/2 inch and not more than 1-1/4 inches wide, with double turned edges, and single lockstitched.
   g. Vertical Seams: Not less than 1/2 inch wide, double turned and double stitched

B. Gypsum Partitions

1. LEED-S V.4 Submittals shall be provided for products demonstrating low VOC’s and for products with recycled content. Submittals for adhesives and sealants shall include printed statement of VOC content. Gypsum based, light gauge steel framing, and concrete masonry unit product submittals shall provide documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content. Submittals for masonry products and reinforcing steel shall demonstrate products are extracted, recovered and manufactured locally (within 500 miles of the project site).

   a. Work of this Section contributes to LEED Credits MR.2, MR.3, MR.4 and IEQ.2

2. Light Gauge Steel Framing members shall comply with ASTM C 754 with Steel Sheet Components complying with ASTM C 654.
3. Steel Studs and Runners: ASTM C 645, provide minimum base metal thickness of 0.0312 inches.
4. Slip-Type Head Joints: Where indicated provide one of the following:

   a. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
b. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.

c. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1) Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

   a) Steel Network Inc. (The); VertiClip Series.
   b) Superior Metal Trim; Superior Flex Track System (SFT).

5. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width required by design. Minimum base metal thickness shall be 0.0312 inch.

6. Cold-Rolled Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch-wide flanges.

   a. Depth: 1 ½ inches
   b. Clip Angle: Not less than 1 ½ by 1 1.2 inches, 0.068 inch thick, galvanized steel.


8. Resilient Furring Channels: ½ inch deep, steel sheet members designed to reduce sound transmission. Channels shall be asymmetrical or hat-shaped.

9. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

10. Interior Gypsum Board

   a. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

      1) Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

         a) USB Corporation
         b) Certainteed
         c) National Gypsum
         d) Equal products.

      2) Fire Resistant Type X board shall be provided with a minimum thickness of 5/8 inch and tapered profile on long edges.
3) Flexible Type board shall be manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness. Provide ¼ inch thick boards with tapered profile on long edges.

4) Abuse Resistant Type boards shall be manufactured to produce greater resistance to surface indentation and through penetrations (impact resistance) than standard type and Type X gypsum board. Core shall be 5/8 inch thick, Type X, and long edges shall be tapered.

5) Tile Backing Panels: Provide cementitious units complying with ANSI A 108.1 standards. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   a) Custom Building Products; Wonderboard
   b) FinPan, Inc.; Util-A-Crete Concrete Backer Board
   c) USG Corporation; Durorock Cement Board

b. Interior Trim shall comply ASTM C 1047 and fabricated of galvanized or aluminum-coated steel sheet or rolled zinc.

c. Joint Tape shall be paper at gypsum board panels, 10-by-10 glass mesh at glass-mat gypsum panels and as recommended by manufacturer at tile backing panels.

d. Joint Compound: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
   1) Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
   2) Embedding and First Coat: For embedding tape and first coat on joints, fasteners and trim flanges, use setting-type taping compound.
   3) Fill Coat: For second coat, use setting-type, sandable topping compound.
   4) Finish Coat: For third coat, use setting-type sandable topping compound for a level 4 finish.

e. Sound Attenuation Blankets: ASTM C 665 Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool or rock wool shall be provided in all stud wall cavities. Comply with mineral fiber requirements of assembly at all fire resistance rated assemblies.

f. Acoustic Sealant: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   1) Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant
   2) United States Gypsum Co.; Sheetrock Acoustical Sealant
   3) Equal products.

C. Masonry Partitions
1. **Concrete Masonry Units (CMU):** Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bond beams, u-blocks, bonding, wall caps and other special conditions. Unless noted otherwise, bullnose units shall be provided at outside corners, door jambs, window jambs, and window sills.

2. **Concrete Block:** Provide units complying with characteristics indicated below for Grade, Type, face size, exposed face and, under each form included, for weight classification:
   a. **Grade:** N
   b. **Size:** Manufacturer’s standard units with nominal face dimensions of 16 inches long by 8 inches high by thickness indicated.
   c. **Type II, nonmoisture-controlled units**
   d. **Exposed Faces:** Manufacturer’s standard color and texture, unless otherwise indicated.
   e. **Weight Classification:** Normal Weight.

3. **Fire Rated Concrete Masonry Units:**
   a. **General:** Comply with referenced standards and other requirements indicated below applicable to each form of sound absorbing concrete masonry units.
   b. **All concrete masonry unit submittals shall include ASTM fire rating approvals and certifications.**

4. **Mortar and Grout Materials:**
   a. **Portland Cement:** ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color cement.
   b. **Hydrated Lime:** ASTM C 207, Type S.
   c. **Aggregate for Mortar:** ASTM C 144; except for joints less than 1/4 inch, use aggregate graded with 100 percent passing the No. 16 sieve.
   d. **Aggreate for Grout:** ASTM C 404.
   e. **Ready-Mixed Mortar:** Cementitious materials, water, and aggregate complying with requirements specified in this Article; combined to produce a pre-blended mortar.
      1) The dry mortar mix materials, including cementitious material and aggregate shall be weighed in a factory, under controlled conditions. All ingredients of the mortar shall be completely dried and pre-blended off the jobsite.
      2) Supplier: Spec Mix or approved equivalent manufacturer.
   f. **Ready-Mixed Grout:** Cementitious materials, water, and aggregate complying with requirements specified in this Article; combined to produce a pre-blended grout.
      1) **Ready-Mixed Grout:** Cementitious materials, water, and aggregate complying with requirements specified in this Article; combined to produce a pre-blended grout.
2) Ready-Mixed Grout: Cementitious materials, water, and aggregate complying with requirements specified in this Article; combined to produce a pre-blended grout

   b. Products: Subject to compliance with requirements, provide one of the following:
      1) Dry-Block Mortar Admixture; W.R. Grace & Co.

6. Reinforcing Steel: Material and Grade as follows:
   a. Steel reinforcing bars shall be billet steel complying with ASTM A 615, Grade 60.
      1) Joint Reinforcement: Provide joint reinforcement formed from stainless steel wire, meeting requirements of ASTM A 580.
   c. Description: Welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet, with prefabricated corner and tee units, and complying with requirements indicated below:
      1) Wire Diameter for Side Rods: 0.1875 inch.
      2) Wire Diameter for Cross Rods: 0.1875 inch
   d. For Single-wythe masonry, provide ladder design with single pair of side rods and perpendicular cross rods spaced not more than 16 inches on center.
   e. For Multi-wythe masonry, provide ladder design with perpendicular cross rods spaced not more than 16 inches on center. Provide one side rod for each face shell of Welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet, with prefabricated corner and tee units, and complying with requirements indicated. Provide integral drips on all cross rods at cavity walls.
      1) Ties and Anchors – General: Provide ties and anchors specified which comply with requirements for metal and size, unless otherwise indicated. All ties and anchors are to be 304 stainless steel. At all metal stud locations masonry ties and be Hohmann and Barnard, Inc. HB-200 Type 304 S.S. or approved equal.
      2) Wire: 0.24 inch diameter stainless steel wire complying with ASTM A 50, Type 304.
      3) Steel Sheet: 0.0747 inch galvanized steel sheet complying with ASTM A 3660.

7. Loose Lintels:
   a. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.
b. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.

c. Loose lintels in exterior walls and at locker rooms shall be hot-dipped galvanized

8. Masonry Wall Ties:

a. Wall ties are required to brace all CMU walls to the adjacent floor and roof structure at each floor and roof level. Wall ties will be comprised of 6x4x5/16x4” long steel angles spaced at 32” on center. The wall ties will be field welded to the adjacent steel structure and anchored to the CMU wall with one 5/8” diameter adhesive anchor each.

D. Operable Partitions:

1. Basis of Design: To establish a minimum standard of quality, specifications are based on Acousti-Seal Encore Series by ModernFold, a Dorma Group Company. Equal products accepted.


3. Panel Construction: Nominal 4 ¼ inch thick panels in manufacturer’s standard 51 inch widths. All panel horizontal and vertical framing members fabricated from minimum 16 gauge formed steel with overlapped and welded corners for rigidity. Top channel is reinforced to support suspension system components. Frame is designed so that full vertical edges of panels are of formed steel and provide concealed protection of the edges of the panel skin.

   a. Panel Skin: Roll-formed steel wrapping around panel edge. Panel skins shall be lock formed and welded directly to the frame for unitized construction.

   b. Acoustical Rating: 56 STC

   c. Panel Trim: no vertical or horizontal trim required or allowed on edges of panels; minimum groove appearance at panel joints.

   d. Panel Weight: 11.8 psf.

   e. Panel Finishes: Acoustical non-woven, needle-punch carpet with fused fibers to prevent unraveling or fray of material.

   f. Panel Trim: No exposed panel trim required or allowed. Hardware to be of one consistent color as selected from manufacturer’s full range of standard options.

4. Sound Seals:

   a. Vertical Interlocking Sound Seals between Panels: Aluminum astragals, with tongue and groove configuration in each panel edge. Rigid plastic astragals are not acceptable.
b. Horizontal Top Seals: Manufacturer’s standard automatic operable top seal. Manually operated top seals are not permitted.

c. Horizontal Bottom Seals: Automatic bottom seals providing nominal 4 inch operating clearance with an operating range of +½ inch to -3 ½ inches which automatically drop as panels are positioned, without the need for tools or cranks. Extended seal shall exert nominal 120 pounds downward force to the floor throughout the operating range.

5. Suspension System: Based on ModernFold RT-200, 2.50” Multi-Directional Suspension System:

a. Suspension Tracks: Precision heat-treated extruded aluminum. Track to be supported by pairs of 3/8 inch diameter threaded rods.

   1) Exposed Soffit: Aluminum, integral to track. Provide off-white, pre-painted finish.

b. Carriers: Shall have horizontal counter rotating wheels with oversized, steel-reinforced, heavy-duty thrust steel bearings. Carriers permit panels to traverse, L, T or X intersections without mechanical switching.

6. Operable Partition Schedule:

a. Partition A:

   1) Location: Proscenium Opening between Band/ Chorus/ Stage and Gymatorium
   2) Size: 11 Panels (approximately 46’-8”) wide by 18’-0” high.
   3) Stacking Arrangement: Remote Expandable Closure – Parallel Stack (Angle Stack) Smart Track.

b. Partition B:

   1) Location: Proscenium Opening between Band/ Chorus/ Stage and Adaptive PE
   2) Size: 12 panels (approximately 51’-0”) wide by 16’-0” high.
   3) Stacking Arrangement: Expandable Closure – 90 Degree Side Stack Smart Track.

E. Vertical Folding Walls:

1. General: Automatic Vertically Retractable Acoustical Wall shall, when in the down position (closed) shall consist of hard, rigid, flat, plumb walls, made of a grid of rectangular acoustical panels, and when are lifted (opened), fold upward (vertically) without the use of any manual labor, in a manner similar to an accordion, into a pocket in the ceiling, between roof joists, or up between built in bulkheads. In the down (closed) position, the wall shall be comprised of two vertical planes of acoustical panels, separated by an acoustical air space. When in operation, all wall panels shall fold and unfold at the exact same time and at the exact same rate.
2. Basis of Design: To establish a minimum standard of quality, specifications are based on the Skyfold Classic Automatic Vertically Retractable Acoustic Walls, as manufactured by Skyfold Inc. Equal products accepted.

3. Acoustical Panels:
   a. Acoustical Panels shall be faced with steel that is compatible with a wide variety of architectural finishes, such as paint, vinyl, fabric, specialty metals, wood veneer, etc.
   b. Acoustical Panels, together with all of the sound insulation, shall be, as much as possible, made of non-combustible or fire-treated materials.
   c. Acoustical panels shall be fabricated to be as stiff as possible in order to satisfy the rigid criteria when the operable wall is down (closed) and to ensure that there is no interference between panels when the wall is in motion.
   d. Acoustical panels shall be architecturally flat with no bowing, oil canning, warping, waviness or any other surface deformation and discontinuity.
   e. Acoustical panels shall have the finish of the architect’s choice, provided that the finish has been approved by the operable wall manufacturer to ensure compatibility with the wall panels. The following criteria must be met:
      1) Maximum weight of material: 0.111 psf
      2) Maximum Thickness of Material: 1/8 inch
      3) No brittle materials
      4) Finishes are railroaded onto the panels, applied horizontally along the panel length.
   f. Acoustical panels shall meet the following STC ratings in accordance with ASTM E90 (ISO 140-3) specification as reported by an independent laboratory:
      
      | Panel Construction | Fully Automatic Operable Wall |
      |--------------------|-------------------------------|
      | 61 STC (60 Rw)    | 51 STC (51 Rw)               |

4. Folding Mechanism:
   a. The hanging, folding and extension mechanism shall be, as much as possible, made from structural grade aluminum extrusions and structural shapes, in order to minimize the weight of the system
   b. All wear surfaces, such as bushings, spacers, pins, discs, bearings, and sleeves shall be designed to function quietly and with minimum wear, over the 10,000 cycle design life of the operable wall/
   c. The hangers, which fasten the lifting mechanism to the support steel, shall be fabricated from steel and shall be welded or bolted to the support steel supplied by the Miscellaneous Metals Contractor.
5. Motor Drive
   a. The motor drive shall be sized properly so that it can open and close the wall effectively over the 10,000 cycle design life of the wall, at an average speed of approximately 5 to 10 vertical feet per minute (1.5 to 3 meters per minute).
   b. The folding mechanism shall be designed to function as smoothly, quietly and safely as possible. Wherever possible, ball bearings shall be used instead of bushings and wear surfaces. In no circumstance shall chain or belt drive systems be acceptable.
   c. There shall be a wire rope cable for every set of folding mechanism. This cable shall be of 6 x 31 construction aircraft cable and shall be made of galvanized steel. The diameter of the cables shall be sized so that they shall be able to hold the entire weight of the wall, with the appropriate safety factor.
   d. The cable wraps on yoyo drums with 2 safety wraps and multiple layers of cable.
   e. The line shaft, sized to deliver the required torque with minimum deflection, shall support and rotate the cable drums.
   f. Flange bearings shall be used for the drive system, located immediately on both sides of the drum assembly.
   g. The motor drive shall be sized to deliver sufficient amount of torque to safely and effectively raise and lower the operable wall over its design life.
   h. The motor drive shall use the latest in industry standards in thermal protection, overload protection, quick acting fuses, etc., in order to ensure the safety and reliability of the system.

6. Safety Equipment:
   a. The operable wall shall employ an electromagnetic type of brake which shall activate firmly, without hesitation, when power is lost to the system. This brake shall have a minimum retarding torque rating equal to 200% of the motor drive’s full load torque. The drive system shall be equipped with a manual override and a brake release lever.
   b. The operable wall shall employ a dynamic brake, distinct and separate from the electromagnetic brake described in the paragraph above, in order to lower the wall at a controlled speed of no more than approximately 150% of the normal down speed, in the case of a catastrophic failure in the motor drive’s power train. Alternately, the operable wall shall employ a brake, distinct and separate from the electromagnetic brake described in the paragraph above, in order to completely halt the downward motion of the wall in the case of a catastrophic failure in the power train.
   c. The operable wall shall employ electrical or other limit switches in order to stop the wall at its up and down travel limits.
d. The operable wall shall employ an over torque detector in order to sense a jam in the system and to act as an over travel limit in the up direction should the primary limit switch fail to act. This over torque sensor shall be mechanical, using the motor’s torque arm in its over torque detection.

e. The entire length of the bottom edge of the operable wall shall be equipped with a continuous pressure sensing strip which shall cut power to the motor drive and shall activate the electromagnetic brake, if the sensing edge comes in firm contact with an object, before the operable wall is in the full down (closed) position. The operable wall will automatically reverse direction and ascend for approximately 3 seconds to clear the obstruction. The power shall remain cut to the motor drive until the switches have been released. The operation of the operable wall can resume once the obstruction is removed.

7. Electrical:

a. The operable wall shall be equipped for a three phase power supply to the electrical control box.

b. Standard electrical control box will be NEMA 1.

c. Low voltage wiring (by others). 18 gauge wiring from the switches to the control box.

d. Switches (standard): Two (2) push button switches wired in series with power controlled by a single, three position key switch. One push button switch shall be equipped with an LED that flashes fault codes in case of an electrical system failure.

C1020 INTERIOR WINDOWS

A. Hollow Metal Frames:

1. General: Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer’s plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

a. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and not visible.

b. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.

c. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

d. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
e. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.

f. Jamb Anchors: Provide number and spacing of anchors as follows:

1) Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

   a) Two anchors per jamb up to 60 inches high.
   b) Three anchors per jamb from 60 to 90 inches high.
   c) Four anchors per jamb from 90 to 120 inches high.
   d) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

1) Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

   a) Three anchors per jamb up to 60 inches high.
   b) Four anchors per jamb from 60 to 90 inches high.
   c) Five anchors per jamb from 90 to 96 inches high.
   d) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
   e) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.

g. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

   1) Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
   2) Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
   3) Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
   4) Provide loose stops and moldings on inside of hollow metal work.
   5) Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

h. Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

   1) Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

      a) Glazing:
1. Tempered Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; Kind FT; 1/4 inch thick unless indicated otherwise.
   a. Acceptable Manufacturers.
      1) AFG Industries, Inc.
      2) Pilkington Building Products North America.
      3) PPG Industries.
      4) Equal Products

2. Uncoated Clear Float Glass: ASTM C 1036; Type I (transparent flat glass); Quality-Q3; Annealed; 1/4 inch thick unless indicated otherwise.
   a. Acceptable Manufacturers.
      a) AFG Industries, Inc.
      b) Pilkington Building Products North America.
      c) PPG Industries.
      d) Equal Products

3. Fire-Rated Monolithic Ceramic Glazing Material: Proprietary product in the form of clear flat sheets of 3/16-inch nominal thickness weighing 2.5 lb/sq. ft. and as follows:
   a. Fire-Protection Rating: As indicated for the fire window in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
   b. Polished on both surfaces, transparent.
   c. Product: Based on "Premium FireLite" (polished on both surfaces) by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products.

C1025 INTERIOR STOREFRONT

A. Bullet Resistant Storefront: All storefront at interior vestibule walls shall be provided as a bullet resistant assembly.
   1. To establish a minimum standard of quality, products are based on the TSS-BL1.75 aluminum framed storefront system, as manufactured by Total Security Solutions. Equal products will be accepted.
   2. Minimum Level of Protection: Level 3
   3. Construction: Head and sill are one piece extrusions with no integral weep system at the sill. Jams are two piece extrusions with removable faces to allow for re-glazing. Mullions are a three piece extrusion with removable faces to allow for glazing and individual lite replacement. All joints and connections shall be tight, providing hairline joints and true alignment of adjacent members. Glazing must not be removable from the threat side of the sash.
a. System shall be designed to defeat ballistic assaults from a .44 magnum handgun in accordance with UL 752, Level 3
b. Aluminum Frames: 1 ¾ inches by 4 inches.
c. Glazing to conform to UL 752 of the the following projection level: Level 3.

1) Glazing Panels: 1 ¼ inch LP 1250 Laminated.

4. Bullet Resistant Aluminum Storefront Doors

a. To establish a minimum standard of quality, bullet resistant aluminum doors are based on TSS-BL3-DR doors as manufactured by Total Security Solutions. Equal products will be accepted.
b. Door stile, top rails and bottom rails shall be lined with hardened steel to meet Level 3 UL Standards.

1) All rails and stiles to be provided at 5 1/4 inch wide.
2) Aluminum Door sand Sidelight Frames and Extrusions: 1 ¾ inch x 4 inch, Structural section 0.125 inch thickness.
3) Standard Glazing: LP-1250 Polycarbonate/ Acrylic Laminate, 1 ¼ inch thick, 7.7 psf, UL 752, UL = 3, .44 mag.
4) Hardware:
   a) Single Doors:
      1. (1) ea. Continuous hinge.
      2. (1) ea. Panic Device
      3. (2) ea. Mortise cylinder – mortise as required.
      4. (1) ea. Surface closer.
      5. (1) ea. Kick plate.
      6. (1) set Weather seals
      7. (1) ea. Sweep
      8. (1) ea. ADA compliant aluminum threshold

   b) Double Doors:
      1. (2) ea. Continuous hinge
      2. (1) ea. Removable mullion
      3. (2) ea. Panic device
      4. (4) ea. Mortise cylinder – mortise as required
      5. (1) ea. Astragal
      6. (2) ea. Surface closer
      7. (2) ea. Kick plate
      8. (1) set Weather seals
      9. (2) ea. Sweeps
      10. (1) ea. ADA compliant aluminum threshold
11. Provide automatic openers at interior and exterior vestibule doors at the primary elementary and middle school entrances.

12. Provide electronic access control at designated locations.

5. Finish: Custom paint finish complying with the following:
   
a. Organic Finish: All exposed areas of aluminum windows and components shall be provided with a high-performance 70 percent fluoropolymer finish, AA-M12-C42-R1X. Color as selected by architect from manufacturer’s full range of options.

C1030  INTERIOR DOORS

A. LEED-S V.4 Submittals shall be provided for products demonstrating chain of custody, postconsumer and preconsumer recycled content, low VOC content, and certifying no urea formaldehyde is used in wood door products. Include Chain of Custody Certificates for wood door products that are manufactured from FSC-Certified Wood. Include evidence that the manufacturer is certified for Chain of Custody by FSC-accredited certification body. Include statement indicating cost for each FSC-certified product. Provide product data for adhesives and composite wood products indicating that the product contains no urea formaldehyde. Provide certificates indicating percentages by weight of postconsumer and preconsumer recycled content of hollow metal products. Include statement indicating costs for each product having recycled content. Provide product data including printed statement of VOC content and chemical compositions for painted finishes.

1. Work of this Section contributes to LEED Credits MR.2, MR.3 and IEQ.2.

B. Flush Wood Doors: subject to requirements, and compliance with Forest Stewardship Council, available manufacturers for flush wood doors include, but are not limited to, the following:

1. Cambridge Door.
2. Baillargeon Doors
3. Lambton Doors

C. Wood Door Construction:

1. Low Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

2. Doors for Transparent Finish:
   
a. Grade: Custom, with Grade A faces.
   b. Species and Cut: Flush wood doors shall be plain sliced select white maple. All doors shall include factory transparent finish.
   c. Match between Veneer Leaves: Book match.
   d. Assembly of Veneer Leaves on Door Faces: Balance match.
   e. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
f. Transom Match: Continuous match.
g. Stiles: Same species as faces or a compatible species.

D. Solid Core Doors:

1. Particleboard Cores: Comply with the following requirements:
   b. Provide doors with either glued-block or structural composite lumber cores instead of particleboard cores at locations where exit devices are indicated.
      1) All resins, adhesives and composite wood (and agrifibre) used to manufacture all components of the wood doors (including the door facing, rails, stiles, cross banding and core) must contain no added urea-formaldehyde.

2. Interior Veneer-Faced Doors:
   a. Core: Particleboard.
   b. Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.

3. Fire-Rated Doors:
   a. Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as needed to provide fire rating indicated.
   b. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated as needed to eliminate through-bolting hardware.
   c. Edge Construction: At hinge stiles, provide manufacturer's standard laminated-edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer.
   d. Pairs: Provide fire-rated pairs with fire-retardant stiles matching face veneer that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals.

E. Light Frames:

   a. Wood Species: Same species as door faces.
   b. Profile: Manufacturer's standard shape.
   c. At 20-minute, fire-rated, wood-core doors, provide wood beads and metal glazing clips approved for such use.

2. Wood-Veneered Beads for Light Openings in Fire Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and
approved for use in doors of fire rating indicated. Include concealed metal glazing clips
where required for opening size and fire rating indicated.

F. Louvers: Provide louvers for interior doors, where indicated, that comply with SDI 111C,
with blades or baffles formed of 0.020-inch-thick, cold-rolled steel sheet set into 0.032-inch-
thick steel frame.

1) Sightproof Louver: Stationary louvers constructed with inverted V-shaped or Y-shaped
blades.

2) Fire-Rated Automatic Louvers: Louvers constructed with movable blades closed by
actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type
and fire-resistance rating indicated by same testing and inspecting agency that
established fire-resistance rating of door assembly.

G. Fabrication:

1. Factory fit doors to suit frame-opening sizes indicated, with the following uniform
clearances and bevels, unless otherwise indicated:
   a. Comply with clearance requirements of referenced quality standard for fitting.
      Comply with requirements in NFPA 80 for fire-rated doors

2. Factory machine doors for hardware that is not surface applied. Locate hardware to
   comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop
   Drawings, DHI A115-W series standards, and hardware templates.
   a. Coordinate measurements of hardware mortises in metal frames to verify
dimensions and alignment before factory machining.
   b. Metal Astragals: Pre-machine astragals and formed-steel edges for hardware for
      pairs of fire-rated doors.

3. Transom and Side Panels: Fabricate matching panels with same construction, exposed
   surfaces, and finish as specified for associated doors. Finish bottom edges of transoms
   and top edges of rabbeted doors same as door stiles.
   a. Fabricate door and transom panels with full-width, solid-lumber meeting rails.
      Provide factory-installed spring bolts for concealed attachment into jambs of metal
door frames.

4. Openings: Cut and trim openings through doors to comply with applicable requirements
   of referenced standards for kind(s) of door(s) required.
   a. Light Openings: Trim openings with moldings of material and profile indicated.
   b. Louvers: Factory install louvers in prepared openings.

H. Factory Finishing:
2. Finish doors at factory that are indicated to receive transparent finish. Factory prime and prepare for field finish doors indicated to receive opaque finish.
3. Transparent Finish:
   a. Grade: Premium.
   b. Finish: Manufacturer's standard finish with performance comparable to AWI System TR-4 conversion varnish.
   c. Staining: As selected by Designer from manufacturer's full range.
   d. Effect: Semifilled finish.
   e. Sheen: Satin.
4. Opaque Finish:
   a. Grade: Premium.
   b. Finish: Manufacturer's standard finish with performance comparable to AWI System OP-2 catalyzed lacquer.
   c. Color: As selected by Designer from manufacturer's full range.
   d. Sheen: Satin.

I. Hollow Metal Doors and Frames

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Amweld Building Products, LLC.
   b. Ceco Door Products; an ASSA ABLOY Group Company.
   c. CURRIES Company; an ASSA ABLOY Group Company.
   d. Mesker Door Inc.
   e. Pioneer Industries, Inc.
   f. Republic Builders Products Company.
2. Materials:
   a. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
   b. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
   c. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 metallic coating.
   d. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
   e. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
   f. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.
g. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

h. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

i. Glazing: Comply with requirements in Section 088000 - GLAZING.

j. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

J. Interior Steel Doors: Face sheets fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior door requirements. Provide doors complying with requirements indicated by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance Level 3, extra heavy-duty, cold rolled 16 gauge (0.053 inch) minimum facer sheets. Provide internal stiffeners at 6 inches on center each way.

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, mineral-board, or vertical steel-stiffener core that produces doors complying with ANSI A250.8.
   a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
   b. Thermal-Rated (Insulated) Exterior Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 4.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.

3. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick end closures or channels of same material as face sheets.
5. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
6. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

K. Interior Steel Frames: Comply with ANSI A250.8 and with details indicated for type and profile. Fabricate from cold-rolled steel sheet.

1. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
2. Door Frame gauges: level 3, (0.0747") minimum 14 gauge.
3. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

L. Steel Frame anchors - Jambs:
1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Post-installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

M. Steel Frame Anchors – Floor:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

N. Steel Stops and Moldings

1. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.
2. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.
3. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

O. Hollow Metal Fabrication

1. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
2. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
3. Hollow Metal Doors:
   b. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
4. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
a. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and not visible.
b. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
c. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
d. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
e. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
f. Jamb Anchors: Provide number and spacing of anchors as follows:

   1) Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

      a) Two anchors per jamb up to 60 inches high.
      b) Three anchors per jamb from 60 to 90 inches high.
      c) Four anchors per jamb from 90 to 120 inches high.
      d) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

   2) Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

      a) Three anchors per jamb up to 60 inches high.
      b) Four anchors per jamb from 60 to 90 inches high.
      c) Five anchors per jamb from 90 to 96 inches high.
      d) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
      e) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.

   3) Compression Type: Not less than two anchors in each jamb.

g. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.

   1) Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
   2) Double-Door Frames: Drill stop in head jamb to receive two door silencers.

5. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

6. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Section 087100 - DOOR HARDWARE.
a. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
b. Reinforce doors and frames to receive non-templated, mortised and surface-mounted door hardware.
c. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
d. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 - ELECTRICAL.

7. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
   a. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
   b. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
   c. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
   d. Provide loose stops and moldings on inside of hollow metal work.
   e. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

P. Steel Door and Frame Finishes

1. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
   a. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
   b. All paints and coatings applied on site shall have VOC contents less than the limits established below:

   1) Non-Flat Interior Coatings: 150 grams / liter
   2) Flat Interior Coatings: 50 grams / liter

Q. Finish Hardware: Typical hardware sets shall be as follows:

1. Office Spaces:
   a. (3) ea. Hinges
   b. (1) ea. Classroom function lockset
   c. (1) ea. Stop
   d. (1) ea. Coat hook
   e. (1) ea. Kick plate
   f. (1) ea. Mop plate
   g. (3) ea. silencers
   h. (1) set Adhesive seal.
2. Administrative Spaces with Photocopier:
   a. (3) ea. Hinges
   b. (1) ea. Classroom function lockset
   c. (1) ea. Surface closer
   d. (1) ea. Stop
   e. (1) ea. Kick plate
   f. (1) ea. Mop plate
   g. (3) ea. Silencers
   h. (1) set Adhesive seal.

3. Maintenance Spaces – Single Leaf:
   a. (3) ea. Hinges
   b. (1) ea. Storeroom function lockset
   c. (1) ea. Stop
   d. (1) ea. Kick plate
   e. (1) ea. Mop plate
   f. (3) ea. Silencers
   g. (1) set Adhesive seal.

4. Maintenance Spaces – Double Leaf:
   a. (6) ea. Hinges
   b. (2) ea. Manual flush bolt
   c. (1) ea. Dust proof strike
   d. (1) ea. Storeroom function lockset
   e. (2) ea. Stop
   f. (1) ea. Kick plate
   g. (1) ea. Mop plate
   h. (2) ea. Silencers
   i. (1) ea. astragal

5. Corridors – Double Leaf:
   a. (6) ea. Hinges
   b. (2) ea. Exit devices (lock function: Key outside retracts latch, Key inside locks or unlocks lever)
   c. (2) ea. Manual flush bolt
   d. (1) ea. Dust proof strike
   e. (1) ea. Storeroom function lockset
   f. (2) ea. Magnetic Hold Opens, Tied to Fire and Security /Alarms
   g. (1) ea. Kick plate
   h. (1) ea. Mop plate
   i. (2) ea. Silencers
   j. (1) ea. astragal
6. Classroom Spaces:
   a. (3) ea. Hinges
   b. (1) ea. Classroom Security Intruder function lockset
   c. (1) ea. Stop
   d. (1) ea. Kick plate
   e. (1) ea. Mop plate
   f. (3) ea. Silencers
   g. (1) set Adhesive seal.

7. Janitors’ Closets:
   a. (3) ea. Hinges
   b. (1) ea. Storeroom function lockset
   c. (1) ea. Surface closer
   d. (1) ea. Kick plate
   e. (3) ea. Silencers
   f. (1) set Adhesive seal.

8. Gang Toilet Rooms / Locker Rooms:
   a. (1) ea. Continuous hinge
   b. (1) ea. Classroom function deadlock
   c. (1) ea. ADA pull
   d. (1) ea. Push plate
   e. (1) ea. Surface closer
   f. (1) ea. Stop
   g. (1) ea. Kick plate
   h. (1) ea. Mop plate
   i. (3) ea. Silencers

9. Single Occupant Toilet Rooms
   a. (3) ea. Hinges
   b. (1) ea. Hotel function lockset
   c. (1) ea. Surface closer
   d. (1) ea. Stop
   e. (1) ea. Kick plate
   f. (1) ea. Mop plate
   g. (3) ea. Silencers

B. Interior Aluminum Storefront: To establish a standard of quality, products shall be based on TSS-BL1.75 ballistic framing, as manufactured by Total Security Solutions. Equal products shall be acceptable.

1. Finish: All exposed areas of interior, aluminum framed storefront and doors shall be provided with a high-performance 70 percent fluoropolymer finish, AA-M12-C42-R1X. Color as selected by architect from manufacturer’s full range of options
2. Head and Sill: Provide one-piece extrusions with no integral weep system at the sill.
3. Jambs: Provide two-piece extrusions with removable faces to allow for re-glazing.
4. Mullions: Provide three-piece extrusions with removable faces to allow for glazing and individual lite replacement.
   a. System shall be designed to defeat ballistic assaults from a .44 magnum handgun in accordance with UL 752, Level 3.
   b. Frame Dimensions: 1 ¾ inch by 4 inches.
   c. Organic Finish: All exposed areas of aluminum windows and components shall be provided with a high-performance 70 percent fluoropolymer finish, AA-M12-C42-R1X. Color as selected by architect from manufacturer’s full range of options
   d. All exposed work shall be carefully matched to produce continuity of line and design with all joints. System design shall be such that raw edges will not be visible at joints.
5. Glazing:
   a. UL 752, Bullet Resistant Level-3:
      1) Provide 1 ¼ inch polycarbonate laminated security glazing. Products shall be based on TSS Polycarbonate LP-1250, as manufactured by Total Security Systems. Equal products shall be acceptable
         a) Layer 1: 1/8 inch mar-resistant polycarbonate
         b) Layer 2: 0.025 inch urethane
         c) Layer 3: 1 inch acrylic
         d) Layer 4: 0.025 inch urethane
         e) Layer 5: 1/8 inch mar-resistant polycarbonate.
6. All adhesives, sealants, paints and coatings applied on site and fall within the weatherproofing system must have VOC contents less than the limits listed in Section 018113 MA-CHPS® Product Requirements.
7. Brackets and Reinforcements: Manufacturer’s standard high-strength aluminum brackets and reinforcements that are compatible with adjacent materials. Provide non-staining, non-ferrous shims for aligning system components.
8. Fasteners and Accessories: Manufacturer’s standard corrosion-resistant, non-staining, non-bMA-CHPSing fasteners and accessories compatible with adjacent materials.
   a. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
   b. Reinforce members as required to receive fastener threads.
   c. Do not use exposed fasteners except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.
9. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
10. Flashing: Manufacturer’s standard corrosion-resistant, nonstaining, flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.

11. Framing System Gaskets and Sealants and Joint Fillers: Manufacturer’s standard recommended by manufacturer for joint type.

12. Bituminous Paint: Cold applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mmil. Thickness per coat.

13. Aluminum Cladding: Prefinished 0.032 inch aluminum cladding to be custom shaped and installed at locations indicated on the drawings. Cladding to be installed with corrosive resistant concealed fasteners.

14. Glazing Gaskets: Manufacturer’s standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers that maintain uniform pressure and watertight seal. Glazing gaskets shall be fabricated from an elastomer of type and hardness recommended by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.

15. Spacers and Setting Blocks Gaskets and Bond Breakers: Manufacturer’s standard permanent, non-migrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements. Spaces must be warm-edge.

16. Doors: To establish a standard of quality, products shall be based on TSS-BL3-DR bullet resistant door system, as manufactured by Total Security Solutions. Equal products shall be acceptable.

   a. Door Construction: Doors shall be designed to defeat ballistic assaults from a .44 magnum handgun in accordance with UL 752, Level 3. All joints and connections shall be tight, providing hairline joints and true alignment of adjacent members. Corner joinery shall consist of heavy duty extruded and keyed aluminum corner splines with continuous 3/8 inch diameter tie rod construction. Glazing must not be removable from the threat side of the door. Provide to dimension heights and widths indicated on the Drawings.

      1) Standard Aluminum Doors: 5 1/4 inch rails and stiles with 8 1/2 inch bottom rail.
      2) Aluminum Door and Sidelight Frames and Extrusions: 1 ¾ inch thick, structural section 0.125 inch thickness
      3) Standard Glazing: LP-1250 Polycarbonate/ Acrylic Laminate, 1 ¼ inch thick, 7.7 psf, UL 752, UL=3, 44 mag.

   b. Hardware:

      1) (2) Ea. Hinges: Select SL-11HD continuous aluminum gear hinge
      2) (2) ea. Exit devices (lock function: Key outside retracts latch, Key inside locks or unlocks lever)
      3) (2) ea. LCN 400 Series heavy-duty door closer
      4) (2) ea. Manual flush bolt
5) (1) ea. Dust proof strike
6) (1) ea. Storeroom function lockset
7) (1) ea. Kick plate
8) (1) ea. Mop plate
9) (2) ea. Silencers
10) (1) ea. Removable Mullion
11) (1) ea. ADA Aluminum Threshold

C1090 INTERIOR SPECIALTIES

Design Intent: All classroom spaces shall receive one 8 ft wide by 4 ft high marker board, one 8 ft. wide by 4 ft. high tach board, one 4ft wide by 4 ft high tach board, and one 8 ft. wide by 4 ft high interactive display board with short through projector. Interactive display boards shall also be provided at conference/meeting rooms and each P.E. station in the Gymatorium, and at Adaptive PE. See drawings for additional locations. Identifying signage shall be provided at all interior doors. Single tier student lockers are planned for middle school corridors and kitchen staff areas. 3-Tier lockers are planned for middle school locker rooms. Fire extinguishers and cabinets shall be distributed throughout the building, as indicated on drawings, and the Gymatorium shall be equipped with protective wall pads, retractable basketball backstops to support one competition court and two practice courts, volleyball standards for one competition court and a roll-up dividing curtain to isolate elementary-level PE teaching stations.

A. LEED-S V.4 Submittals shall be provided for products demonstrating postconsumer and preconsumer recycled content. Provide certificates indicating percentages by weight of postconsumer and preconsumer recycled content of visual display boards, fire protection specialties and metal lockers. Include statement indicating costs for each product having recycled content.

1. Work of this Section contributes to LEED Credits MR.3.

B. Visual Display Boards

1. Marker Board Manufacturer: To establish a standard of quality, drawings and specifications based upon Claridge Products and Equipment, Inc. LCS – II, series 8, low glare, porcelain marker boards. Subject to compliance with requirements, provide marker board products by one of the following:
   a. Claridge Products and Equipment, Inc.
   b. Greensteel, Inc.
   c. Nelson–Harkins Industries

2. Tack Board Manufacturer Tackboards: To establish a standard of quality, drawings and specifications based upon Claridge Products and Equipment, Inc. LCS – II, series 8, low glare, tack boards
   a. Claridge Products and Equipment, Inc.
   b. Greensteel, Inc.

3. Materials:

a. Tackboards

1) Series 230 by Nelson-Harkins, or equal.
   a) \( \frac{3}{8} \)“ thick self healing, burlaped backed surface
   b) Surface color to be chosen from manufacturer’s standard colors
   c) Metal trim shall be 5/16” wide aluminum with etched & anodized paint
      finish in color chosen by the architect
   d) Provide tackboards without glass enclosure.
   e) Frame profile: Beveled.

b. Whiteboards

1) Porcelain enamel writing surface
2) 24 gage cold rolled steel with color coated surface
3) Core material shall be 7/16” fiberboard on hardboard backing
4) Metal trim shall be 5/16” wide aluminum with etched & anodized paint finish in
   color chosen by the architect
5) Tray to be continuous, extruded aluminum in color matching the frame. Tray to
   include matching end caps.
6) Accessories at each location to include a 1” cork strip and 2 map hooks per
   every 4’ 0”
7) Size: 4’ 0” high by dimension indicated on the drawings.
8) Mounting: Provide concealed fasteners at all location. Provide manufacturer’s
   metal trim accessories at continuous units and/or whiteboard & tackboard
   joints.

4. Accessories: Provide all accessories as required for a complete installation.

5. Fabrication

a. Assembly: Provide factory-assembled units, unless field-assembled units are
   required.

   1) Make joints only where total length exceeds maximum manufactured length.
      Fabricate with minimum number of joints, balanced around center of board, as
      acceptable to Architect.

6. Finishes

a. General: Comply with NAAMM’s "Metal Finishes Manual for Architectural and
   Metal Products" for recommendations relative to applying and designating finishes.

b. Finish designations prefixed by AA conform to the system established by the
   Aluminum Association for designating aluminum finishes.
C. Interactive White Boards

1. Interactive White Boards: To establish a standard of quality, drawings and specifications based upon Poly Vision e³ Ceramicsteel writing surfaces. Equal products will be accepted.

2. Writing Surface: Surface shall consist of a 0.019 inch steel core covered on both side with thin enamel coatings. The ceramic finish shall be fused to the steel at a temperature of approximately 1,500 deg. F.
   a. Writability: Writing surface must accept any dry erase, semi-permanent, water soluble permanent marker, pen, or crayon without damaging the surface
   b. Erasability: Wipes clean with dry cloth or standard eraser.
   c. Washability: Register 6.5 or better on the Mohs hardness scale. Provide high resistance to impact damage, abrasion, scratching and color fading.
   d. Visibility: Contrast/Waviness for markerboards (light and dark effects) is no greater than 15 when tested with BYK Gardner Wave Scan 5+ measurement device showing visual acuity (contrast sensitivity) to the human eye at distances greater than 10 feet (3m). Resolution (visual acuity) shall be based on 3 lines per degree and be visibly maintained beyond the current standard of 10 ft.
   e. Magnet Compatibility: Ideal for all magnets and will not be scratched or damaged from the contact.
   f. Flame Resistance: 100 percent non-combustible surface

3. Dimensions: 96 inches wide by 48 inches high, or as indicated on Drawings
4. Color: White
5. Sheen: Satin, Low-Gloss
6. Accessories: Provide standard mill finish aluminum frame with marker tray for full width of board. Marker tray shall be provided with end cap closures.

D. Specialty Signage

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following
   a. Takeform Architectural Graphics
   b. ASI Sign Systems, Inc.
   c. Gemini Incorporated.

2. Materials:
   a. Polyamid Resin Sheet: Provide photomechanically produced, monolithic, stratified, polyamid resin tactile panel, bonded to inert base.
   b. Mounting Height: 60 inches above finished floor, unless otherwise noted for interior signs.

3. Panel Signs – General:
Panel Signs: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.

1) Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally.
2) It is the responsibility of the Sign Manufacturer to check/verify spelling errors on sign copy/text. Any questions regarding possible spelling errors should be brought to the Architect’s attention prior to fabrication.

b. Raised Sign Copy: Raise copy 1/32-inch from plaque surface by manufacturer’s photomechanical stratification processes. Uniformly opaque, precisely formed graphics shall comply with applicable ADA regulations including size, style, spacing, content, position, and colors.

c. Raised Braille Copy: Raise copy 1/32-inch from plaque surface by manufacturer's photomechanical stratification processes. Uniformly opaque, precisely formed Braille copy shall comply with applicable ADA regulations including but not limited to size, style, spacing, content, position, and colors.

1) Sign manufacturer shall be responsible for translation of sign copy to Braille.

d. Provide Interior room signs at all doors shown on floor plans. Room numbering system to be determined based on Owner’s input during construction.

e. Provide Wayfinding signage at each corridor branch/intersection.

f. Provide informational signage, (ex. “Authorized Personnel”), at 5”Hx14”L. Mounting locations to be determined by Owner. Provide one informational sign per every 5,000 s.f. of building area.

4. Panel Signs:

a. Interior Architectural Signage System:

1) The signage shall incorporate a decorative laminate face with applied graphics including all tactile requirements in adherence to ADA specifications.
2) All signs, including Room ID’s, overheads, directionals and directories shall have a matching appearance and constructed utilizing the same manufacturing process to assure a consistent look throughout.

b. Materials

1) Sign face shall be 0.035” (nominal) standard grade, high pressure surface laminate. A painted sign face shall not be acceptable.
2) The sign core shall be a natural fiber wood product. The sign shall incorporate balanced construction with the core sandwiched between laminates to prevent warping. An acrylic core shall not be acceptable. Laminate on the sign face only shall not be acceptable. Wood-based products shall be free of added urea-formaldehyde
3) Tactile lettering shall be precision machined, raised 1/32”, matte PETG and subsurface colored for scratch resistance.

4) Signs shall incorporate a metal accent bar. Bars shall be anodized with a brushed satin finish.

c. Standard Colors

1) Face/background color shall be standard grade, high pressure laminate, all colors and finishes.

2) Standard tactile colors shall match manufacturer's ADA standard color selection.

3) Sign and backer edge shall be treated with a hot wax seal for moisture integrity.

d. Construction

1) The signage shall be capable of accepting paper or acetate inserts to allow changing and updating as required. Insert components shall have a 0.080” thickness non-glare acrylic window and shall be inlaid flush to sign face for a smooth, seamless appearance.

2) The signage shall, with the exception of directories and directionals, be a uniform 8½” width to facilitate inserts printed on standard width paper.

3) The signage contractor shall provide and install all signage inserts.

4) Manufacturer shall provide a template containing layout, font, color, artwork and trim lines to allow Owner to produce inserts on laser or ink jet printer. The template shall be in an Acrobat or Word format (.pdf).

5) The signage shall include modules allowing for inserts, notice holders, occupancy sliders, marker, magnetic, and cork pin boards. All modules shall be flush to sign face for a smooth, seamless appearance.

6) The laminates (front and back) shall be pressure laminated and precision machined together to a 90-degree angle. Edges shall be smooth, void of chips, burrs, sharp edges, marks and shall be treated with a hot wax seal for moisture integrity.

7) The signage shall utilize an acrylic sphere for Grade II Braille inserted directly into a scratch resistant, high pressure laminate sign face. Braille dots are to be pressure fit in high tolerance drilled holes.

8) Braille dots shall be half hemispherical domed and protruding a minimum 0.025”.

9) The signage shall utilize an ethylene-vinyl acetate (EVA) adhesive. The adhesive shall be nonhazardous and shall allow for flexing and deflection of the adhered components due to changes in temperature and moisture without bond failure.

10) All signs shall be provided with appropriate mounting hardware. Hardware shall be finished and architectural in appearance and suitable for the mounting surface.

e. Certification:
1. Signage shall be SFI certified and comply with requirements of the Sustainable Forest Initiative Signage without SFI or equivalent green certification shall not be acceptable.

5. LEED-S Educational Displays:

   a. Contractor to provide and install twelve Educational Display Signs as follows:

      1) Size: 11 inches by 17 inches
      2) Material: As specified for Panel Signs
      3) Two sets of building floor plans (4 levels) with graphic indicators for locations of CHPS information displays. Architect will furnish plans and graphics
      4) Six signs with narrative to describe building features that incorporate the six credit categories of CHPS criteria. Architect will furnish narrative and graphics.
      5) Four signs with narrative to describe the School District’s policies related to sustainable practices.

6. Bronze Plaques

   a. Contractor to provide and install one (1) bronze dedication plaque. The installation location and timing will be determined by the architect. Each plaque shall be constructed according to the following:

      1) Size: 2’ 0” x 3’ 0” overall.
      2) Material: Cast bronze.
      3) Letter Style: relief, polished.
      4) Border: 1-1/2” wide doubled lined
      5) Background: Dark oxidized, pebble.
      6) Mounting: Concealed treaded rods.
      7) Finish: Manufacturer’s chemical protection.
      8) Layout: Plaque No. 1 to include name of building, Building Committee members, Architect, Contractor and Misc. Text (200 characters). Text to include logos with digital layouts provided by the owner. Final layout to be determined by the architect.

7. Exterior Building Signage: Provide Exterior signs to identify building entrances, exit access points and classroom designations.

   a. Dimensional Letters:

      1) Height: 18 inches
      2) Material: Aluminum
      3) Finish: Baked Enamel, color as selected by architect from manufacturer’s full range of options.
      4) Mounting Method: Mechanically attached back. All fasteners shall be concealed.

E. Lockers:
1. General: Lockers shall be provided as indicated on drawings. Locations include but are not limited to, middle school corridors, middle school locker rooms and kitchen. For each type and location, provide no less than 5 percent as accessible units.

2. Products: Available products that may be incorporated into the Work include, but are not limited to, the following or equal:
   a. Art Metal Products
   b. Lyon Workspace Products
   c. Penco Products, Inc.

3. Locker Arrangement and Sizes:
   a. Type 1: Single Tier, 12 inch wide by 12 inch deep by 72 inch high fully welded units
      1) Use: Student Lockers at middle school corridors
      2) Quantity: 450 (150 per floor)
      3) Body: 16 ga. steel
      4) Back: 18 ga. steel
      5) Door: 14 ga. steel with continuous heavy-duty piano hinge
      6) Louvers: Manufacturer’s standard
      7) Latch: Manufacturer’s standard recessed latching mechanism and integral combination lock
      8) Base: No base
   b. Type 2: Single Tier, 12 inch wide by 12 inch deep by 72 inch high, fully welded units
      1) Use: Staff lockers at kitchen
      2) Quantity: 10
      3) Body: 16 ga steel
      4) Back: 18 ga. steel
      5) Door: 14 ga. steel
      6) Louvers: Manufacturer’s standard
      7) Latch: Manufacturer’s standard recessed latching mechanism, capable of accepting a pad lock
      8) Base: No base
   c. Type 3: Six Tier, 18 inch wide, by 21 inch deep by 60 inch high fully welded units
      1) Use: Student Locker Rooms
      2) Quantity: 14
      3) Body: 16 ga. steel
      4) Back: 18 ga. steel
      5) Door: 14 ga. steel
      6) Louvers: Diamond
      7) Latch: Manufacturer’s standard recessed latching mechanism, capable of accepting a pad lock
      8) Base: No base
F. Toilet Room Accessories:

1. Manufacturers: Subject to compliance with requirements, provide toilet accessories by one of the following:
   a. American Specialties, Inc.
   b. Bobrick Washroom Equipment, Inc.
   c. Bradley Corporation.
   d. Valay Corporation

2. Materials
   a. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch minimum nominal thickness, unless otherwise indicated.
   e. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

3. Fabrication
   a. General: One, maximum 1-1/2-inch-diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer’s name and product model number.
   b. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.
   c. Recessed Toilet Accessories: Unless otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors and access panels with full-length, stainless-steel hinge. Provide anchorage that is fully concealed when unit is closed.
   d. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.
   e. Accessory Schedule: Unless noted otherwise, Product Model Numbers based on Bobrick Washroom Equipment, Inc. Equal Products accepted.

1) Soap Dispenser: B-4112 (one per sink location)
2) Mirror: B-290 1836 (x 34 locations)
3) Toilet Tissue Dispenser: B-27460 (one per WC location)
4) Electric Hand Dryer: Xlerator Model XL-SB with ADA Compliant Recess Kit, as manufactured by Excel Hand Dryers (2) per gang toilet room; (1) per single Occupant Toilet Room
5) Grab Bars: B-6806.99 x 42 inches long (x 2 per toilet room)
6) Shower Curtain Rod: B-6047 (x 3 locations)
7) Vinyl Shower Curtain: B-204-2 (x 3 locations)
8) Shower Curtain Rings: B-204-1 (x 21 hooks)
9) Folding Shower Seat: B517/ B518 (see drawings for handing)
10) ‘L’-shaped Grab Bar: B5806.30 (x 3 locations)
11) Double Robe Hook: B-672 (one per toilet stall)
12) Partition Mounted Sanitary Napkin Disposal: B4354 (x 26 locations)
13) Floor Standing Waste Receptacle: B-2250 (one per toilet room)
14) Baby Changing Station: BKB200-00 (x 1 location)

G. INTERIOR STAIRS

1. General: Interior stairs shall be steel framed with concrete-filled, formed metal pan treads and landings.

2. Stair Framing: Framing members at interior stairs shall be provided as structural steel shapes.
   a. Fabricate stair tower stringers of steel channels. Provide closure for exposed ends of stringers.
   b. Fabricate monumental stair stringers of steel tubes. Provide closer for exposed ends of stringers.
   c. Construct platforms of steel plate or channel headers and miscellaneous framing members as needed to comply with performance requirements.
   d. Weld stringers to headers, weld framing members to stringers and headers.
   e. Where stairs are enclosed by gypsum board or shaft-wall assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they will not encroach on required stair width and will be within the fire resistance rated stair enclosure.
   f. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

3. Metal Pans: Form risers, subtread pans and subplatforms from steel sheet of thickness needed to comply with performance requirements, but not less than 0.0677 inch.
   a. Steel Sheet: Uncoated hot-rolled steel sheet, unless otherwise indicated.
   b. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.
   c. Shape metal pans to include nosing integral with riser.
   d. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.
   e. Coordinate for installation requirements of cast terrazzo treads where indicated.

4. Steel Tube Railings: Handrails shall be provided as steel tube sections.
   a. General: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
b. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

c. Form changes in direction of railings as detailed on the Drawings.

d. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

e. Close exposed ends of railing members with prefabricated end fittings.

f. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

g. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.

1) Connect posts to stair framing by direct welding, unless otherwise indicated.

2) For stainless steel railings and caps, provide compatible fittings, brackets, fasteners, sleeves, and other ferrous-metal components.

3) For nongalvanized railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.

h. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

i. Finish: Except for stainless steel components, all railings shall be factory primed for field painting.

1) Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements of SSPC-SP-3 “Power Tool Cleaning” specifications for SSPC Zone 1A.

2) Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA1 “Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel”, for shop painting.

3) All paints and coating applied on site shall have VOC contents less than the limits established below:

   a) Non-Flat Interior Coarings: 150 grams / liter
   b) Flat Interior Coatings: 50 grams / liter

H. Fire Protection Specialties

1. Portable Fire Extinguishers
a. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

b. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4A-80BC, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2. Fire Protection Cabinet

a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) JL Industries, Inc.
2) Larsen's Manufacturing Company.
3) Potter Roemer; Div. of Smith Industries, Inc.

b. Cabinet Type: Suitable for fire extinguisher, and hose and hose valve where applicable.


d. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated.

1) Trimless with Plaster Stop: Surface of surrounding wall finishes flush with exterior finished surface of cabinet frame and door, without overlapping trim attached to cabinet. Provide recessed flange, of same material as box, attached to box to act as plaster stop.

e. Door Material: Steel sheet with baked enamel finish, color as selected.

f. Door Style: Vertical duo panel with frame.

g. Door Glazing: Tempered glass.

h. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

i. Accessories:

1) Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.

2) Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

3. Mounting Brackets

a. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.

b. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Designer.
4. Fabrication

a. Fire-Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
   1) Weld joints and grind smooth.
   2) Construct fire-rated cabinets with double walls fabricated from 0.0428-inch-thick, cold-rolled steel sheet lined with minimum 5/8-inch-thick, fire-barrier material.
      a) Provide factory-drilled mounting holes.

b. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
   1) Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
   2) Miter and weld perimeter door frames.

c. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

d. Finishes
   1) Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
      a) Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
      b) Finish fire-protection cabinets after assembly.
      c) Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

I. Athletic Equipment:

1. Basketball Backstops: Ceiling mounted, forward folding electrically operated backstop assemblies to support one regulation high school court and two practice courts.
   a. Support: Backstops shall be supported by 3 1/2” O.D. pipe anchored to roof framing members by means of heavy, formed steel support fittings.
   b. Frame: 2 3/8” O.D. drop pipe spaced on 5’-9” centers. Frame shall be horizontally braced above the backboard by 2 3/8” O.D. spreaders spaced on approximately 4’-0” centers.
   c. Backstop: Rectangular, 6 ft wide by 4 ft high
1) Material: Glass, transparent
2) Accessories: Manufacturer’s standard padding kit.

d. Winch: Electrically operated, heavy-duty fully enclosed worm gear type winch, designed to hold the unit at any position when raising or lowering backstop.

1) Hoist Cable: ¼” diameter galvanized aircraft cable with 7,000 lb ultimate breaking strength Swivel pulley shall be furnished with a 4 inch diameter cast (ductile iron) pulley sheave, with a maintenance free, oil impregnated bearing for proper hoist cable routing to winch. Pulley assembly and attachment to 3 ½” O.D. support structure shall be rated at a minimum 9,000 pound load rating.

e. Baskets: Each basket shall consist of a single 18 inch inside diameter metal ring, its flange and braces, and a white-cord 12-mesh net, 15-18 inches in length

2. Wall Pads:

a. Panel Dimensions: 2′-0″ wide by 5′-10″ high
b. Material: Flame retardant, 2 inch thick open cell neoprene foam filler with a density of 5.5 lb/ft³ and Indentation Force Deflection (IFD) of 25-45 lbs.
c. Attachment: Provide concealed, heavy-duty 6063-T5 extruded aluminum wall attachment clips with pre-drilled attachment holes.

1) Clips shall be 6 ft in length with the capability of field cutting to length as needed.

d. Color: Selected by architect from manufacturer’s full range of options

3. Divider Curtains:

a. Type: Roll-Up
b. Dimensions: 62′-0″ wide by 30′-0″ high
c. Material: Bottom 8 ft of curtain shall be solid vinyl, polyester reinforced 22 oz vinyl coated fabric (per sq. yard, containing antibacterial, fungi resistant and flame-retardant chemicals to meet requirements of ASTM E 84, Class A Rating, and NFPA-701 large scale, ULC S-109 large and small scale and State of California test requirements). Upper section of curtain shall be a flame resistant, open polyester type interlocking grid weave coated with polyvinyl chloride with an approximate 45 to 50 percent open area. Weight of material – 7 oz per sq. yard.
d. Top Rod: Top of curtain shall be fabricated to conceal a continuous 1 5/16 inch O.D. steel tube extending the full length of the fabric to ensure proper support. Steel tube shall be supported from special support assemblies with threaded rods or support chains as required to ensure curtain is level and plumb during installation.
e. Batten Tube: Curtain shall be neatly and compactly rolled on a 3 ½ inch diameter batten tube concealed in the bottom section of the vinyl fabric. Rolling action shall be accomplished by means of multiple hoist belts not to exceed 20′-0″ centers.
f. Hoist Belts: Belts shall be of a heavy industrial grade polyester fabric, 5 inches in width with a tensile strength of 5,000 lbs per belt. One side of hoist belts shall be
provided with a special PVC coating to provide rolling friction against the vinyl fabric to facilitate rolling action of the bottom batten to roll compactly and eliminate wrinkles.

**g. Curtain Operator:** Line shaft on curtain shall be driven by a heavy-duty 115 volt, double output shaft, C-faced, double reduction (100-1) gear motor, furnished with integral 6 ft lb. brake mechanism and automatic overload protection.

1) **Motor:** Motor shall be ¾ H.P. (15 amp) for curtains over 3,000 sf in size. Gear reducer shall be filled with oil and equipped with high quality Buna-N lip seals for long life and maintenance-free service.  
2) **Output Shaft:** Output shaft of operator shall be mechanically interconnected to a special rotary-counting Up-Down limit switch assembly, which shall be mounted and pre-wired to motor as an integral part of the operator.  
3) **Limit Switch:** limit switch shall be furnished in a special, extruded aluminum housing. Limit switches shall be designed so that adjustments can easily be made without the use of tools.

**h. Key Switch:** Provide manufacturer’s standard key switch control.

4. Volleyball:

a. **Standards:** 2 3/8 inch O.D. sleeve-type combination game standards for indoor use  
b. **Sleeves:** Provide 2 3/8 inch diameter indoor floor sleeves with covers.  
c. **Net:** Net shall be 32 ft wide be 33 inches high in size, with 45 ft rope provided in the top hem binding. Netting shall be of heavy 4 inch square, black polyester twine. Top binding shall be 2 inches wide, white reinforced vinyl material. Ends and bottom of net shall be provided with a heavy, black tape binding. The four corners of the net shall be provided with grommets and 30 inch long tie cords.  
d. **Boundary Markers:** Boundary markers shall be of 2 inch wide durable white polyester reinforced vinyl material with white Velcro attachment strips sewn in place for securing to any competition volleyball net. Boundary markers shall be fabricated with an integral vinyl sleeve to accept antenna  
   1) **Net Antenna:** Net antenna shall be furnished in 3/8 inch diameter, high tensile strength, extruded fiberglass, 6'-0" long, one-piece construction for maximum durability. Top half of antenna shall be striped with alternating white and orange markings to meet all competition requirements.

**C20 INTERIOR FINISHES**

Design Intent: Unless noted otherwise, typical floors shall receive resilient sheet finishes. Toilet rooms and locker rooms shall receive thin-set a porcelain tile floor finish (thick-set at showers) and the kitchen shall receive a thick-set quarry tile finish. The Gymatorium, Adaptive PE and Stage Thrust shall receive hardwood maple flooring. Stairs shall receive a rubber tile floor finish and entry vestibules shall be provided with specialized walk-off carpet. Moisture mitigation for slabs on grade shall be provided finish flooring contractor. Typical walls shall receive a painted finish, with tile at areas designated on drawings (i.e. toilet room wet walls, locker rooms,
Typical ceilings will consist of suspended acoustical tile ceiling systems at 10 ft above finish floor, accented by gypsum soffits where indicated on drawings.

C2010 WALL FINISHES

A. LEED-S V.4 Submittals shall be provided for products demonstrating postconsumer and preconsumer recycled content, and low VOC content for construction adhesives, sealants, paints and coatings. Provide certificates indicating percentages by weight of postconsumer and preconsumer recycled content of alternating tread stairs, and metal railings. Include statement indicating costs for each product having recycled content. Provide manufacturer's printed statement of VOC content.

1. Work of this Section contributes to LEED Credits MR.3 and IEQ.2

B. Porcelain Tile:

1. Porcelain Tile #W1 (wall)
   a. Tile size: 24” x 24” & 24” x 6” – cut pieces
   b. Mortar: Latex-modified thinset over cement tile backer board
   c. Grout: Chemical-resistant, water-cleanable, tile-setting and grouting epoxy
   d. Joint Width: 3/16 inch.
   e. Products to be equal to Ultratech Colorbody Polished by American Olean

2. Porcelain Tile #W2 (wall)
   a. Tile size: 4” high x 12” long Polished Bullnose Wainscott
   b. Mortar: Latex-modified thinset over cement tile backer board
   c. Grout: Chemical-resistant, water-cleanable, tile-setting and grouting epoxy
   d. Joint Width: 3/16 inch.
   e. Products to be equal to Siena Springs Colorbody by American Olean

4. Porcelain Tile #W3 (Shower Walls):
   a. Tile Type: Unglazed 13”x13”porcelain tile as selected by Designer.
   b. Mortar: Latex-modified thinset over cement tile backer board
   c. Grout: Polymer-modified unsanded grout.
   d. Joint Width: 3/16 inch.
   e. Products to be equal to Porte Leona by American Olean

5. Porcelain Tile #W4 (Shower Walls):
   a. Tile Type: Unglazed 2”x2”porcelain tile as selected by Designer.
   b. Mortar: Latex-modified thinset over cement tile backer board
   c. Grout: Polymer-modified unsanded grout.
   d. Joint Width: 3/16 inch.
   e. Products to be equal to Porte Leona by American Olean

B. Quarry Tile
1. Quarry Tile #Q1: Kitchen Floor Installation.
   a. Tile Type: 6” x 6” Quarry Tile as selected by Designer.
   b. 6” x 6” Quarry Tile Wall Base with Bullnose Edge
   c. Thick-Set Mortar bed
   d. Grout: Polymer-modified unsanded grout.
   e. Joint Width: 3/8 inch.
   f. Products to be equal to Daltile

2. Grout Sealers:
   a. Bostik, Ceramaseal – Magic Seal
   b. Equal products approved by the architect.

C. Porcelain Tile Products

1. ANSI Tile Standard: Provide tile that complies with ANSI for types, compositions, and other characteristics indicated.
   a. Provide tile complying with Standard grade requirements, unless otherwise indicated.
   b. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.


3. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

4. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless otherwise indicated.

5. Tile Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes selected from manufacturer's standard shapes.

6. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

7. Water-Cleanable, Tile-Setting Epoxy Adhesive: ANSI A118.3, with a VOC limit in compliance with SECTION 018113 MA-CHPS PRODUCT REQUIREMENTS.

8. Organic Adhesive: ANSI A136.1, Type I.


10. Standard Unsanded Cement Grout for Joints Widths 1/8 inch or smaller: ANSI A118.6, color as indicated.

11. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
D. Elastomeric Sealants for Porcelain Tile

1. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

a. Available Products:
   1) Dow Corning Corporation; Dow Corning 786.
   2) GE Silicones; Sanitary 1700.
   3) Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
   4) Tremco, Inc.; Tremsil 600 White.

2. Multipart, Pourable Urethane Sealant for Use T: ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.

a. Available Products:
   1) Bostik; Chem-Calk 550.
   3) Pecora Corporation; NR-200 Urexpan.
   4) Tremco, Inc.; THC-900.

E. Setting Materials for Porcelain Tile


a. Cleavage Membrane: polyethylene sheeting, ASTM D 4397, 4.0 mils (0.1 mm) thick.
   b. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches (50.8 by 50.8 mm) by 0.062-inch (1.57-mm) diameter; comply with ASTM A 185 and ASTM A 82 except for minimum wire size.
   c. Latex Additive: water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.


a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1) Boiardi Products; a QEP company.
   2) Bonsal American; an Oldcastle company.
   3) Bostik, Inc.
   4) Custom Building Products.
   5) Laticrete International, Inc.
   6) MAPEI Corporation.
7) Southern Grouts & Mortars, Inc.
8) Summitville Tiles, Inc.

b. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.1.

F. Painting

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   a. Sherwin Williams
   b. PPG Industries, Inc.
   c. Benjamin Moore Paints.

2. Paint Materials, General
   a. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   b. All paints and coatings that are applied onsite and fall within the building weather barrier must have a VOC content less than the limits of Green Seal Standards GS-11 and GC-03 and the State of California’s South Coast Air Quality Management District (SCAQMD) Rule 1113.

   The VOC content limits of Green Seal Standard GS-11 are as follows:

<table>
<thead>
<tr>
<th>Paints</th>
<th>VOC Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
<td>(grams/litre)</td>
</tr>
<tr>
<td>Interior Coatings, Non-Flat</td>
<td>150</td>
</tr>
<tr>
<td>Interior Coatings, Flat</td>
<td>50</td>
</tr>
</tbody>
</table>

   The VOC content limits of Green Seal Standard GC-03 are as follows:

<table>
<thead>
<tr>
<th>Anti-Corrosive Paints</th>
<th>VOC Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
<td>(grams/litre)</td>
</tr>
<tr>
<td>Anti-Corrosive Paint, Gloss</td>
<td>250</td>
</tr>
<tr>
<td>Anti-Corrosive Paint, Semi-Gloss</td>
<td>250</td>
</tr>
<tr>
<td>Anti-Corrosive Paint, Flat</td>
<td>250</td>
</tr>
</tbody>
</table>
The VOC content limits of SCAQMD Rule 1113 are as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>VOC Limit (grams/litre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bond Breaker</td>
<td>350</td>
</tr>
<tr>
<td>Clear Wood Finish, Varnish</td>
<td>275</td>
</tr>
<tr>
<td>Clear Wood Finish, Sanding Sealer</td>
<td>275</td>
</tr>
<tr>
<td>Clear Wood Finish, Lacquer</td>
<td>275</td>
</tr>
<tr>
<td>Clear Brushing Lacquer</td>
<td>275</td>
</tr>
<tr>
<td>Concrete-Curing Compound</td>
<td>100</td>
</tr>
<tr>
<td>Dry-Fog</td>
<td>150</td>
</tr>
<tr>
<td>Flat Coating</td>
<td>50</td>
</tr>
<tr>
<td>Floor Coating</td>
<td>50</td>
</tr>
<tr>
<td>Graphic Arts (sign) Coating</td>
<td>500</td>
</tr>
<tr>
<td>Industrial Maintenance Coating</td>
<td>100</td>
</tr>
<tr>
<td>High Temperature Industrial Maintenance Coating</td>
<td>420</td>
</tr>
<tr>
<td>Zinc-Rich Industrial Maintenance Coating</td>
<td>100</td>
</tr>
<tr>
<td>Japans/Faux Finishing Coating</td>
<td>350</td>
</tr>
<tr>
<td>Magnesite Cement Coating</td>
<td>450</td>
</tr>
<tr>
<td>Mastic Coating</td>
<td>300</td>
</tr>
<tr>
<td>Metallic Pigmented Coating</td>
<td>500</td>
</tr>
<tr>
<td>Multi-Colour Coating</td>
<td>250</td>
</tr>
<tr>
<td>Non-Flat Coating</td>
<td>50</td>
</tr>
<tr>
<td>Pigmented Lacquer</td>
<td>275</td>
</tr>
<tr>
<td>Pre-Treatment Wash Primers</td>
<td>420</td>
</tr>
<tr>
<td>Primer, Sealer and Undercoating</td>
<td>100</td>
</tr>
<tr>
<td>Quick-Dry Enamel</td>
<td>50</td>
</tr>
<tr>
<td>Quick-Dry Primer, Sealer and Undercoating</td>
<td>100</td>
</tr>
<tr>
<td>Recycled Coating</td>
<td>250</td>
</tr>
<tr>
<td>Roof Coating</td>
<td>50</td>
</tr>
<tr>
<td>Roof Coating, Aluminum</td>
<td>100</td>
</tr>
<tr>
<td>Roof Primer, Bituminous</td>
<td>350</td>
</tr>
<tr>
<td>Rust Preventative Coating</td>
<td>100</td>
</tr>
<tr>
<td>Shellac, Clear</td>
<td>730</td>
</tr>
<tr>
<td>Material Type</td>
<td>Code</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Shellac, Pigmented</td>
<td>550</td>
</tr>
<tr>
<td>Specialty Primer</td>
<td>100</td>
</tr>
<tr>
<td>Stains</td>
<td>100</td>
</tr>
<tr>
<td>Stains, Interior</td>
<td>250</td>
</tr>
<tr>
<td>Swimming Pool Coating, Repair</td>
<td>340</td>
</tr>
<tr>
<td>Swimming Pool Coating, Other</td>
<td>340</td>
</tr>
<tr>
<td>Traffic Coating</td>
<td>100</td>
</tr>
<tr>
<td>Waterproofing Sealer</td>
<td>100</td>
</tr>
<tr>
<td>Waterproofing Concrete/Masonry Sealer</td>
<td>100</td>
</tr>
<tr>
<td>Wood Preservative, Below-Ground</td>
<td>350</td>
</tr>
<tr>
<td>Wood Preservative, Other</td>
<td>350</td>
</tr>
<tr>
<td>Low-Solids Coating</td>
<td>120</td>
</tr>
</tbody>
</table>

**c. Material Quality:** Provide manufacturer’s best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer’s product identification will not be acceptable.

**3) Proprietary Names:** Use of manufacturer’s proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer’s material data and certificates of performance for proposed substitutions.

**4) Interior Paint Schedule**

**a. Interior Gypsum Wallboard and Plaster for Eggshell Finish:**

**Primer:**

1. 372 – Eco-Spec WB Primer
2. S-W Harmony Latex Primer B11 W900 Series
3. PPG Speedhide Interior Latex Primer Sealer 6-2.

**First Coat**

1. 374 – Eco-Spec WB Eggshell
2. S-W Harmony Eggshell B9 Series
3. PPG Speedhide Interior Eggshell Latex Enamel 6-411 Series.
Second Coat

1. 374 – Eco-Spec WB Eggshell
2. Harmony EgShel B9 Series
3. PPG Speedhide Interior Eggshell Latex Enamel 6-411 Series.

b. Interior Gypsum Wallboard and Plaster Ceilings for Flat Finish:

Primer:

1. 372 – Eco-Spec WB Primer
2. S-W Harmony Latex Primer B11W900 Series
3. PPG Speedhide Interior Latex Primer Sealer 6-2.

First Coat:

1. 373 – Eco-Spec WB Flat
2. S-W Harmony Flat B5 Series
3. PPG Speedhide Interior Flat 6-70 Series.

Second Coat:

1. 373 – Eco-Spec WB Flat
2. S-W Harmony Flat B5 Series
3. PPG Speedhide Interior Flat 6-70 Series.

c. Interior Gypsum Wallboard and Plaster for Latex Semi-Gloss Finish:

Primer:

1. 372 – Eco-Spec WB Primer
2. S-W Harmony Primer B11W900 Series
3. PPG Speedhide Interior Latex Primer Sealer 6-2.

First Coat:

1. 376 – Eco-Spec WB Semi-Gloss
2. S-W Harmony Semi-Gloss B10 Series
3. PPG Speedhide Interior Semi-Gloss Acrylic Latex 6-500 Series.

Second Coat:

1. 376 – Eco-Spec WB Semi-Gloss
2. S-W Harmony Semi-Gloss B10 Series
3. PPG Speedhide Interior Semi-Gloss Acrylic Latex 6-500 Series.

Primer:

1. 372 – Eco-Spec WB Primer
2. S-W Harmony Primer B11W900 Series
3. PPG SEAL GRIP® Interior Latex Enamel Undercoater 17-955.

First Coat:

1. 376 – Eco – Spec WB Semi-Gloss
2. S-W Harmony Semi-Gloss B10 Series
3. PPG Speedhide Interior Semi-Gloss Acrylic Latex 6-500 Series.

Second Coat:

1. 376 – Eco – Spec WB Semi-Gloss
2. S-W Harmony Semi-Gloss B10 Series
3. PPG Speedhide Interior Semi-Gloss Acrylic Latex 6-500 Series.

e. Interior Architectural Woodwork, Finish Carpentry and Millwork for Satin Transparent Finish (all hardwoods and hardwood veneers, except paint grade and factory-finished items):

Sand 120 grit sandpaper
Sand 220 grit sandpaper

One Coat Stain

1. Carver Tripp Waterbase Stain
2. Knute’s Restoration EF Waterbase Stain
3. American Formulating & Manuf., SafeCoat Durostain
4. S-W Minwax 250 VOC Stain
5. PPG OLYMPIC® Interior Oil Based Wood Stain 44500.

First Coat

1. 423 Benwood Stays Clear Acrylic Low Luster Polyurethan
2. S-W Water based Polyurethane Satin A68 Series
3. PPG OLYMPIC® Premium Interior Water Based Polyurethane Clear 42786.

Second coat

1. 423 Benwood Stays Clear Acrylic Low Luster Polyurethane
2. S-W Water based Polyurethane Satin A68 Series
3. PPG OLYMPIC® Premium Interior Water Based Polyurethane Clear 42786.

Sand Between Urethane Coats - 220 grit sandpaper

f. Interior Concrete Masonry Units for Latex Semi-Gloss Finish in Dry Areas:

Primer/Block Filler:

1. 285 – Moorcraft Super Craft Latex Block Filler
2. S-W Preprite Block Filler B25W25 Series
3. PPG Speedhide Int/Ext Latex Masonry Block Filler 6-7.

Finish Coat:

1. 376 – Eco-Spec WB Semi-Gloss
2. S-W Harmony Semi-Gloss B10 Series
3. PPG Speedhide Interior Semi-Gloss Acrylic Latex 6-500 Series.

Second Coat:

1. 376 – Eco-Spec WB Semi-Gloss
2. S-W Harmony Semi-Gloss B10 Series
3. PPG Speedhide Interior Semi-Gloss Acrylic Latex 6-500 Series.

g. Ferrous Metal – Semi-Gloss:

Primer:

1. P04 – super Spec HP Acrylic Metal Primer
2. S-W Pro Industrial™ Pro-Cryl® Universal Primer B66-310 Series

First Coat:

1. Super Spec HP D.T.M. Acrylic Semi-Gloss
2. S-W Pro Industrial™ 0 VOC Acrylic Semi-Gloss, B66-600 Series

Second Coat:

1. Super Spec HP D.T.M. Acrylic Semi-Gloss
2. S-W Pro Industrial™ 0 VOC Acrylic Semi-Gloss, B66-600 Series
h. Epoxy Paint Locations: Concrete Block

Primer:

2. PPG Speedhide Int/Ext Latex Masonry Block Filler 6-7.

First Coat:

1. 256 – Moorcraft Super Spec Semi-Gloss Acrylic Epoxy
2. S-W Water Based Catalyzed Epoxy, B70W211/B60V25 Semi-Gloss
3. PPG Pitt-Glaze WB Water Borne Acrylic Epoxy 16-551 Series.

Second Coat:

1. 256 – Moorcraft Super Spec Semi-Gloss Acrylic Epoxy
2. S-W Water Based Catalyzed Epoxy, B70W211/B60V25 Semi-Gloss
3. PPG Pitt-Glaze WB Water Borne Acrylic Epoxy 16-551 Series.

i. Intumescent Paint: At all electrical & data back backboards – color = blue

   One Coat  1. Flamestop IM or equal

   Second Coat  1. Flamestop IM or equal

C2030  FLOOR FINISHES

A. LEED-S V.4 Submittals shall be provided for products demonstrating postconsumer and preconsumer recycled content, and low VOC content for construction adhesives, sealants, paints and coatings. Provide certificates indicating percentages by weight of postconsumer and preconsumer recycled content of alternating tread stairs, and metal railings. Include statement indicating costs for each product having recycled content. Provide manufacturer’s printed statement of VOC content.

1. Work of this Section contributes to LEED Credits MR.3 and IEQ.2

B. Sealed Concrete Floors:

1. One Coat

   a. M27-00 – Clear Acrylic Sealer
   b. S-W H&C Wet Look Sealer
   c. PPG Int/Ext Floor, Porch & Deck Satin Latex Enamel 3-510 Series.

2. Second Coat

   a. M27-00 – Clear Acrylic Sealer
   b. S-W H&C Wet Look Sealer
c. PPG Int/Ext Floor, Porch & Deck Satin Latex Enamel 3-510 Series.

C. Porcelain Tile Schedule

1. Porcelain Tile #F1: Floor installation.
   a. Tile size: 20” x 20”
   b. Base: 6” x 13” cove base
   c. Mortar: Latex-modified thinset
   d. Grout: Chemical-resistant, water-cleanable, tile-setting and grouting epoxy
   e. Joint Width: 3/16 inch.
   f. Products to be equal to Siena Springs Colorbody by American Olean

2. Porcelain Tile #F2: Floor installation
   a. Tile size: 24” x 24” & 24” x 6” – cut pieces
   b. Mortar: Latex-modified thinset over cement tile backer board
   c. Grout: Chemical-resistant, water-cleanable, tile-setting and grouting epoxy
   d. Joint Width: 3/16 inch.
   e. Products to be equal to Ultratech Colorbody Polished by American Olean

3. Porcelain Tile #F3: Toilet Room Floor installation
   a. Tile Type: Unglazed 13” x 13” porcelain tile as selected by Designer & 6” x 13” cove base.
   b. Thin-Set Mortar
   c. Grout: Chemical-resistant, water-cleanable, tile-setting and grouting epoxy.
   d. Joint Width: 3/16 inch.
   e. Products to be equal to Porte Leona by American Olean

4. Porcelain Tile #F4: Locker Room Floor installation at floor drains:
   a. Tile Type: Unglazed 2” x 2” mosaic tile mesh mounted sheets as selected by Designer.
   b. Thick-Set Mortar Bed
   c. Grout: Chemical-resistant, water-cleanable, tile-setting and grouting epoxy.
   d. Joint Width: 3/16 inch.
   e. Products to be equal to Porte Leona by American Olean

5. Grout Sealers:
   a. Bostik, Ceramaseal – Magic Seal
   b. Equal products approved by the architect.

D. Porcelain Tile Products

1. ANSI Tile Standard: Provide tile that complies with ANSI for types, compositions, and other characteristics indicated.
a. Provide tile complying with Standard grade requirements, unless otherwise indicated.
b. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.


3. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

4. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless otherwise indicated.

5. Tile Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes selected from manufacturer's standard shapes.

6. Marble Thresholds: Uniform, fine- to medium-grained white stone with gray veining, ASTM C 503 with a minimum abrasion resistance of 10 per ASTM C 1353 or ASTM C 241 and with honed finish. Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
   a. Width: Provide units 4 ½ inches wide by length of door opening.
   b. Bevel edges at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to 1/2 inch or less, and finish bevel to match face of threshold.

7. Water-Cleanable, Tile-Setting Epoxy Adhesive: ANSI A118.3, with a VOC limit in compliance with LEED Product Requirements

8. Organic Adhesive: ANSI A136.1, Type I.


10. Standard Unsanded Cement Grout for Joints Widths 1/8 inch or smaller: ANSI A118.6, color as indicated.

11. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

E. Elastomeric Sealants for Porcelain Tile

1. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
   a. Available Products:
      1) Dow Corning Corporation; Dow Corning 786.
      2) GE Silicones; Sanitary 1700.
      3) Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
4) Tremco, Inc.; Tremsil 600 White.

2. Multipart, Pourable Urethane Sealant for Use T: ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.

   a. Available Products:
      1) Bostik; Chem-Calk 550.
      3) Pecora Corporation; NR-200 Urexpam.
      4) Tremco, Inc.; THC-900.

F. Setting Materials for Porcelain Tile

   a. Cleavage Membrane: polyethylene sheeting, ASTM D 4397, 4.0 mils (0.1 mm) thick.
   b. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches (50.8 by 50.8 mm) by 0.062-inch (1.57-mm) diameter; comply with ASTM A 185 and ASTM A 82 except for minimum wire size.
   c. Latex Additive: water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.

   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) Boiardi Products; a QEP company.
      2) Bonsal American; an Oldcastle company.
      3) Bostik, Inc.
      4) Custom Building Products.
      5) Laticrete International, Inc.
      6) MAPEI Corporation.
      7) Southern Grouts & Mortars, Inc.
      8) Summitville Tiles, Inc.

G. Concrete Moisture Control Materials for new Slabs-On-Grade

1. Basis-of-Design Product: Subject to compliance with requirements, provide ARDEX MC™ RAPID by ARDEX Engineered Cements, Aliquippa, Pa (tel. 724-203-5000), or a comparable product by one of the following or equal:
   b. KOSTER American Corporation, Virginia Beach, VA (tel. 757-425-1206).
2. Performance and Physical Properties: Meet or exceed the following values for material cured at 70 deg F ± 3 deg F and 50 percent ± 5 percent relative humidity:

   b. Material Requirements on CSP 3 Prepared Concrete: Max 270 sq. ft. per mixed unit for 10 mils.
   c. Permeability (ASTM E96): <0.1 perms.
   d. 14 pH solution (ASTM D1308): No effect.
   e. Working Time: 20 minutes
   f. Pot Lift: 20 minutes
   g. VOC: 0g/L, calculated SCAQMD 1113 h. Walkable: Minimum of 4 hours
   h. Prime and Install Underlayment: Minimum 4 hours, maximum 24 hours

3. Underlayment: Hydraulic-cement-based, polymer-modified, self-leveling product that can be applied in minimum uniform thickness of 1/4 inch and that can be feathered at edges to match adjacent floor elevations.

   a. Basis-of-Design Product: Subject to compliance with requirements, provide ARDEX K-15 Self-Leveling Underlayment by ARDEX Engineered Cements, Aliquippa, Pa (tel. 724-203-5000), or a comparable product by one of the following or equal:

      1) Bonsal American, an Oldcastle company; ProSpec Level Set 200.
      2) MAPEI Corporation; Ultraplan 1 Plus.
      3) USG Corporation; Levelrock SLC 300.

         a. Cement Binder: ASTM C 150, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C 219.
         b. Performance and Physical Properties: Meet or exceed the following values for material cured at 70 deg F ± 3 deg F and 50 percent ± 5 percent relative humidity:

            1. Application: Barrel Mix or Pump.
            2. Flow Time: 10 minutes.
            3. Initial Set: Approx. 30 minutes.
            4. Final Set: Approx. 90 minutes.
            5. Compressive Strength: Minimum 4100 psi at 28 days, ASTM C109M.
            6. Flexural Strength: 1000 psi at 28 days, ASTM C78.
            7. VOC: 0 g/l, calculated SCAQMD 1168.

         c. Water: Potable and at a temperature of not more than 70 deg F.
         d. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.

            1. Primer shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D.
            2. Primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the
H. Resilient Flooring

1. Available Products: Subject to compliance with requirements, linoleum homogeneous floorcovering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Johnsonite
   b. Armstrong
   c. Tarkett

2. Style and Colors: Style: Equal to Veneto & Veneto Tile (Accents) by Johnsonite. Colors to be selected by Designer.
   a. Provide 4 (four) colors for sheet flooring patterns and 3(three) colors for Tile Accents.

3. Thickness: 0.100” inch.
4. Sizes:
   a. Rolls: 6’-6” nominal
   b. Tiles: 19.68”x19.68”

5. Welding Rods: Colors to be selected by Designer

I. Rubber Wall Base

1. Wall Base: ASTM F 1861.
   a. Johnsonite
   b. Nora Rubber Flooring, Freudenberg Building Systems, Inc.
   c. Equal products may be used with approval from the architect.

2. Style and Colors: Equal to traditional style by Johnsonite or approved equal. Color to be selected by Designer.
3. Type: Rubber
4. Shape: Coved at resilient flooring.
5. Minimum Thickness: 0.125 inch.
6. Height: 6 inches.
7. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard length.
10. Surface: Smooth.

J. Carpet Tile
1. All carpet products must meet the testing and product requirements of the Carpet and Rug Institute’s Green Label Plus program.

2. All carpet cushion products must meet the testing and product requirements of the CRI Green Label program.

3. Products: Subject to compliance with requirements, provide the following:

   a. Modular Multi-Level Patterned Loop

      1) Construction: Loop pile
      2) Pile Fiber: Solution Dyed Nylon with soil resistance treatment
      3) Density: 6415
      4) Stitches per inch: 11.3
      5) Gauge: 1/10
      6) Pile Thickness: .101
      7) Tufted Yarn Weight: 18 oz. per square yd.
      8) Primary Backing: 100% synthetic
      9) Secondary Backing: Infinity RE with minimum 10% post-consumer and 20% pre-consumer recycled content by total weight.
      10) Wear Warranty: Lifetime limited wear warranty
      11) Backing Warranty: Lifetime Limited backing warranty
      12) CRI Green Label Plus – PSA-970522
      13) Methenamine Pill Test (ASTM-D-2859): Passes
      14) Flooring Radiant Panel Test: Class1 (Direct Glue)
      15) N.B.S. smoke chamber Test (ASTM-E-662): <450 (Flamming Mode)
      16) Electrostatic Propensity Test (AATCC 134): <3.0 KV
      17) Weight Density: 115,485
      18) standard size: 24” x 24” tiles
      19) Colorways: Three (3) different colorways to be used throughout the facility.

   b. Provide carpet collection with a minimum of three (3) carpet patterns all with coordinating colors.

   c. Manufacturer: To establish a standard of quality, the contract drawings and specifications are based on Mannington Commercial, Modular carpet, Cartography Collection which includes Carpet Styles: landmark, Provenance & Terrain. Carpet Collections equal to the above products may be used with approval from the architect.

K. Carpet Installation Accessories

L. Carpet Adhesives: Provide adhesives from same source as carpet. Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and that is recommended by carpet manufacturer.

   1) VOC Limits: Provide adhesives that have VOC contents less than the limits listed in for LEED Product Requirements.

      Seam Sealer per Manufacturer’s written installation procedures.
M. Walk-Off Carpet

1. Recycled Content: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.

2. VOC Limits: Provide adhesives that have VOC contents less than the limits listed in for LEED Product Requirements.

3. Basis of Design Product: Subject to compliance with requirements, provide Designstep by C/S Group, or a comparable product by one of the following:
   a. American Floor Products Company, Inc.
   b. Cactus Mat Mfg. Co.
   c. Mats Inc.
   d. Musson Rubber Company.
   e. Pawling Corporation; Architectural Products Division.

4. Carpet-Type Tiles: Polypropylene carpet bonded to 1/8- to 1/4-inch-thick, flexible vinyl backing to form mats 3/8 or 7/16 inch thick with nonraveling edges.
   a. Colors, Textures, and Patterns: As selected by Architect from full range of industry colors.
   b. Tile Size: 24 by 24 inches

5. Installation Accessories:
   a. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
   b. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
      1) Adhesives shall be rated for 85 percent relative humidity.
      2) Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
      3) Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
   c. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet tile, and of maximum lengths to minimize running joints.

N. Wood Athletic Flooring
1. LEED-S V.4 Submittals shall be provided for all wood products, including printed statement of VOC content, Composite Wood Manufacturer’s product data for each composite wood product used indicating that bonding agent used contains no urea formaldehyde, and Product certificates for all wood-based products certified by the Forest Stewardship Council (FSC) stating chain-of-custody (COC) number. Include statement indicating cost for each material and the fraction by weight that is considered FSC certified.

   a. Wood floors are proposed at the Gymatorium and Stage Thrust.
   b. Work of this Section contributes to LEED Credits MR.2 and IEQ.2

2. Maple Strip Flooring System:

   a. To establish a standard of quality, the design and this specification is based on 33/32" Lock-Tite Maple Flooring System by Robbins Inc. using First Grade maple as defined by the Maple Flooring Manufacturer's Association. Complete installed system shall be a single source supplier. Approved manufacturers are as follows:

      1) Robbins Inc. – “Lock-Tite Series”
      2) Superior Flooring Company Inc. – “Super-Tite Series”

3. Materials:

   a. Membrane:

      1) 6-mil polyethylene

   b. Flooring System

      1) Robbins Resilient Blanketseal Underlayment

         a) 1/2" x 48" x 120’ multicellular closed cell polyethylene film. Properties: Cell Size, 5mm, Method, ASTM D-2956 Density, pcf 1.8-3.3 ASTM D-1622.

      2) Clips and Channels

         a) 16 gauge zinc plated steel. Clips shall have one full length holding wing not less than 1" in width with an engaging projection or projections on opposite side.

      3) Fasteners

         a) Channel Anchors - 3/8" diameter flat head - minimum 1-1/4" long

      4) Flooring
a) 33/32” x 2-1/4” Second Grade and Better, T & G and EM, KD Northern hard MFMA Maple flooring with special locking grooves as manufactured by Robbins, Inc. and graded in accordance with MFMA standards.
b) Treating: Robbins flooring shall be treated with WOODLIFE preservative.

c. Perimeter Base Molding – Vented Maple Molding.
d. Finishing Materials
   1) Robbins Miracle oil modified polyurethane sealer and finish.
   2) Gameline paint shall be as recommended by the finishing materials manufacturer, compatible with the finish.

C2040 STAIR FINISHES

A. LEED-S V.4 Submittals shall be provided for products demonstrating postconsumer and preconsumer recycled content, and low VOC content for construction adhesives, sealants, paints and coatings. Provide certificates indicating percentages by weight of postconsumer and preconsumer recycled content of alternating tread stairs, and metal railings. Include statement indicating costs for each product having recycled content. Provide manufacturer’s printed statement of VOC content.

   1. Work of this Section contributes to LEED Credits MR.3 and IEQ.2

B. Rubber Floor Tile: ASTM F 1344. Provide new rubber tile flooring at all stair landings and integral rubber tread / risers at all stair runs.

   1. Available products which may be incorporated into the work include, but are not limited to, the following:
      a. Johnsonite
      b. Nora Rubber Flooring, Freudenberg Building Systems, Inc.
      c. Endura

   2. Style and Colors: Style: Cubis equal to Johnsonite. Color to be selected by Designer.
   3. Thickness: 0.125 inch.

C2050 CEILING FINISHES

A. LEED-S V.4 Submittals shall be provided for products demonstrating low VOC’s and for products with recycled content. Submittals for adhesives and sealants shall include printed statement of VOC content. Submittals shall provide documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content. Submittals for acoustical panel ceiling products shall demonstrate products are extracted, recovered and manufactured locally (within 500 miles of the project site).

   1. Work of this Section contributes to LEED Credits MR.2, MR.4 and IEQ.2
B. Acoustical Panel Ceilings

A. Products:

1) Subject to compliance with specified requirements, provide one of the following products for each type indicated.

   1) CertainTeed
   2) Armstrong
   3) USG Corporation
   4) Equal products

2) Acoustical Panel Type SAT-1 (Kitchen):

   1) Surface Texture: Non directional
   2) Composition: High density fiberglass
   3) Color: White
   4) Size: 24in x 48in x 3/4 in; as indicated on drawings
   5) Edge Profile: Square.
   6) Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.80.
   7) Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 21
   8) Flame Spread: ASTM E 1264; Class A (UL)
   9) Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.73.
   10) Dimensional Stability: Standard
   11) Acceptable Products: Ecophon Hygiene Performance A #3542 7308 manufactured by CertainTeed or approved equal.
   12) Grid: 15/16”.
   13) Recycled Content: 70% minimum

B. Acoustical Panel Type SAT-2 (MDF/IDF Rooms):

   a. Surface Texture: pebbled
   b. Composition: Gypsum core with vinyl facing and sealed edges
   c. Color: White
   d. Size: 24in x 48in x 1/2 in.
   e. Edge Profile: square
   f. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.10.
   g. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 40
   h. Flame Spread: ASTM E 1264; Class A (UL)
   i. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.88.
   j. Dimensional Stability: 10 year warranty against sag.
   k. Acceptable Products: Envirogard #1190-CRF-1 manufactured by CertainTeed or approved equal.
   l. Grid: 15/16”
m. Recycled Content: 12% minimum

C. Acoustical Panel Type SAT-3 (Classrooms):
   a. Surface Texture: fine
   b. Composition: Fiberglass
   c. Color: White
   d. Size: 24in x 48in x 3 in.
   e. Edge Profile: Reveal
   f. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 1.05.
   g. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 30
   h. Flame Spread: ASTM E 1264; Class A (UL)
   i. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.84.
   j. Acceptable Product: Open Plan #1390B-ELT1 manufactured by CertainTeed or approved equal.
   k. Grid: 15/16”

D. Acoustical Panel Type SAT-4 (Classroom Corridors and Enclosed Stairs):
   a. Surface Texture: fine
   b. Composition: Fiberglass
   c. Color: White
   d. Size: 24in x 48in x 9/16 in.
   e. Edge Profile: Reveal
   f. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, .85.
   g. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 21
   h. Flame Spread: ASTM E 1264; Class A (UL)
   i. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.84.
   j. Acceptable Product: Ecophon Gedina E/24 #3541 9083 manufactured by CertainTeed or approved equal.
   k. Grid: 15/16”

E. Acoustical Panel Type SAT-5 (Public Corridors):
   a. Surface Texture: fine
   b. Composition: Fiberglass
   c. Color: White
   d. Size: 24in x 24in x 9/16 in.
   e. Edge Profile: Reveal
   f. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, .85.
   g. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 21
   h. Flame Spread: ASTM E 1264; Class A (UL)
i. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.84.
j. Acceptable Product: Ecophon Gedina E/24 #3539 4426 manufactured by CertainTeed or approved equal.
k. Grid: 15/16”.

F. Acoustical Panel Type SAT-6 (Offices):

a. Surface Texture: fine  
b. Composition: Fiberglass  
c. Color: White  
d. Size: 24in x 24in x 3 in.  
e. Edge Profile: Reveal  
f. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.90.
g. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 30  
h. Flame Spread: ASTM E 1264; Class A (UL)  
i. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.84.  
j. Acceptable Product: Open Plan #1492B-ELT1 manufactured by CertainTeed or approved equal.  
k. Grid: 15/16”.

G. Acoustical Panel Type SAT-6 (Locker and Toilet Rooms):

a. Surface Texture: fine  
b. Composition: Fiberglass  
c. Color: White  
d. Size: 24in x 48in x 1/2 in.  
e. Edge Profile: Square  
f. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, N/A.  
g. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 43  
h. Flame Spread: ASTM E 1264; Class A (UL)  
i. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.84.  
j. Acceptable Product: Aqua Rock #1180-CRF-1SV manufactured by CertainTeed or approved equal.  
k. Grid: 15/16”.

H. Metal Suspension Systems for Acoustical Metal Panel Ceilings:

a. Metal Suspension System Standard: Provide manufacturer’s standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

1) Manufacturer: Same source as Ceiling Tiles to maintain Warranties.  
2) Structural Classification: Intermediate-duty system.  
3) End Condition of Cross Runners: Override (stepped) or butt-edge type.
4) Face Design: Flat, flush.
6) Color: White, prefinished.
7) Grid Face Width: As specified with ACT type.

b. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.

1) Anchors in Concrete: Anchors with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency; zinc-plated for Class SC1 service.

2) Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

c. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1) Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

2) Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106 diameter wire.

d. Hold-Down Clips: At vestibules and areas subject to wind uplift, provide manufacturer's standard hold-down clips spaced 24 inches on all cross tees.

I. Metal Edge Moldings and Trim for Acoustical Panel Ceilings

A. Roll-Formed 30% requirement – not likely? Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

1) For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.

2) For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

3) For narrow-face suspension systems, provide suspension system and manufacturer's standard edge moldings that match width and configuration of exposed runners.
C. Gypsum Soffits and Ceilings

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
   a. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
   b. Protective Coating: manufacturer’s standard corrosion-resistant zinc coating, unless otherwise indicated.
   c. All light steel framing products should have minimum post-consumer and pre-consumer recycled content as specified in Section 018113 MA-CHPS Product Requirements.
   d. All light steel framing products should have minimum post-consumer and pre-consumer recycled content as specified in Section 018113 MA-CHPS Product Requirements.

B. Suspension System Components
   a. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch-diameter wire.
   b. Hanger Attachments to Concrete:
      1) Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.
      2) Type: Post-installed, expansion anchor.
   c. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.
   d. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch-wide flanges with depth as required for span and loading and indicated on Drawings.
   e. Furring Channels (Furring Members): 0.0538-inch bare-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
   f. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
      1) Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
         b) Chicago Metallic Corporation; Drywall Furring System.
         c) USG Corporation; Drywall Suspension System.

C. Steel Framing for Framed Assemblies
   a. Steel Studs and Runners: ASTM C 645.
1) Minimum Base-Metal Thickness: 0.0312 inch.

b. Slip-Type Head Joints: Where indicated, provide one of the following:

1) Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch-deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
2) Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
3) Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

   a) Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

      1. Steel Network Inc. (The); VertiClip Series.
      2. Superior Metal Trim; Superior Flex Track System (SFT).

c. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

   1) Minimum Base-Metal Thickness: 0.0312 inch.

d. Cold-Rolled Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch-wide flanges.

   1) Depth: 1-1/2 inches.
   2) Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.

e. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

   1) Minimum Base Metal Thickness: 0.0312 inch.
   2) Depth: 7/8 inches and 1-1/2 inches, as indicated on Drawings.

f. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.

   1) Configuration: Asymmetrical or hat shaped.

g. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches wall attachment flange of 7/8 inch, minimum bare-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.
h. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

i. Isolation Strip at Exterior Walls: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

D. Interior Gypsum Board

a. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

1) Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a) USG Corporation products.
   b) Certainteed products.
   c) National Gypsum Company.
   d) Or equal.

b. Fire-Resistant Type X:

   1) Thickness: 5/8 inch.
   2) Long Edges: Tapered.

c. Flexible Type: Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.

   1) Thickness: 1/4 inch.
   2) Long Edges: Tapered.

d. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.

   1) Thickness: 5/8 inch.
   2) Long Edges: Tapered.

D. Painting

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

   a. Sherwin Williams
   b. PPG Industries, Inc.
   c. Benjamin Moore Paints.

2. Paint Materials, General
a. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

b. All paints and coatings that are applied onsite and fall within the building weather barrier must have a VOC content less than the limits of Green Seal Standards GS-11 and GC-03 and the State of California’s South Coast Air Quality Management District (SCAQMD) Rule 1113.

1) The VOC content limits of Green Seal Standard GS-11 are as follows:

<table>
<thead>
<tr>
<th>Paints</th>
<th>VOC Limit (grams/litre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior Coatings, Non-Flat</td>
<td>150</td>
</tr>
<tr>
<td>Interior Coatings, Flat</td>
<td>50</td>
</tr>
</tbody>
</table>

2) The VOC content limits of Green Seal Standard GC-03 are as follows:

<table>
<thead>
<tr>
<th>Anti-Corrosive Paints</th>
<th>VOC Limit (grams/litre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-Corrosive Paint, Gloss</td>
<td>250</td>
</tr>
<tr>
<td>Anti-Corrosive Paint, Semi-Gloss</td>
<td>250</td>
</tr>
<tr>
<td>Anti-Corrosive Paint, Flat</td>
<td>250</td>
</tr>
</tbody>
</table>

3) The VOC content limits of SCAQMD Rule 1113 are as follows:

<table>
<thead>
<tr>
<th>Coatings</th>
<th>VOC Limit (grams/litre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bond Breaker</td>
<td>350</td>
</tr>
<tr>
<td>Clear Wood Finish, Varnish</td>
<td>275</td>
</tr>
<tr>
<td>Clear Wood Finish, Sanding Sealer</td>
<td>275</td>
</tr>
<tr>
<td>Clear Wood Finish, Lacquer</td>
<td>275</td>
</tr>
<tr>
<td>Clear Brushing Lacquer</td>
<td>275</td>
</tr>
<tr>
<td>Concrete-Curing Compound</td>
<td>100</td>
</tr>
<tr>
<td>Dry-Fog</td>
<td>150</td>
</tr>
<tr>
<td>Flat Coating</td>
<td>50</td>
</tr>
<tr>
<td>Coating Type</td>
<td>Specification</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Floor Coating</td>
<td>50</td>
</tr>
<tr>
<td>Graphic Arts (sign) Coating</td>
<td>500</td>
</tr>
<tr>
<td>Industrial Maintenance Coating</td>
<td>100</td>
</tr>
<tr>
<td>High Temperature Industrial Maintenance Coating</td>
<td>420</td>
</tr>
<tr>
<td>Zinc-Rich Industrial Maintenance Coating</td>
<td>100</td>
</tr>
<tr>
<td>Japans/Faux Finishing Coating</td>
<td>350</td>
</tr>
<tr>
<td>Magnesite Cement Coating</td>
<td>450</td>
</tr>
<tr>
<td>Mastic Coating</td>
<td>300</td>
</tr>
<tr>
<td>Metallic Pigmented Coating</td>
<td>500</td>
</tr>
<tr>
<td>Multi-Colour Coating</td>
<td>250</td>
</tr>
<tr>
<td>Non-Flat Coating</td>
<td>50</td>
</tr>
<tr>
<td>Pigmented Lacquer</td>
<td>275</td>
</tr>
<tr>
<td>Pre-Treatment Wash Primers</td>
<td>420</td>
</tr>
<tr>
<td>Primer, Sealer and Undercoating</td>
<td>100</td>
</tr>
<tr>
<td>Quick-Dry Enamel</td>
<td>50</td>
</tr>
<tr>
<td>Quick-Dry Primer, Sealer and Undercoating</td>
<td>100</td>
</tr>
<tr>
<td>Recycled Coating</td>
<td>250</td>
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<tr>
<td>Roof Coating</td>
<td>50</td>
</tr>
<tr>
<td>Roof Coating, Aluminum</td>
<td>100</td>
</tr>
<tr>
<td>Roof Primer, Bituminous</td>
<td>350</td>
</tr>
<tr>
<td>Rust Preventative Coating</td>
<td>100</td>
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<tr>
<td>Shellac, Clear</td>
<td>730</td>
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<tr>
<td>Shellac, Pigmented</td>
<td>550</td>
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<tr>
<td>Specialty Primer</td>
<td>100</td>
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<tr>
<td>Stains</td>
<td>100</td>
</tr>
<tr>
<td>Stains, Interior</td>
<td>250</td>
</tr>
<tr>
<td>Swimming Pool Coating, Repair</td>
<td>340</td>
</tr>
<tr>
<td>Swimming Pool Coating, Other</td>
<td>340</td>
</tr>
<tr>
<td>Traffic Coating</td>
<td>100</td>
</tr>
<tr>
<td>Waterproofing Sealer</td>
<td>100</td>
</tr>
<tr>
<td>Waterproofing Concrete/Masonry Sealer</td>
<td>100</td>
</tr>
<tr>
<td>Wood Preservative, Below-Ground</td>
<td>350</td>
</tr>
<tr>
<td>Wood Preservative, Other</td>
<td>350</td>
</tr>
<tr>
<td>Low-Solids Coating</td>
<td>120</td>
</tr>
</tbody>
</table>
c. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1) Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

3. Interior Paint Schedule

j. Interior Gypsum Wallboard and Plaster Ceilings for Flat Finish:

1. Primer:

   a. 372 – Eco-Spec WB Primer
   b. S-W Harmony Latex Primer B11W900 Series
   c. PPG Speedhide Interior Latex Primer Sealer 6-2.

2. First Coat:

   a. 373 – Eco-Spec WB Flat
   b. S-W Harmony Flat B5 Series
   c. PPG Speedhide Interior Flat 6-70 Series.

3. Second Coat:

   a. 373 – Eco-Spec WB Flat
   b. S-W Harmony Flat B5 Series
   c. PPG Speedhide Interior Flat 6-70 Series.

k. Interior Architectural Woodwork and Finish Carpentry for Latex Semi-Gloss Paint Finish (softwoods, paint grade hardwoods, MDO, and hardwood veneers):

1. Primer:

   a. 372 – Eco-Spec WB Primer
   b. S-W Harmony Primer B11W900 Series
   c. PPG SEAL GRIP® Interior Latex Enamel Undercoater 17-955.

2. First Coat:

   a. 376 – Eco – Spec WB Semi-Gloss
   b. S-W Harmony Semi-Gloss B10 Series
   c. PPG Speedhide Interior Semi-Gloss Acrylic Latex 6-500 Series.
3. Second Coat:
   a. 376 – Eco – Spec WB Semi-Gloss
   b. S-W Harmony Semi-Gloss B10 Series
   c. PPG Speedhide Interior Semi-Gloss Acrylic Latex 6-500 Series.

I. Interior Architectural Woodwork, Finish Carpentry for Satin Transparent Finish (all hardwoods and hardwood veneers, except paint grade and factory-finished items):

1. Sand 120 grit sandpaper
2. Sand 220 grit sandpaper
3. One Coat Stain
   a. Carver Tripp Waterbase Stain
   b. Knute’s Restoration EF Waterbase Stain
   c. American Formulating & Manuf., SafeCoat Durostain
   d. S-W Minwax 250 VOC Stain
   e. PPG OLYMPIC® Interior Oil Based Wood Stain 44500.

4. First Coat
   a. 423 Benwood Stays Clear Acrylic Low Luster Polyurethan
   b. S-W Water based Polyurethane Satin A68 Series
   c. PPG OLYMPIC® Premium Interior Water Based Polyurethane Clear 42786.

5. Second coat
   a. 423 Benwood Stays Clear Acrylic Low Luster Polyurethane
   b. S-W Water based Polyurethane Satin A68 Series
   c. PPG OLYMPIC® Premium Interior Water Based Polyurethane Clear 42786.

6. Sand Between Urethane Coats - 220 grit sandpaper

D SERVICES

D10 CONVEYING

Design Intent: Separate passenger elevators are intended to serve the elementary and middle school wings. The elementary wing elevator will serve 2 floors, with a travel distance of 14 ft, and shall be provided as a 2-stage, holeless hydraulic elevator. The elevator at the middle school wing will serve 3 floors, with a travel distance of 28 ft, and shall be provided as a 2-stage holes hydraulic elevator. Elevator cabs shall meet MA Stretcher Code requirements.
D1010 Elevators

A. LEED-S V.4 Submittals shall be provided for each wood or laminated product stating that bonding agent used contains no urea-formaldehyde. Submittals for adhesives and sealants shall include printed statement of VOC content.

1. Work of this Section contributes to LEED Credit IEQ.2.

B. Manufacturer: To establish a standard of quality, specifications are based on the Endura, 2-stage hydraulic elevator, by ThyssenKrupp Elevator. Subject to requirements, available products include, but are not limited to, the following:

1. Montgomery KONE Inc.
2. Dover Elevator Systems
3. Otis Elevator Co.
4. Schindler Elevator Corp.

C. Materials, General

1. Colors, patterns, and finishes: As selected by the Architect from manufacturer's standard colors, patterns, and finish charts.

2. Steel:
   a. Shapes and bars: Carbon.
   b. Sheet: Cold-rolled steel sheet, commercial quality, Class 1, matte finish.
   c. Finish: Factory-applied baked enamel.

3. Plastic laminate: Decorative high-pressure type, complying with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050" thickness. All adhesives, sealants, paints and coatings applied on site shall meet the VOC limits as stated in LEED Product Requirements. Laminate binders must be free of added urea-formaldehyde.

4. Flooring: Resilient sheet flooring installed by others.

5. All adhesives, sealants, paints and coatings applied on site shall meet the VOC limits as stated in the LEED Product Requirements.

D. Hoistway Equipment

1. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood subfloor. Underside of the platform shall be fireproofed.

2. Sling: Steel stiles affixed to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.


4. Guides: Slide guides shall be mounted on top and bottom of the car.

5. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on a steel template that is fastened to the pit floor or continuous channels fastened to the
elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions.

6. Jack: Jack unit shall be of sufficient size to lift the gross load the height specified. Factory test jack to insure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Provide the following jack type: Twin post holeless telescopic 2-stage. Two jacks piped together, mounted one on each side of the car with each having two telescopic sections designed to extend in a synchronized manner when oil is pumped into the assembly. Each jack section will be guided from within the casing or the plunger assembly used to house the section. Each plunger shall have a high pressure sealing system which will not allow for seal movement or displacement during the course of operation. Each jack assembly shall have a check valve built into the assembly to allow for automatically re-syncing the two plunger sections by moving the jack to its fully contracted position. The jack shall be designed to be mounted on the pit floor or in a recess in the pit floor. Each jack section shall have a bleeder valve to discharge any air trapped in the section.

7. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the landings and correct for overtravel or undertravel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.

8. Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary code compliant pipe and fittings shall be provided to connect the power unit to the jack unit. Provide proper grade oil as specified by the manufacturer of the power unit.

E. Power Unit

1. Power Unit - Oil Pumping and Control Mechanism: A self-contained unit consisting of the following items:

   a. NEMA 4/Sealed Oil reservoir with tank cover including vapor removing tank breather.
   b. An oil hydraulic pump.
   c. An electric motor.
   d. Electronic oil control valve with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and electro-magnetic controlling solenoids.

2. Pump: Positive displacement type pump specifically manufactured for oil-hydraulic elevator service. Pump shall be designed for steady discharge with minimum pulsation to give smooth and quiet operation. Output of pump shall not vary more than 10 percent between no load and full load on the elevator car.

4. Control System: Shall be microprocessor based and protected from environmental extremes and excessive vibrations in a NEMA 1 enclosure.

5. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.
   a. Relief valve shall be externally adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.
   b. Up start and stop valve shall be adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.
   c. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.
   d. Lowering valve and leveling valve shall be adjustable for down start speed, lowering speed, leveling speed and stopping speed to ensure smooth "down" starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling after slowdown is initiated.


F. Hoistway Entrances

1. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening bolted\knock down construction.
   a. Manufacturer's standard entrance design consisting of hangers, doors, hanger supports, hanger covers, fascia plates, sight guards, and necessary hardware.
   b. Main landing door & frame finish: ASTM A1008 steel panels, factory applied powder coat finish.
   c. Typical door & frame finish: ASTM A 366 steel panels, factory applied powder coat finish.

2. Interlocks: Equip each hoistway entrance with an approved type interlock tested as required by code. Provide door restriction devices as required by code.

3. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway horizontal sliding door.
   a. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
b. Hangers: Provide an adjustable device beneath the track to limit the up-thrust of the doors during operation.

c. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.

4. Hoistway Sills: Extruded metal, with groove(s) in top surface. Provide mill finish on aluminum.

G. Car Enclosure

1. Car Enclosure:
   a. Walls: Cab type a steel shell design, reinforced cold-rolled steel with an applied panel design. The applied panels design, shall be arranged vertically on wood core panels covered on both sides with high pressure plastic laminate.
   b. Canopy: Cold-rolled steel with hinged exit.
   c. Ceiling: Suspended type, LED lighting with translucent diffuser mounted in a metal frame. Framework shall be finished with a stainless steel, no. 4 brushed finish.
   d. Cab Fronts, Return, Transom, Soffit and Strike: Provide panels faced with No. 4 brushed stainless steel.
   e. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic sliding guides.

      1) Door Finish: Stainless steel panels: No. 4 brushed finish.
      2) Cab Sills: Extruded aluminum, mill finish.

   f. Handrail: Provide 1.5" diameter cylindrical metal on side and rear walls on front opening cars and side walls only on front and rear opening cars. Handrails shall have a stainless steel, No. 4 brushed finish.
   g. Ventilation: Manufacturer’s standard exhaust fan, mounted on the car top.
   h. Protection pads and buttons: Provide one set of vinyl protection pads with metal grommets for the project. Provide pad buttons on cab front(s) and walls.

2. Car Top Inspection: Provide a car top inspection station with an “Auto-Inspection” switch, an "emergency stop" switch, and constant pressure "up and down" direction and safety buttons to make the normal operating devices inoperative. The station will give the inspector complete control of the elevator. The car top inspection station shall be mounted in the door operator assembly.

H. Door Operation

1. Door Operation: Provide a direct or alternating current motor driven heavy duty operator designed to operate the car and hoistway doors simultaneously. The door control system shall be digital closed loop and the closed loop circuit shall give constant feedback on the position and velocity of the elevator door. The motor torque shall be constantly adjusted to maintain the correct door speed based on its position and load. All adjustments and setup shall be through the computer based service tool. Door
movements shall follow a field programmable speed pattern with smooth acceleration and deceleration at the ends of travel. The mechanical door operating mechanism shall be arranged for manual operation in event of power failure. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. AC controlled units with oil checks, or other deviations are not acceptable.

a. No Un-Necessary Door Operation: The car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as a dispatch car.
b. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.
c. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel shall reverse and the door shall reopen to answer the other call.
d. Nudging Operation: The doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door closing is prevented for a field programmable time, a buzzer shall sound. When the obstruction is removed, the door shall begin to close at reduced speed. If the infra-red door protection system detects a person or object while closing on nudging, the doors shall stop and resume closing only after the obstruction has been removed.
e. Door Reversal: If the doors are closing and the infra-red beam(s) is interrupted, the doors shall reverse and reopen. After the obstruction is cleared, the doors shall begin to close.
f. Door Open Watchdog: If the doors are opening, but do not fully open after a field adjustable time, the doors shall recycle closed then attempt to open six times to try and correct the fault.
g. Door Close Watchdog: If the doors are closing, but do not fully close after a field adjustable time, the doors shall recycle open then attempt to close six times to try and correct the fault.
h. Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied to possibly overcome mechanical resistance or differential air pressure and allow the door to close.

2. Door Protection Devices: Provide a door protection system using microprocessor controlled infra-red light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen.

I. Car Operating Station

1. Car Operating Station, General: The main car control in each car shall contain the devices required for specific operation mounted in an integral swing return panel
requiring no applied faceplate. Wrap return shall have a No. 4 brushed stainless steel finish. The main car operating panel shall be mounted in the return and comply with handicap requirements. Pushbuttons that illuminate using long lasting LED’s shall be included for each floor served, and emergency buttons and switches shall be provided per code. Switches for car light and accessories shall be provided.

2. Emergency Communications System: Integral phone system provided.

3. Auxiliary Operating Panel: Not Required

4. Column Mounted Car Riding Lantern: A car riding lantern shall be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop. The lantern shall remain illuminated until the door(s) begin to close.

J. Control Systems

1. Controller: Shall be integrated in a hoistway entrance jamb. Should be microprocessor based, software oriented and protected from environmental extremes and excessive vibrations in a NEMA 1 enclosure. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by "up-down" push buttons at each intermediate landing and "call" push buttons at terminal landings.

2. Automatic Light and Fan shut down: The control system shall evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. The settings shall be field programmable.

3. Emergency Power Operation: (10-DOA) Upon loss of the normal power supply, building-supplied standby power is available on the same wires as the normal power supply. Once the loss of normal power is detected and standby power is available, the elevator is lowered to a pre-designated landing and the doors are opened. After passengers have exited the elevator, the doors are closed and the car is shut down. When normal power is restored, the elevator automatically resumes operation.

K. Hall Stations

1. Hall Stations, General: Vandal resistant buttons with center jewels which illuminate to indicate that a call has been registered at that floor for the indicated direction. Each button shall be provided with an internal automatic stop to prevent damage of switches that register the call. Provide 1 set of pushbutton risers. All fixtures shall be vandal resistant type. Provide one pushbutton riser with faceplates having a brushed stainless steel finish.

   a. Phase 1 firefighter’s service key switch, with instructions, shall be incorporated into the hall station at the designated level.

2. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.

3. Hall Position Indicator: An electronic dot matrix position indicator shall be provided and mounted for optimum viewing. As the car travels, its position in the hoistway shall be
indicated by the illumination of the alphanumeric character corresponding to the landing which the elevator is stopped or passing. When hall lanterns are provided, the position indicator shall be combined with the hall lanterns in the same faceplate. Faceplates shall match hall stations. Provide at all landings.

4. Hall lanterns: A hall lantern with adjustable chime shall be provided at each landing and located adjacent to the entrance. The lanterns, when illuminated, shall indicate the elevator car that shall stop at the landing and in what direction the car is set to travel. When the car reaches a predetermined distance from the floor where it is going to stop, the corresponding hall lantern shall illuminate and the chime shall sound. The hall lantern shall remain illuminated until the car doors close in preparation for leaving the floor. Illumination of the arrow shall be with LED’s. Faceplates shall match the hall station finish. Provide at all landings.

L. Miscellaneous Elevator Components

1. Oil Hydraulic Silencer: Install an oil hydraulic silencer (muffler device) at the power unit location. The silencer shall contain pulsation absorbing material inserted in a blowout proof housing arranged for inspecting interior parts without removing unit from oil line.

M. Elevator Schedule:

1. Elevator 1:
   a. Location: Elementary School
   b. Speed: 150 fpm
   c. Stops: 2
   d. Travel Distance: 14 ft.

2. Elevator 2:
   a. Location: Middle School
   b. Speed: 150 fpm
   c. Stops: 3
   d. Travel Distance: 28 ft

D20 PLUMBING

D2010 PLUMBING FIXTURES

A. Plumbing Fixtures

1. All plumbing fixtures required to be accessible shall be in accordance with the Americans with Disabilities Act (ADA), 504 and UFAS standards.

2. Water closets and urinals shall be wall hung, vitreous china, low consumption (0.125 gallon per flush urinals and high efficiency 1.28 gallon per flush water closets), by American Standard or approved equal. Flush valves shall 120 volt operated, by Toto or approved equal.
3. Lavatories for faculty use shall be wall hung, vitreous china, by Toto or approved equal. Faucets shall be low consumption 120 volt operated, by Symmons or approved equal.

4. Lavatories (for student use at bathroom groups) shall be wall hung, solid synthetic surface with integral soap dispensers, by Willoughby Faucets shall be low consumption 120 volt operated.

5. Showers shall be ANSI Z124.2 molded cast acrylic, 36 x 36 x 75 inch high, with integral receptor, soap dish, integral seat, removable chrome plated strainer, tailpiece, color as selected. Trim shall be ASME A112.18.1; concealed shower supply with pressure balanced thermostatic mixing valves, integral service stops, bent shower arm with flow control and adjustable spray ball joint shower head with maximum 1.5 gpm flow, and escutcheon and hand held shower with 60 inch metal clad hose and 24 inch slide bar, female inlet.

6. Wall hangers for water closets, urinals, and lavatories shall be heavy duty adjustable height type installed within chase spaces provided behind fixtures, by J.R. Smith or approved equal.

7. Drinking fountains shall be stainless steel, wall recessed, two-tier, ADA style, vandal resistant manufactured by Elkay or approved equal.

8. Mop basins shall be floor mounted, 24”x24”, molded stone, with wall mounted faucet & trim, by Fiat or approved equal.

9. Classroom sinks shall be stainless steel, by Elkay or approved equal with gooseneck faucets, by Simmons or approved equal.

10. Cast iron floor drains shall be installed at all gang toilet rooms. Heavy-duty cast iron floor drains & floor sinks shall be installed in the mechanical room. Floor drains shall be by J.R. Smith or approved equal. Trap primers shall be provided for floor drains.

11. Hose bibs shall be installed in all group toilet rooms, by Woodford or approved equal.

12. Wall Hydrants shall be installed on exterior walls every 100 feet. Wall hydrants shall be non-freeze type by Woodford or approved equal.

13. An interior grease trap/interceptor shall be installed on a separate building drainage line servicing kitchen waste water flows. The unit shall intercept and collect fats, oil and grease in the waste water flow from kitchen fixtures and drains that would allow fats, oil or grease to be discharged into the building drainage system.

14. An exterior grease interceptor shall be coordinated and then installed below grade to receive kitchen waste water flows. The waste connection exiting the grease interceptor shall connect to the building sewer system. The interceptor shall prevent fats, oil and grease from entering and clogging the public sewer system.
D2020 – DOMESTIC WATER DISTRIBUTION

D2020.10 – WATER PIPING

A. Water Piping

1. Tubing to be Type L hard temper conforming to ASTM Specification No. B88-78. Fittings to be wrought copper conforming to ASTM B16.22. All joints shall be soldered with ASME Standard BWS/A5.8 lead free solder or shall be connected with press fitting such as Propress type fitting. Shall be used for all interior water piping.

2. A new 4” domestic water service shall be provided by local water company which shall enter the building below slab, and rise up to a service assembly located in the water service room. The service assembly located within the water service room shall consist of shut-off valves, backflow preventer, water meter and strainer. Domestic cold water, domestic hot water, and domestic hot water recirculation piping shall be Type L copper conforming to ASTM B 88. Domestic water piping throughout the building shall be installed above ceilings and concealed within walls. Jacketing shall be provided on piping exposed in occupied areas (when exposed pipe is located below 10’).

3. A new water line for site irrigation shall be provided off of the domestic water system. This line shall include a backflow preventer.

4. Copper Victaulic system (Type L) with 150 psi Victaulic joints may be used for water main piping.

5. The hot water distribution system shall include 140°F piping for the kitchen (boosted to 180°F at the dishwashing area) and 120°F piping to serve the remainder of the building. The water in the storage tank will be stored at 140°F. An automatic High/Low tempering valve, by Leonard or approved equal, will reduce to the water to 120°F for the building piping. For controllability reasons a second High/Low tempering valve will be installed on the kitchen 140°F water feed. An automatic tempering valve, by Leonard or approved equal, will reduce to the water to 120°F for showers. Public lavatories shall be provided with individual thermostatic mixing valves to reduce the water to 110°F.

6. Hot water recirculation pumps shall be installed to maintain the appropriate temperatures in the domestic hot water distribution systems. The pumps shall be controlled by the building management system (BMS) to minimize energy consumption. Hot water recirculation piping shall be brought to all lavatory, sink and kitchen locations.

7. Press type fitting such as Propress for pipe size less than 2-1/2” will be allowed

D2020.20 – NATURAL GAS PIPING

A. Black steel piping and fittings (Natural Gas)
1. A new natural gas service shall be provided by the local gas company and shall enter the building in the main mechanical room after connecting to the pressure regulator assembly. The pressure regulator assembly shall consist of shut-off valves, pressure regulator and meter. Gas piping shall be ASTM A53 schedule 40 black steel. Gas piping will serve the boilers, domestic hot water heater, science labs, and kitchen appliances.

2. Black steel pipe shall be Schedule 40 conforming to ASTM Designation A53 (seamless type). Fittings shall be black malleable (threaded or flanged) 150 pounds, conforming to ASA Designation B16.3. Shall be used for interior gas. Gas pipe dropping in concrete block walls shall be factory wrapped with corrosion resistant covering No. X-TRU coat or scotch kote.

3. All gas piping 4" and over and all buried gas piping shall be joined by welded connections, except where detailed otherwise.

4. Emergency gas solenoid valves shall be installed in the kitchen and science lab areas to shut off the gas supply to all equipment.

D2020 – DOMESTIC WATER EQUIPMENT

D2020.30 – WATER HEATERS

A. Water Heaters

1. Furnish and install (2) 600,000 BTU/HR gas fired condensing type water heaters with total of 260 gallon storage by PVI or approved equal, in the mechanical room.

2. Heater shall be a factory assembled package rated to heat the capacity specified and control the outlet within 40°F of the selected temperature when supplied with steam before the control valve. The domestic water pressure drop through the heater shall not exceed that specified. Heater shall be furnished with an integral circulating pump to constantly circulate the water within the heater to prevent fouling of the heat exchanger or corrosion cells from forming on the tube wall due to entrained gases in the water.

3. Heater shall be constructed and stamped in accordance with Section VIII of the ASME Code for a working pressure of 155 psig at 210°F and shall have National Board Registration. ASME Data Report Form U-1, shall be provided to owner for each water.

D2020.40 – INSULATION

A. Insulation

1. All piping and equipment installed under this Contract shall be covered as follows:

2. All domestic and non domestic cold water.

3. All domestic and non domestic hot water supply and recirculation.
4. All tempered water systems.
5. All horizontal conductor piping
6. Waste piping and vent piping at overhangs and below mechanical rooms.
7. Heat trace piping

B. Materials

1. Water piping insulation - fiberglass.
2. Fittings and Valve Insulation:
3. Hydraulic setting combination insulating and finishing cement.
4. Molded or fabricated fitting covers of equal thickness and identical in composition to adjacent pipe insulation.
5. All materials, including vapor barrier jacket, glass cloth jackets, adhesives, etc., shall be fire retardant.
6. Horizontal conductor piping and waste piping below mechanical rooms and vertical drops from drain to offset and elbow at the end of the horizontal run, 1" thick with vapor barrier. Drainage piping, including drains may be insulated with two layers of vapor barrier blanket, 1" thick, minimum one pound density.

C. Insulation Thickness

1. The piping, fittings, and valves shall be insulated with the following minimum thicknesses.
2. Domestic hot, circulating and tempered water piping, 3/4" thick up to 1" pipe size; over 1" pipe size shall be 1" thickness.
3. Cold water piping shall be 1/2" thick.

D2030 – SANITARY WASTE
D2030.10 – PIPING

A. Cast Iron Soil Pipe and Fittings - Above ground soil, waste and vent conductor piping.
1. American manufacture no-hub cast iron soil pipe and fittings conforming to ASTM A74. Joints to be made with couplings consisting of stainless steel shield and clamp assembly and elastomeric sealing sleeve. Clamps shall be Heavy Duty Clamp-All #125.
2. PVC may be used above ground for soil, waste and vent piping and shall be used for indirect waste piping and where space is limited or where called for on the drawings, except urinal waste piping shall remain cast iron.

B. Cast Iron Soil Pipe and Fittings – Buried soil, waste and vent conductor piping

1. American manufacture service weight cast iron soil pipe and fittings conforming to ASTM A74. Joints shall be made with rubber resilient gasket push-on joints.

D2040 – RAIN WATER DRAINAGE

A. Rain Water

1. Piping shall be no-hub cast iron with standard torque clamps, conforming to CISPI 301 for above ground piping and hub and spigot cast iron conforming to ASTM A74 for piping installed below the floor slab. Storm, waste, and vent piping shall be concealed within chases and walls where possible. Storm and waste services shall exit the building below slab at multiple locations to be coordinated with the site engineer. The secondary storm system shall exit the building separate from the primary system; discharge shall be above grade, at locations visible to the building maintenance staff.

2. Roof areas shall have primary and secondary emergency overflow roof drains by Watts. Cast iron, with dome strainer or approved equal.

D2090 – Other Plumbing Systems

A. Solar Thermal

1. A complete solar thermal system shall be installed including tanks, piping, and accessories controls insulation.

2. (1) 119 gallon indirect tank with solar hot water coil, (12) roof mounted flat plate collectors and (3) 40 gallon drain back tanks.

D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)

D3020 HEATING SYSTEMS

D3020.10 HEAT GENERATION

A. Boilers:

1. High efficiency natural gas fired condensing hot water boilers. Power burners shall be fully modulating. Boiler shall have a minimum efficiency of 90% per DOE 10 CFR 431.86 testing procedures for commercial packaged boilers.

2. Manufacturer: Subject to compliance with the above, provide high efficiency gas fired condensing boiler of one of the following: Aerco, Cleaver Brooks, Viesmann or equal.

B. Pumps:
1. Vertical inline fitted with high efficiency electric motors and factory mounted variable frequency drives.

2. Manufacturers: Subject to compliance with the contract documents provide pumps of the following manufacturer: Taco, Bell & Gossett, Armstrong, or equal.

3. Tie into BMS controls system.

D3020.20 HEAT SYSTEM SUPPLEMENTARY COMPONENTS

A. Radiant Ceiling Panels:

1. Hydronic piping shall be Schedule 40 ASTM A-53, black steel pipe with butt welded ends and fittings on 3” and above and threaded ends and fittings on 2-1/2” and smaller. At the contractor option, type "L" copper may be used on all 2-1/2" and smaller.

2. Classroom and office spaces will also have radiant ceiling panels located in the ceiling grid at the outside walls, the panels will run wall to wall and be 2 feet wide by Airtite or approved equal.

B. Radiant Floor:

1. Radiant floor system shall be by Viega or approved equal. Radiant floor system shall include the following components: Mixing station with low head, 3-speed circulator, stainless steel manifold with shut off valves, manifold cabinets, zip ties, & plastic bend supports. Piping shall be Viega or approved equal PEX piping. Piping shall be rated to be used in radiant floor systems.

2. Radiant floor system shall be installed in Pre-K/ Kindergarten wing of building.

C. Piping and Fittings:

1. Hydronic piping shall be Schedule 40 ASTM A-53, black steel pipe with butt welded ends and fittings on 3” and above and threaded ends and fittings on 2-1/2” and smaller. At the contractor option, type "L" copper may be used on all 2-1/2” and smaller.

D. Valves:

1. All valves shall be bronze, brass, or cast iron as system design requires.

2. Locate all valves so as to isolate all parts of the system and as required for normal system operation.

3. Manufacturers: Subject to compliance with the requirements of the contract documents provide valves of the following manufacturer: Milwaukee, Stockham, Nibco, or equal.

E. System Identification:
1. Provide markers on all piping and equipment. Tag all valves in system with corresponding valve lists.

F. Insulation:

1. All piping shall be insulated with snap-on fiberglass insulation with all service jacket. Fittings shall be insulated with snap on pre-molded covers with loose fill fiberglass insulation.

2. All HVAC supply and return ductwork shall be insulated with 2 inch thick fiberglass blanket (min. R-6 insulation) with a foil vapor barrier. All outside air intake ductwork shall be insulated with 2 inch (min. R-8 insulation) rigid fiberglass with foil vapor barrier.

D3030 COOLING SYSTEMS
D3030.10 CENTRAL COOLING

A. Chilled Water Plant:

1. Chillers: The cooling plant, for space cooling will consist of (2) site mounted air cooled chillers. Chiller shall be Trane or approved equal. The chiller will be mounted on a concrete pad and will be provided with a full sound enclosure surrounding the chillers on all sides and top.

2. Chilled water pumps: The chilled water pumping plant will generally consist of one dual arm pump for each the condenser and evaporator side of the chiller. Each pump will be sized for 100% capacity, for complete redundancy on each arm. The pump will be the vertical inline dual-arm type. The pump will be mounted on a 4” thick concrete housekeeping pad in the boiler room. Pump will be provided with factory mounted VFD.

3. The pumps for the space cooling system will circulate chilled water from the chiller to the dedicated outside air (DOA) units and chilled beams throughout the facility. The DOA units will be provided with 42-45°F chilled water while a secondary loop will provide the chilled beams with 55-57°F chilled water.

B. Chilled Beams:

1. Active chilled beams will provide heating and cooling to the classrooms and offices throughout the building. Chilled beams shall be Dadanco or approved equal. Chilled beams will be located in the ceiling grid and suspended from the structure. Each chilled beam will have a duct connected to its inlet which will convey the outside ventilation air from the associated DOA unit. Each beam will be provided with hot & chilled water and a modulating control valve by Belimo or approved equal. Depending on outdoor conditions, chilled beam will have chilled water or hot water pumped through the beams coil, the DOA ventilation air will then be blown over the coil and delivered to the space.
A. Locker Rooms:

1. The locker rooms will be served by one (1) heat recovery ventilating roof top unit. The roof top unit will consist of an integral heating hot water coil, chilled water cooling coil and a plate type heat recovery. The heat recovery ventilator unit shall be by Xetex or approved equal. Unit will provide heating, cooling, ventilation and exhaust to locker rooms. Supply and exhaust fans with be equipped with variable frequency drives.

B. Gymnasium:

1. The Gymnasium will be served by one (1) single zone variable air volume roof top unit. The roof top unit will consist of an integral heating hot water coil and chilled water cooling coil. The roof top unit shall be by Trane or approved equal. The unit will also incorporate demand control ventilation which will modulate the amount of outside air to the space based on occupancy and CO2. Direct drive supply and exhaust fans with be equipped with variable frequency drives.

C. Cafeteria/ Kitchen:

1. Kitchen exhaust hoods (dishwasher & grease) shall be designed and specified by the Kitchen Equipment Consultant. The each grease hood and dishwasher will have a dedicated rooftop up-blast exhaust fan. The kitchen AHU will provide make up air for the kitchen while also serving the cafeteria. The cafeteria will be served by a single zone variable air volume air handling unit with integral hot water and chilled water coil. The cafeteria/kitchen unit will incorporate demand control ventilation which will modulate the amount of outside air to the space based on the occupancy and CO2.

D. Classroom, Offices and Administration Areas (Dedicated Outside Air Handling Units (DOA’s):

1. All units will consist of total energy plate type energy recovery, hot water coil, chilled water coil, supply fan, relief fan, and MERV 13 filters. DOAs units will be located on the roof.

2. Available Manufacturers: Subject to compliance with the requirements of the contract documents provide air handling units of the following manufacturer: Xetex or equal

E. Tel/Data and Electrical Rooms

1. Tel/Data closets will be served by ductless split units, by LG or approved equal. Each MDF room will utilize one (1) 2-ton cassette fan coil unit. Each IDF room will utilize one (1) 1.5-ton cassette fan coil unit. The unit serving MDF and IDF rooms will be connected to emergency power.
D3050  TERMINAL AND PACKAGE UNITS

A. Unit Heaters:

1. Horizontal or cabinet type with exact locations to be determined. All units shall be provided with fan and aquastat control.

2. Available Manufacturers: Subject to compliance with the requirements of the contract documents provide unit heaters of the following manufacturer: Rittling, Sterling, Trane, or equal

B. Fin Tube Radiation:

1. Commercial slope top fin-tube with steel tube and steel fin. Cover shall be 14 ga. with baked enamel factory finish. All units shall be provided with full backplate, damper, end covers, and splice pieces for a complete installation.

2. Available Manufacturers: Subject to compliance with the requirements of the contract documents provide fin-tube radiation of the following manufacturer: Sterling, Vulcan, Rittling, or equal

C. Ductwork:

1. All ductwork shall be galvanized steel with all seams sealed. Entire ductwork system shall be fabricated and installed per SMACNA Low Pressure Duct Construction Standards.

2. Grease exhaust hood ductwork shall be constructed of 16 gage carbon steel and the dishwasher shall be constructed of 18 gage stainless steel.

D. Diffusers:

1. All devices shall be steel construction with louvered face and baked enamel finish.

2. Manufacturers: Subject to compliance with the requirements of the contract documents provide displacement diffusers of the following manufacturer: Krueger, Price, Titus, or equal

D3060  CONTROLS AND INSTRUMENTATION

A. Automatic Temperature Controls:

1. A Building Management System (BMS) shall be installed to control the mechanical and selected electrical systems. BMS shall be Alerton or approved equal and shall be connected back to campus head end.

2. The BMS shall provide temperature control for all HVAC systems and control select lighting and plumbing in the new building.

3. The system shall be programmed for occupied/unoccupied cycles for the air handling equipment, with an override feature for spaces that would be utilized after-hours.
4. The system shall monitor occupancy sensing devices to control the amount of outside air being brought in to assist in energy conservation.

5. The BMS shall be accessible from any Web browser and remote desktop with proper authorization.

6. Further definition of exact controls sequences implemented for owner convenience, occupant comfort and energy savings will be defined as design is progressed.

D3070 SYSTEM TESTING AND BALANCING

A. Requirements include measurement and establishment of the quantities of the mechanical systems as required to meet specifications, and recording and reporting the results. Test, adjust and balance the following mechanical systems:

1. Supply air systems.
2. Return air systems.
3. Exhaust air systems.
4. Outside air systems.
5. Hydronic heating and cooling systems.
6. Verify temperature control system operation.

B. Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders.

C. An independent testing, adjusting, and balancing agency certified by the AABC or NEBB as a Test and Balance Engineer in those testing and balancing disciplines required for this project.

D3090 OTHER HVAC SYSTEMS

A. Workmanship and Installation Methods:

1. All work shall be installed in a first-class manner consistent with the best current practices.
2. All piping shall be installed with slope for proper drainage shall be grouped together, and be parallel to each other. Utilize gang hangers wherever feasible. Group all valves together where feasible.

B. Cleaning and Protection:

1. Protect all materials and equipment during shipment and installation, and properly handle and store at the job site so as to prevent damage, and upon completion of this work, clean all fixtures and equipment and replace damaged parts.
C. Sleeves and Escutcheons:
   1. Furnish and install in masonry walls and floors, galvanized steel sleeves as required. Provide escutcheons where sleeves and pipe penetrations are exposed to view.

D. Firesafing:
   1. At all sleeved walls and floors provide firesafe caulking, packing, blanket, for a completely tight system to prevent the passage of smoke and fire.
   2. Operation Manuals and Maintenance Manuals:
      3. Refer to the contracts specifications for a complete outline of all requirements of operations and maintenance data.

E. Record Drawings and Control Documents.

F. All motors provided shall be high efficiency or better.

G. All ductwork and accessories shall meet SMACNA standards.

H. Air distribution shall be accomplished by using sheet metal duct for supply, return and exhaust ductwork, no plenum air will be allowed.

I. Provide all HVAC equipment with extra set of filters.

J. Seismic restraints shall be installed as required per State of Massachusetts Building Code and Fire Safety Code. This includes piping, ductwork, equipment, and equipment bases.

K. Provide glass fiber insulation for all hydronic piping and ductwork. Insulation shall be installed to meet the Energy Code.

L. Provide firestopping around mechanical penetrations in accordance with fire stopping requirements. System shall be capable of maintaining against flame and gases. System shall be UL listed and comply with ASTM E814.

M. Provide mechanical identification for mechanical systems. Identification shall comply with ANSI A13.1.

N. All pipe connections shall be installed to allow for freedom of movement of the piping during expansion and contraction without springing. Swing joints, expansion loops and expansion joints with proper anchors and guides shall be provided by the Contractor where necessary and/or where shown.

O. Provide vibration isolation for hydronic piping, ductwork, and equipment.
D40 FIRE PROTECTION

D4010 - SPRINKLERS

A. Sprinklers

1. Sprinklers shall be concealed, fully recessed in finished areas with ceilings. Sidewall, exposed, extended coverage sprinklers shall be installed where appropriate. Upright sprinklers with protective baskets shall be installed within the gymnasium and mechanical rooms. Quick response sprinkler heads shall be used in light hazard locations. Sprinkler heads, unless noted otherwise, shall have a ½” orifice, 5.6K-factor and a 165°F temperature rating. Intermediate temperature classification sprinklers shall be installed within the mechanical room, skylights and other applicable areas.

2. 8” fire protection water service shall be provided by the local water company. A backflow preventer assembly shall be installed on the water service within the building’s fire service room. Please note: a water flow test will need to be performed. Results from the water flow test and hydraulic calculations may dictate a need for a fire pump.

3. A fire department connection shall be installed at a location coordinated with the local Fire Marshal.

4. Alarm valves shall be installed to properly zone the sprinkler system.

5. A new fire protection system, in accordance to NFPA 13, shall be installed throughout all areas of the building, and shall be connected to the building fire alarm system.

6. Sprinkler bodies shall be die-cast brass, with hex shaped wrench boss integrally cast into the sprinkler body to reduce the risk of damage during installation.

7. Where sprinklers will be installed in close proximity to heat sources and special locations, as identified in NFPA 13, temperature ratings shall be in accordance with the requirements of NFPA 13.

8. Where plans call for extended coverage sprinkler heads coordinate coverage requirements with required pressure and K-factor.

9. Piping for the sprinkler system shall be steel pipe, ASTM A 53; Schedule 40 seamless carbon steel. Schedule 10 pipe shall be allowed for pipe sizes larger than 2” diameter when roll grooved mechanical couplings are used. Sprinkler piping shall be installed above ceilings and concealed within chases where applicable. Stainless steel flex connection to sprinklers will be allowed.

10. Fittings shall be grooved mechanical fittings: ANSI A21.10 ductile iron; ASTM A47 grade malleable iron. Couplings shall be ASTM A 536 ductile iron or malleable iron housing, EPDM gasket with nuts, bolts, locking pin, locking toggle or lugs to secure roll grooved pipe and fittings.
11. **Spare Sprinklers**: The Sprinkler Contractor shall furnish spare automatic sprinklers in accordance with the requirements of NFPA for stock of extra sprinklers. The sprinklers shall be packed in a suitable container and shall be representative of, and in proportion to, the number of each type and temperature rating of the sprinklers installed. The Sprinkler Contractor shall furnish no less than two special sprinkler wrenches, or at least one wrench for each container or sprinkler box, whichever is greater.

**D4020- STANDPIPES**

A. **Standpipes**

   1. Combined standpipes and fire hose valves shall be installed in the stairs per NFPA 14 requirements

**D4090- OTHER FIRE PROTECTION SYSTEMS**

A. **Kitchen Hoods**

   1. Kitchen hoods and kitchen exhaust ductwork shall be protected by a wet chemical type fire suppression system and shall be connected to the building fire alarm system.

**D50 ELECTRICAL**

**D5010 ELECTRICAL SERVICE AND DISTRIBUTION**

A. **Electrical Service**

   1. See allowances section for back charges by utility company with respect to permanent service.

   2. The project will consist of one electrical service sized at 3000A, 3P, 4W, 480V. Refer to Electrical Riser Diagram for additional information.

   3. An additional service will be provided for the electrically driven fire pump, per NEC requirements. This service will be sized at 600A, 3P, 4W, 480V and will be fed from the same utility transformer as the main building service.

   4. Provide all primary system raceways, elbows, pull wires, pad and all pad grounding. Utility company will provide pad mounted transformer and primary conductors including making up of all terminations and connections.

   5. Provide secondary service complete including copper conductors, raceways and connectors.

   6. Metering: One secondary meter will be provided for each electrical service (main building and fire pump) mounted on the exterior of the building. There will be two electrical
services to the school. Utility Company will furnish current transformers and potential transformers to be installed in switchgear.

7. Provide services to remote buildings on campus (i.e. concession stand, modular offices, etc). Include copper conductors and underground conduit.

B. EMERGENCY POWER SYSTEM

1. Manufacturers: Kohler, Cummins, Caterpillar or approved equal.

2. Life safety and optional standby power will be provide by a 300kW, 480/277V, diesel fueled engine, NFPA 110 standby generator meeting EPA Tier 3 emissions regulations.

3. The generator will be located on a concrete pad on grade at the north side of the Building. The generator will be equipped with a sound attenuating, vandal-resistant, weatherproof steel housing, near the chiller equipment. Enclosure rating will be selected for minimum sound attenuation of 25 dB at 500 Hz. Sound level measured at a distance of 10 feet from the exhaust discharge after installation is complete will be 85 dBA or less.

4. The generator will be equipped with a double walled, sub-base fuel tank and will provide (72) hours of fuel storage for continuous operation at 100 percent rated power output. Base-mounted fuel oil tank to be factory installed and piped, complying with NFPA 30 and UL 142. Fuel type to be diesel, Grade DF-2.

5. The generator will feed three Automatic Transfer Switches. One for Life Safety/Emergency Lighting, one for optional standby loads, and one integral to the fire pump controller. Each ATS will be fed from a breaker in the main normal power switchboard.

6. Each ATS will serve a 480/277V distribution panelboard located in the main emergency room (the fire pump ATS will be furnished by the Fire protection contractor and will directly serve the fire pump controller).

7. Emergency system panelboards will be provided with a surge protection device, and all emergency system overcurrent devices will be selectively coordinated, per a selective coordination study, with all supply-side overcurrent protective devices.

8. Emergency and Legally Required electrical feeders will be in a 2 hour fire rated enclosure or fire rated cable assembly.

9. The following items are anticipated to be powered from the generator:

   a. Fire sprinkler system (pumps and all functional counterparts)
   b. Fire alarm system
   c. Exit Signs (Green LED with no battery backup)
   d. Emergency lighting/emergency lighting control relays/no battery backup.
   e. Exterior Egress lighting
   f. Telephone & communication systems
Easthampton Maple Elementary School
Design Alternative E.4; Pre-K Through Grade 8
Schematic Design Specifications

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D5020  DISTRIBUTION AND WIRING

A.  TRANSFORMERS

1.  Manufacturers: General Electric, Square D, Siemens, Eaton, or equivalent.

2.  NEMA ST 20, factory-assembled, air-cooled, dry type transformers, ratings as indicated on Drawings.

3.  Primary Voltage: 480 volts, 3 phase, delta.


5.  Insulation system and average winding temperature rise for rated kVA as follows:

   a.  1-15 kVA: Class 185 with 115 degrees C rise.
   b.  16-500 kVA: Class 220 with 115 degrees C rise.

1)  Winding Taps:

   a)  Transformers Less than 15 kVA: Two 5 percent below rated voltage, full capacity taps on primary winding
   b)  Transformers 15 kVA and Larger: NEMA ST 20.
   c)  Sound Levels: NEMA ST 20.
   d)  Basic Impulse Level: 10 kV for transformers less than 300 kVA, 30 kV for transformers 300 kVA and larger.
   e)  Ground core and coil assembly to enclosure by means of visible flexible copper grounding strap.

2)  Mounting:

   a)  1-15 kVA: Suitable for wall mounting.
b) 16-75 kVA: Suitable for floor mounting.
c) Larger than 75 kVA: Suitable for floor mounting.

3) Coil Conductors: Continuous aluminum windings with terminations brazed or welded.
4) Enclosure: NEMA ST 20, Type 1, ventilated. Furnish lifting eyes or bracket.
5) Isolate core and coil from enclosure using vibration-absorbing mounts.
6) Transformers will meet DOE efficiency requirements, as mandated by the 2015 International Energy Conservation Code.

B. SWITCHBOARDS

1. Manufacturers: General Electric, Square D, Siemens, Eaton, or equivalent.

2. Main building switchboards shall be constructed in accordance with UL 891 and ANSI standards and of the required number of vertical sections bolted together to form one metal enclosed rigid structure. The front shall be accessible. Buses shall be copper.

3. Switchboard shall be arranged for operation as follows:
   b. Frequency: 60 cycles
   c. Service: 3 phase, 4 wire, ampere capacity as indicated on drawings.
   d. Neutral - full capacity
   e. Available short circuit current at line terminals - 100K RMS amperes symmetrical.
   f. Integrated equipment rating – 100 KAIC.
   g. Copper ground bus, full length.
   h. UL service entrance label.

   1) Owner’s submeters will be provided to meet LEED requirements for Advanced Energy metering. These devices shall meter Lighting, General Power and HVAC loads separately.

C. PANELBOARDS

1. Manufacturers: General Electric, Square D, Siemens, Eaton, or equivalent.

2. Panelboards shall be dead-front, door in door safety type hinged and locked and equipped with single or multi-pole circuit breakers suitable for 208/120 volt or 480/277 volt, 3 phase, 4 wire operation.

3. Buses shall be copper. Panelboards shall have a circuit directory card mounted in a frame with plastic cover on inside of door. Panelboards to have a copper ground bus with terminals for each circuit.

4. Panelboards and distribution panels shall be of same manufacturer as switchboard.

5. Circuit breakers shall be bolt on type.

6. Protection Devices:
a. Furnish and install surge protection devices with ratings of 160,000 amperes on the secondary side of the main service overcurrent device and 80,000 amperes for panelboards feeding computer equipment and HVAC equipment.

b. Furnish and install ground fault protection device in main switchgears.

1) Separate panelboards will be provided for lighting, general power and HVAC systems.

D. PHOTOVOLTAIC SYSTEM

1. A photovoltaic system will be provided. The system will be located on the roof. (2)4" conduits will be provided from the roof to the main switchboard.

2. The system is sized at 100kw including micro-inverters.

D5030 GENERAL PURPOSE ELECTRIC POWER

A. Raceways and Enclosures:

1. No raceway shall be smaller than ¼ inch diameter and shall have no more than four (4) 90° bends in any one run, and where necessary, pull boxes shall be provided. Only rigid metal conduit or intermediate metal conduit is allowed for in-slab work. No in-slab conduits will be allowed within raised slabs. Cable systems, if allowed to be used by other sections of this specification, shall not be used exposed or in slabs, whether listed by "UL" for such use or not.

2. Rigid metal conduit may be used for service work, exterior work, slab work, and below grade level slab, wet locations, and in penthouse for drops down to equipment from elevations above eight feet and also where raceway may be subject to mechanical damage.

3. Electrical Metallic Tubing (EMT), may be used in masonry block walls, stud partitions, above furred ceilings, where exposed but not subject to mechanical damage, and shall be used for fire alarm work.

4. Surface metal raceways shall be used where raceways cannot be concealed

5. Flexible metal conduit shall be used for final connections to recessed lighting fixtures from above ceiling junction boxes and for final flexible connections to motors and other rotating or vibrating equipment. Liquid tight flexible metal conduit shall be used for the above connections which are located in moist locations. All flexible connections shall include an insulated grounding conductor.

6. Rigid non-metallic conduit may be used for underground electric and telephone services outside the foundation wall and shall be polyvinyl chloride (PVC) schedule 40, 90°C. All exposed exterior conduit shall be rigid steel.

7. Underground conduit running below driveways, roadways, etc shall be concrete encased
8. PVC Schedule 40 may also be used for below slab circuits within building confines and site lighting branch circuits. Below slab rigid non-metallic conduits do not require concrete encasement. Rigid non-metallic conduits shall not be used for exterior feeders, in slabs, nor for elbows which penetrate slabs. Raceways and fittings shall be produced by same manufacturer.


B. Outlets:

1. Outlets: Each outlet in wiring or raceway systems shall be provided with an outlet box to suit conditions encountered. Boxes installed in normally wet locations or surface mounted shall be of the cast metal type having hubs. Concealed boxes shall be cadmium plated or zinc coated sheet metal type. Old work boxes with Madison clamps not allowed in new construction. Thru the wall boxes are not permitted.

2. Acceptable manufacturers: Appleton, Crouse Hinds, Steel City, RACO, or equal.

C. Pull and Junction Boxes:

1. Where indicated on plans, and where necessary to terminate, tap off, or redirect multiple raceway runs or to facilitate conductor installation, furnish, and install appropriately designed boxes. Boxes shall be fabricated from code gauge steel assembled with corrosion resistant machine screws. Box size shall be as required by Code.


D. Floor Outlets (Flush Type):

1. All flush floor outlets shall be Steel City 640 or 840 series cast iron, watertight type. The 640 series shall be used generally, and the 840 series used where shallow depth is required.

2. Whenever floor outlets for different services are indicated in the same location, they shall be ganged together.

3. Covers shall be brass series P64. Duplex receptacle covers shall be lift lid type P64DS. Low tension covers shall be series P64 3/4 2 with 3/4" diameter and 2" diameter plugs. Flush floor outlets located in carpeted areas shall be provided with P64 CP carpet plates of the number of gangs required.

E. Wiring Devices:

1) Wall Switches:
a. Manufacturers: Hubbell Wiring Products, Leviton, Bryant, Pass and Seymour or equivalent.
b. Body and Handle: Color by architect.
c. Voltage: 120-277 volts, AC.
d. Ratings: Match branch circuit and load characteristics.
e. Specification grade device.

2) Receptacles
   
b. Configuration: NEMA WD 6, type as indicated on Drawings.
c. Convenience Receptacle: Type 5-20.
d. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

3) Wall Plates
   
b. Decorative Cover Plate: stainless steel natural brushed finish.

4) Dimmer Controls
   
a. All devices shall be UL listed specifically for the required loads (i.e., LED, fluorescent, magnetic low voltage, electronic low voltage). Manufacturer shall provide file card upon request. Universal dimmers are not acceptable.

5) Conductors:
   
a. All conductors shall be a minimum size of #12 AWG except for control wiring and fire alarm wiring where #14 AWG may be used. For all exit sign circuits, normal/emergency and/or emergency only circuits, exterior lighting circuits, and also where distance from panel board to first outlet exceeds 80' feet for 120 volts and 150 feet for 277 volts, #10 AWG shall be minimum size wire allowed. All feeder and branch circuit conductor shall be color coded as follows:

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Phase</th>
<th>Color</th>
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<tbody>
<tr>
<td>208Y/120V</td>
<td>Phase A</td>
<td>Black</td>
</tr>
<tr>
<td>208Y/120V</td>
<td>Phase B</td>
<td>Red</td>
</tr>
<tr>
<td>208Y/120V</td>
<td>Phase C</td>
<td>Blue</td>
</tr>
<tr>
<td>480Y/277V</td>
<td>Phase A</td>
<td>Brown</td>
</tr>
<tr>
<td>480Y/277V</td>
<td>Phase B</td>
<td>Orange</td>
</tr>
<tr>
<td>480Y/277V</td>
<td>Phase C</td>
<td>Yellow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grounded Conductor</td>
</tr>
<tr>
<td>120/208</td>
<td></td>
<td>White</td>
</tr>
<tr>
<td>277/480</td>
<td></td>
<td>Grey</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Equipment Ground</td>
</tr>
<tr>
<td>120/208</td>
<td></td>
<td>Green</td>
</tr>
<tr>
<td>277/480</td>
<td></td>
<td>Green with Yellow Trace</td>
</tr>
</tbody>
</table>
b. All conductors not installed in accordance with color scheme shall be replaced. All conductors larger than #6 AWG must be identified with colored tape.

c. Connections throughout the entire job shall be made with solderless type devices.

d. For #10 AWG and smaller: spring type.

e. For #8 AWG and larger: circumferential compression type.


g. Any splices made up in ground mounted pull boxes shall be resin cast waterproof type or waterproof pressure type, as manufactured by King Technology, St. Louis, MO.

h. Conductors shall be copper, soft drawn, and annealed of 98% conductivity. Conductors larger than #10 AWG shall be stranded; #10 AWG and smaller shall be solid. Conductors shall be insulated for 600 volts and be of following types:

i. All conductors shall have heat/moisture resistant thermoplastic insulation type THHN/THWN (75oC) except as follows:

j. In sizes #1 AWG and larger: Crosslinked polyethylene insulation type XHHW (75oC - 90oC) may be used.

k. Fire alarm system conductors shall be #14 AWG, type THHN, solid. Color coding of fire alarm conductors shall be in accordance with fire codes.

l. Fixture whips #16AWG type "SF".

6) Mineral-Insulated Metal-Sheathed Fire-Resistive Cables (Type MI) - Cables shall consist of a factory assembly of one or more solid copper conductors insulated with highly-compressed magnesium oxide and enclosed in a seamless, liquid-and-gas-tight continuous copper sheath. Cables shall be rated for 600 volts and less. Cables shall comply with Article 330 of the National Electrical Code. Cables shall be classified by Underwriters Laboratories, Inc, as having a 2-hour fire resistive rating. Cable terminations shall be made with UL listed mineral-insulated cable fittings. Approved Manufacturer - Pyrotenax USA, Inc., or equal.

7) Type MC cable may be used for concealed branch circuits and fire alarm in hollow spaces where allowed by code if installed and terminated as specified under Execution Section. Armor to be galvanized steel, and shall be UL listed for 2 hour thru-wall fire penetration. Conduit shall be used from panelboards to first device.

8) Acceptable manufacturers: AFC Cable Systems, American Wire & Cable, Cerro, Cornish, Crescent, General Cable, Okonite, Or Equal

F. Miscellaneous Branch Circuits:

1) Furnish (12) 20A/1P circuits for gymnasium equipment.

2) Furnish 20A/1P circuit for each bathroom to power hardwired flush valves and sinks.

3) Furnish Emergency power and gas shutoff systems within each science lab, boiler room, and kitchen. Asco or similar

4) Provide GFCI/weatherproof receptacles located on the roof at each HVAC unit.
5) Provide GFCI/weatherproof receptacles on the exterior of the building at ground level, spaced 100’

G. Disconnect Switches:

1) Disconnect (safety) switches shall conform to industrial standards of NEMA, be UL listed and shall be heavy duty type, quick-make, quick-break type with interlocking cover mechanism and provisions for padlocking switch handle in "OFF" position. Three pole toggle switches are not acceptable as substitute for disconnect switches.

2) Acceptable Manufacturers: General Electric, Westinghouse, Square D/Groupe Schneider, Siemens, Allen Bradley, or equal.

H. Fuses:

1) Provide a complete set of fuses for each item of fusible type equipment. Fusible equipment furnished by other contractors will be complete with fuses, unless noted otherwise on electrical drawings.


I. Electrical System Controls and Instruments:

1) Provide a complete power system consisting of branch circuits, motor disconnect switches, pushbutton stations, motor starters, and other devices to connect up and leave in operating condition each piece of electrically operated equipment provided either under this section or other Divisions.

2) All control wiring not indicated in the electrical specifications or not shown on electrical drawings will be provided by Temperature Control Subcontractor.

J. Access Panels

1) Provide access panels for access to concealed junction boxes and to other concealed parts of system that require accessibility for operation and maintenance. In general, electrical work shall be laid out so access panels are not required.

2) Access panels shall be prime painted and equipped with screwdriver operated cam locks.


K. Sleeves, Inserts, And Openings
1) Provide sleeves of proper sizes for all openings required in concrete floors and walls. Sleeves passing through floors shall be set with top of sleeve 1 inch above finished floor. Core drilling will also be acceptable if in accordance with any structural standards. Any unsleeved openings shall be waterproofed.

L. Grounding System

1) All equipment and systems shall be grounded. Refer especially to NEC Section 250 Requiring Connections to Building Steel, Foundation, Water Service, and Interior Piping. Provide transformer pad grounding to be in accordance with utility company standards.

D5040 LIGHTING

A. Fixtures/Systems

1) General:
   a. All lighting shall be LED source.
   b. Provide lighting fixtures complete with lamps, drivers, and other devices as required for a first class installation. Furnish Ceiling Subcontractor with instructions concerning openings necessary, and provide frames for NEMA standard ceiling types or special mounting frames, as may be required. Fixtures shall be supported independently of hung ceiling construction.
   c. LED, light-emitting diode light sources shall have an output of 50,000 hours of operation at not less than 70% of the initial lumen output. LED drivers shall have total harmonic distortion of not more than 10%. LED lights shall have CRI ratings of 85.
   d. Provide universal arrows on all exit signs and punch out directions as shown on floor.

2) Pendant mounted fixtures shall be suspended by means of air craft cable with aligner and canopy in finished areas or threaded rods in non-public areas. Length of suspension method to be as required to mount fixtures at the elevations called for or as otherwise shown on drawings or architectural elevations.
   a. Provide LED exit signs at each egress door and at the end of each corridor (And in other areas required by architectural code sheets).
   b. Provide high-bay pendant mounted LED fixtures in the gymnasium.
   c. Provide high-bay pendant mounted LED fixtures in the cafeteria.
   d. Provide (2) wall mounted linear direct/indirect LED fixture at each stairwell landing.

3) Theatrical Lighting - The platform area shall be provided with a theatrical lighting system as follows:
   a. Theatrical dimmer cabinet with relays capable of controlling (24) lighting circuits.
   b. Control board with computer and software. Philips Strand or equal.
   c. Remote spotlights – (24) LED color changing and movable fixtures
   d. On-stage spotlights – (16) LED color changing and movable fixtures
   e. On-stage wash lights – (16) LED color changing and movable fixtures
   f. 6 stage pockets containing multiple circuits (2 SR, 2 SL, 1 rear and 1 on stage front) for lighting trees and miscellaneous applications.
g. On-stage lights will be mounted on support piping that is capable of being flown in and out for aiming, alteration and maintenance.

h. All lighting locations shall have DMX control wiring and multiple additional lighting circuits.

i. Stage will also be equipped with separately controlled 1x4 LED house lights.

j. House lighting shall be multi-zoned LED fixtures capable of 100% dimming and independent of each zone. House lighting system shall also control aisle lighting. System shall consist of low voltage wall stations, and control interfaces.

4) Athletic Lighting

a. The existing football field on the site of the new school is illuminated by a Musco Light-Structure System consisting of four (4) 70-foot poles, each with (7) 1500W metal-hallide fixtures. As part of this project, new concrete bases will be provided for relocation of these poles in the new football field location. Bases will be approximately 22-feet in length and 16” in diameter, with 8’ of the base extending above grade. New electrical feeds will be provided in underground conduit from the main building to each new light pole location. Lights will be aimed and re-focused to ensure optimal illumination of the football field. The electrical contractor will include this work under the electrical trade-bid, as well as review of the new location and wind speed/structural analysis by a State of Massachusetts professional structural engineer.

B. LIGHTING CONTROL

1) Occupancy sensors:

a. Manufacturers: Crestron, Hubbell, Acuity or approved equal.

b. Separate sensitivity and time delay adjustments with LED indication of sensed movement. User adjustable time-delay: 30 seconds to 12 minutes.

c. Furnish with manual override.

d. Operation: Silent.

e. Room Sensors: As indicated on Drawings.

f. High bay areas: For areas with ceilings more than 15 feet above finished floor, provide high-bay ceiling mounted occupancy sensor – Wattstopper HB3x0-Lx series.

2) Photocells

a. Manufacturers: Crestron, Hubbell, Acuity or approved equal.

b. Capable of being switched between 4 measurement ranges.

c. Separate trip points for high and low response settings.

d. Momentary contact device to override photocell relays.

e. Three minute time delay between switching outputs to avoid nuisance tripping.

f. Sensor Devices: Each sensor employs photo diode technology to allow linear response to daylight within illuminance range.

g. Exterior Lighting: Hooded sensor, horizontally mounted, employing flat lens. Entire sensor encased in optically clear epoxy resin.

h. Indoor Lighting: Sensor with Fresnel lens providing for 60 degree cone shaped response area to monitor indoor office lighting levels.
3) Relay Panels:
   a. Manufacturers: Crestron, Hubbell, Acuity or approved equal.
   b. Product Description: Standalone relay panel with quantity of relays as indicated on drawings. Panel shall incorporate a roof mounted photocell to control all indicated site lighting fixtures. Panel shall utilize a digital controller with LCD screen and numerical keypad.
   c. Exterior photocell shall be Douglas model WPS-5527K or approved equal. Photocell shall be mounted as indicated on drawings, and shall face north.
   d. Relay panels shall be provided to control all site lighting fixtures and corridor/stairwell fixtures.
   e. Relay panels shall communicate with the building management system for time scheduling.

4) Room controllers
   a. Manufacturers: Crestron, Hubbell, Acuity or approved equal.
   b. Where indicated on the drawings provide a pre-configured, digitally addressable, plenum rated controller.
   c. The Room Controller shall be capable of:
      d. Autonomously controlling a space.
      e. Networking to a central Dialog control system.
      f. Networking to a central BACnet based management system.
      g. The Room Controller shall consist of:
         h. A universal voltage type (120Vac/277Vac/347Vac) power supply.
         i. Four 20A rated relays complete with manual override. Circuit Load rating dependent on usage. One circuit dedicated for 20A receptacle control.
         j. Four 0-10V control channels, capable of 100mA current sinking
         k. A port to connect downstream switches, occupancy sensors and daylight sensors. All downstream devices shall connected via two #18AWG, non-polarized, non-shielded, non-twisted conductors. See Section 3.4 for wiring specifications.
         l. A port to connect to an upstream Dialog Lighting Control Unit.
         m. A port to connect upstream to BACnet IP building management system. The Controller shall communicate using native BACnet command objects appropriate for the application.
         n. An indicating LED to aid in locating the controller in a darkened ceiling space.
         o. Circuit testing buttons
         p. Capable of connecting with WUL-3924
         q. Output 24Vac 120Ma
         r. Relay Ratings
            s. 20A Suitable for General Purpose Loads @ 120/277/247VAC
            t. 20A Suitable for Standard Ballasts and Tungsten Loads @ 120/277VAC
            u. 16A Suitable for Electronic Ballasts @ 120/277VAC
            v. 0.5HP @ 120/277Vac
         w. The Room Controller relays shall be connected such that 120Vac plug load(s) and 277Vac/347Vac lighting loads can be switched by a single Controller with no additional add-ons or remote modules.
x. The Room Controller shall mount to electrical junction box via threaded \( \frac{1}{2}'' \) chase nipple. No other mounting hardware shall be required.

5) Lighting control keypads

a. Manufacturers: Crestron, Hubbell, Acuity or approved equal.
b. Keypads shall be compatible with the provided room controllers and shall meet or exceed the following specifications:
   c. Switches shall connect to the lighting control network via a common low voltage, 2-wire, non-polarized data line.
   d. Switches shall be factory configured and programmed to control one or more outputs in the lighting control system.
   e. Switches can be programmed for preset control to set a specific lighting scene.
   f. Switch to fit standard Decora opening. Switches and switch hardware shall mount to standard wall boxes.
   g. Each switch shall provide a location for a label to identify function. The label shall be under a clear plastic cover and shall be field replaceable should the operation of the switch change. Permanently etched switches are not acceptable.
   h. Adhere to the factory recommended wiring practices so that physical removal of any single switch shall still permit communication between relay panels in the rest of the lighting control network.

D5060 LIGHTNING PROTECTION

A. Provide all labor, material, equipment, and services required for the complete lightning protection system in accordance with NFPA 780, UL96A and applicable contract drawings for the Building. System shall receive UL Master Label.

B. The system to be furnished under this specification shall be the standard product of a manufacturer regularly engaged in the production of lightning protection equipment and shall be the manufacturer’s latest approved design. The equipment shall be UL listed and properly UL labeled. All equipment shall be new, and of a design and construction to suit the application where it is used in accordance with accepted industry standards and UL and NFPA requirements.

C. Provide a complete lightning protection system in compliance with the specifications and standards of the most current editions of the National Fire Protection Association’s Lightning Protection Standard NFPA-780, and Underwriters Laboratories Lightning Protection Standard UL96A and LPI 175. The system shall be installed by a lightning protection contractor who is listed by Underwriters Laboratories, Inc. and a member of LPI.

D. All lightning protection materials and components shall comply in weight, size and composition with UL 96 and NFPA-780 lightning protection material requirements for this type of structure. All materials shall be copper, bronze, or stainless steel. Aluminum components shall be used in locations where system components are mounted to aluminum surfaces to avoid galvanic corrosion of dissimilar metals. Class I materials shall be used on structures not more than 75 feet in height. Class II materials shall be used on structures over 75 feet in height.
D60 Communications

D6010 DATA COMMUNICATIONS

A. Incoming Service Provider Pathways: Four (4) 4-inch conduits from the service provider’s utility pole(s) to the building’s main telecommunications room/MDF.

B. Main Distribution Room: One-hour rated room with lighting, power and cooling for both active systems (Servers, Network, Voice/IP) and passive (Racks, Cabling, Patching).

C. Telecommunications Rooms: Provided in the building on each level and will be connected to the MDF with multiple 4-inch conduit risers and sleeves as required to interconnect spaces.

D. Cable Management: System will entail cable tray and j-hooks mounted above accessible ceilings. Conduit sleeves will house cables from floor to floor and for cabling entering IT server rooms.

E. Backbone Cabling: Fiber optic backbone will be placed between all equipment rooms from the main server.

F. Horizontal Cabling: Install a new EIA/TIA compliant structured cabling system within the building with Category 6 (CAT6) copper tele/data cabling from patch panel connectivity to work area outlets (WAO).

1) The structured cabling must include standard pathways/cable support system and dedicated closets.

2) On each floor, provide dedicated conditioned equipment rooms for both servers and Ethernet switches for floor-by-floor distribution.

G. Grounding: Entire data infrastructure is to be grounded.

D6060 DISTRIBUTED COMMUNICATIONS AND MONITORING

A. Public Address System

1) Manufacturers: Valcom, Bogen, Rauland Borg, Simplex or approved equal.

2) A new system will be provided throughout the building and will be an all-digital system that is fully integrated with the VoIP telephone system.

3) Maintain the capability for this system to be an override feature for emergency communications that can be used for front office to classroom intercom communications.

4) At least one speaker shall be located in each room within the project. Offices shall be provided with cutoff switches to temporarily disable speakers within room.

5) Supply and install paging speakers as follows:

   a. 2x2 Lay-in speakers shall be mounted in areas with dropped ACT ceilings.
b. In areas with gypsum or other non-accessible ceilings, provide recessed round
   speakers.

c. In areas without ceilings, provide surface mounted overhead speakers.

d. Interior wall speakers shall be provided in stairwells and other high-bay areas.

e. Exterior wall speakers shall be provided on the building exterior in drop-off areas and
   at the main entrance.

f. Clock/speaker baffles with 8” cone speakers shall be provided in classrooms.

B. Clocks

1) Manufacturers: Primex, Valcom, Pyramid Time or approved equal.

2) Provide a complete wireless clock system to include a control unit (Master clock), wireless
   repeater, secondary clocks, and all accessories for complete operation.

3) The Master Clock shall be directly connected to the systems CPU allowing programming
   and visual annunciation of all clock features from the same software package controlling
   the system. Systems requiring a separate assembly with a separate software package will
   not be accepted.

4) The secondary clock shall be a wireless analog clock. The clocks will be capable of
   receiving a signal from multiple clocks. The clock shall receive and transmit with a 915-
   928 MHz frequency-hopping technology. The clock is to be capable of transmitting the
   time simultaneously without interfering with each other. The clocks shall include automatic
   calibration, as well as diagnostic that allow the user to view the quality of the signal, last
   correction signal and a gearbox test. The clock shall have a semi-flush smooth surface ABS
   case. The crystal cover shall be shatterproof, side molded polycarbonate material. The
   clock shall have black minute and hour hands as well as a red second hand. The clock shall
   operate on 15 mA @ 24 VAC and be FCC compliant, part 15 Section 15.247.

C. Classroom Sound Reinforcement System

1) Manufacturers: Valcom, Topcat, Crestron or approved equal.

2) Each classroom shall contain a sound reinforcement system that will consist of a control
   panel, speakers, and wireless microphones for teacher and students. The speakers shall be
   compatible with the PA system.

3) Wireless ADA assisted listening headsets shall also be provided. An ADA transmitter and
   antenna will be provided with the classroom sound reinforcement system.

D6070 AUDIOVISUAL SYSTEMS

A. Digital Signage

1. Manufacturer: Mitsubishi, Advantech, Carousel or approved equal.

2. Product Description: Provide wall mounted digital signage screens with HDMI-over-
   Ethernet media players.
3. Screens shall meet or exceed the following characteristics:
   a. 42” diagonal.
   b. Commercial grade, energy star certified monitor
   c. Wattage shall be 86W or less
   d. Provide manufacturer approved wall brackets.
   e. Resolution shall be 1080p
   f. Model shall be Mitsubishi LDT422V or equal.

4. Media Player shall meet or exceed the following characteristics:
   a. Live full-HD web appliance
   b. Linux OS Hardware with 4GB min. built-in storage
   c. Capable of updating content via Ethernet or USB
   d. HDMI Connection
   e. Integral web software for content manager
   f. Model shall be Mitsubishi XMP3250 or equal.

5. System shall include programmable schedule that automatically powers a monitor on or off at set days and times

B. Video Display Cabling and connectors

1. Manufacturers: Tripp-Lite, C2G, FSR or approved equal.

2. HDMI cables shall meet or exceed the following specifications:
   a. Supports 1080p and 4K resolution.
   b. Carries up to 32 audio channels.
   c. High speed with Ethernet
   d. 28 AWG copper conductors.
   e. Voltage Rating: 30V.
   f. Minimum Bend angle: 60º

3. USB cables shall meet or exceed the following specifications:
   a. Version “3.0”.
   b. A-A or A-B type, as indicated on drawings.
   c. 24 / 28 AWG copper conductors.
   d. Up to 4.8 Gbps bandwidth.

4. Stereo audio cables shall meet or exceed the following specifications:
   a. 3.5mm type
   b. Shielded
   c. Tip-ring-sleeve
   d. Fully molded connector with strain relief

5. VGA cables shall meet or exceed the following specifications:
   a. Supports up to 2048x1536 resolution.
b. 15-pin type.
c. 26 / 28 AWG copper conductors.
d. Minimum bend radius: 51 mm.
e. Voltage Rating: 30V.
f. Nominal Impedance: 75 ohm, +/- 5 ohm.

6. HDMI optical runner cable for in-wall applications:
   a. To connect 2 HDMI connectors via in-wall cabling system, provide optical runner cable equivalent to C2G RapidRun.
   b. Cable shall be In-wall CL2 rated.
   c. Provide length as required for each application.
   d. At the source end, optical cable shall terminate at “flying” lead transmitter and shall be connected to HDMI connector in faceplate.
   e. At the display end, optical cable shall terminate at a faceplate-style receiver mounted in the audiovisual display faceplate. To power system, provide USB-to-AC adapter and plug into available receptacle adjacent to display.
   f. Part numbers:
      1) Optical Runner Cable: C2G Rapid Run or equal.
      2) Flying Lead Transmitter: C2G #60130 or equal.
      3) Faceplate-style Receiver: C2G #60173 or equal.

7. USB-over-Cat.X extenders
   a. Provide two(2) extender modules to passively extend USB 2.0 signal over a single Cat.6 cable.
   b. Extender shall not require 120VAC power.
   c. Provide extender compatible with interactive whiteboards and projectors, capable of sending computer data for interactivity purposes.
   d. Along with transmitter module, Provide 1 meter (3.3ft) Cat.6 patch cable at transmitter end, where the USB source is located.
   e. Along with receiver module, Provide 1 meter (3.3ft) Cat.6 patch cable at the receiving end, where the USB display is located.
   f. Extenders shall be “dongle” type, plugged into RJ45 jacks in faceplate.
   g. Provide SMART™ Model CAT5-XT-1100 or equal.

8. All cables shall be factory-supplied with connectors as indicated on drawings.

9. All cables shall be rated for in-wall applications.

**D70 ELECTRONIC SAFETY AND SECURITY**

**D7010 ACCESS CONTROL AND INTRUSION DETECTION**

A. The security systems will consist of the following integrated subsystems as specified herein:

1) Electronic Surveillance
2) Electronic Monitoring and Control

3) Security Communication System

**D7030 ELECTRONIC SURVEILLANCE**

**A. Video Surveillance:** A new IP-based system will be provided to perform fixed and pan-tilt-zoom (PTZ) surveillance, assessment, monitoring, and recording operations. The system will be capable of integrated operations with other security related systems such as the access control systems or alarm call-up and event assessment at all remote workstations.

1) IP-based system will allow for remote viewing and control by administration.

**B. Network Video Recorder (NVR):** The NVR will provide storage of all cameras using the following criteria:

1) 30-day video storage retention.

2) All cameras using H.264 compression.

3) Interior fixed and PTZ cameras: Record HDTV 1920x1080 with H.264 compression @ 5 images per second when no motion is detected and 15 images/second when motion is detected.

4) Exterior fixed and PTZ cameras: Record HDTV 1920x1080 with H.264 compression @ 5 images per second when no motion is detected and 15 images/second when motion is detected.

5) Motion triggered recording
   a. Assume that motion will be detected 50% of the day.
   b. Motion detection will be configurable by camera and schedule to mitigate nuisance triggers.
   c. Record video as specified herein when motion is detected.
   d. Record video as specified herein when no motion is detected.

**C. Cameras:** The cameras will provide video surveillance, assessment, and visual alarm monitoring of selected interior and exterior access doors as well as other critical areas.

1) Cameras will be IP based fixed, multi-lens and pan-tilt-zoom (PTZ).

2) Exterior cameras will have lightning protection.

**D7050 FIRE DETECTION AND ALARM**

**A. Fire Detection and Alarm**
1) Provide a UL listed, supervised and addressable fire alarm system.

2) General Requirements: The system shall include but not be limited to all control panels, power supplies, initiating devices, audible (Voice Evac) and visual alarm devices, and all accessories required to provide a complete operating fire alarm system in accordance with code and local fire department.

3) The system shall be ADA compliant and installed in accordance with NFPA 72 utilizing combination speaker/strobe units and strobe only units.

4) Double action manual pull stations shall be provided at all exits equipped with local sounder protective covers.

5) System shall include photoelectric type smoke detectors and rate of rise heat detectors where indicated.

D7070 ELECTRONIC MONITORING AND CONTROL

A. Intrusion Detection: System consisting of door position switches and motion detection in all main perimeter areas of the building.

1) This system will be fully integrated with the access control system.

B. Access Control System: Fully integrated system, which will include card readers and audio/video intercoms, electric locking devices, request to exit switches, door release buttons, electromagnetic door holders, lockdown buttons, audible alarms, automatic door operators, lock power supplies, equipment enclosures, tamper switches, credentials, credential printers and credential cameras.

1) The system monitors and controls all access of the perimeter doors, including the front door.

C. Interface: The access control system will interface with the video surveillance system, as well as card access for select interior doors.

D. Card readers: Installed on doors requiring access control.

E. Door Position Switch (DPS): The DPS at card reader controlled locations serve to indicate the open/closed status of the associated door and will establish the basis for reporting a door-propped or unauthorized entry condition.

F. Panic Buttons: Installed at predetermined locations to alert emergency officials of any emergency.

G. Electric Locking Devices: Electrified door hardware for card reader controlled doors will include electrified locksets, electrified hinges, electric exit devices, and electric power transfers.

H. Request to Exit Devices (REX): The request to exit device will shunt the alarm initiated from the door contact upon egress. Shunting of the alarm will be accomplished by connection of the
REX to an appropriate input on the field control panel. This input will be programmed to shunt the door contact upon activation of the REX device.

I. Door Release Button: The door release button, when activated, will trigger an event in the access control system, which will unlock the associated door.

J. Electromagnetic Door Holder: Each electromagnetic door holder will be configured to be demagnetized upon activation of the lockdown button and intrusion detection system. Magnetization will not occur until reset by either system.

K. Lockdown Button: The lockout button, when activated, will trigger an event in the access control system, which will lock all electrified doors, disable the card readers and any door release functions. Cards of security personnel will continue to work on the locked out readers during a lockout situation. The lockdown button, when activated, will cut power for electromagnetic door holding magnets. Magnets will remain de-energized until reset.

L. Motion Detectors: Will be dual technology, combining a PIR and microwave sensor.

D7090 SECURITY COMMUNICATION

A. The video intercom system will be capable of having multiple control units and/or IP direct masters and video door stations.

B. All exterior communication equipment will have lightning protection.

C. Installed separately from conventional general-purpose internal communications systems, the system will be used as a video door entry system, emergency announcement system, rescue assistance system, urgent call system, public announcement system, and access control system as scheduled, indicated or required.

D. The system will have the ability to roll over any video intercom door station call to any video intercom master station within the complete system. This system functionality will be flexible and configurable by system programming and not rely upon physical wiring connections.

E. The system will include remote door unlocking capability from the master station.

F. Will include a full range of control unit functions, including basic conversation, will be capable: call forwarding, scan monitoring, emergency call, priority call, video audio recording, paging, and zone paging as scheduled, indicated or required.
E  EQUIPMENT & FURNISHINGS

E10  EQUIPMENT

E1010  COMMERCIAL EQUIPMENT

Design Intent: The school will include a single commercial kitchen to support preparation of meals for the full student population. Lunch will be provided at separate middle school and elementary school cafeterias, over 3 sittings each (approximately 340 students per sitting, total). Residential appliances are to be distributed as indicated on drawings, but anticipated to include dishwashers at middle school Science Prep. Rooms, a refrigerator with ice maker at the Nurse’s Suite, Refrigerators and Microwaves at Teacher Work Rooms, and Laundry (washer and dryer) at the early-education wing, select SPED spaces, and Kitchen.

A. LEED-S V.4: Submittals shall include product data indicating that all residential appliances are ENERGY STAR rated. Non-ENERGY START appliances will not be accepted. Submittals shall include product data indicating modified energy factor and water factor for water-efficient clothes washers.

B. A single full service kitchen shall be provided to serve two cafeteria. The kitchen shall be provided with the following equipment. All necessary utilities and service connections shall be provided to the kitchen location which occupies the previous natatorium space.

1 ea.  Detergent storage cabinet
1 ea.  Mop sink (by PC)
1 ea.  Mop rack/shelf
1 ea.  Stacked clothes washer/dryer
4 ea.  Staff lockers (by CM)
1 ea.  Fire suppression system
1 ea.  Food processor
1 ea.  Prep counter with sinks
1 ea.  Wall shelf
10 ea.  Storage shelving units
4 ea.  Dunnage platforms
1 ea.  Walk-in freezer
1 ea.  Walk-in cooler included above
1 ea.  Mechanical refrigeration systems (2) included above
10 ea.  Mobile shelving units
2 ea.  Mobile dunnage platforms
3 ea.  Hand sinks
1 ea.  Pot washing sinks
1 ea.  Wall shelf
1 ea.  Exhaust ventilator
1 ea.  Warewasher
1 ea.  Forty quart tilt kettle
2 ea.  Convection oven
1 ea.  Range with oven
1 ea. Ten pan steamer
1 ea. Shelving unit
1 ea. Braising Pan
1 ea. Automatic slicer
1 ea. Mobile slicer stand
1 ea. Work table
1 ea. Twenty quart mixer
1 ea. Mobile mixer stand
2 ea. Mobile hot food cabinets
1 ea. Cook’s table with sink
1 ea. Work table
1 ea. Mobile work table
1 ea. Pass-thru refrigerator
4 ea. Drop cords
3 ea. Utility carts
2 ea. Pan racks
2 ea. Milk coolers
12 ea. Hot food wells (2 grps of 3)
6 ea. Protector cases
1 ea. Serving counter
1 ea. Display shelf assembly
2 ea. Cold Pans
1 ea. Serving Counter
2 ea. Mobile Cashier Stand
1 ea. Cashier Terminal (by Owner)
2 ea. Mobile condiment counter
1 ea. Hose reel
1 ea. Hand sink
6 ea. Sorting/ Trash Bins

C. Residential Appliances: Work includes residential cooktops, oven, refrigerator, microwave, dishwasher, clothes washer and clothes dryer. See Drawings for appliance locations in Autism Rooms, Staff Lunch room, Teachers’ Rooms, Science Lab Prep. Rooms and Kitchen.

1. Cooktops:

   a. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

      1) General Electric Company (GE)
      2) Whirlpool Corporation
      3) Sears brands LLC (Kenmore)

   b. Width: 30 inches
   c. Electric Power supply: As indicated
   d. Controls: Digital panel controls located on front
   e. Electric burner elements: Four
1) Radiant Type: Two 1500W and two 2000W

f. Location: DLC Classroom

2. Wall Ovens

a. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

1) General Electric Company (GE)
2) Whirlpool Corporation
3) Sears brands LLC (Kenmore)

b. Mounting: Built-in wall, One oven unit
c. Electric Power supply: As indicated
d. Electric Power Rating: Oven 2400W; Broiler 3500W
e. Capacity: 3.3 cu.ft.
f. Broiler: Located in top of oven
g. Oven Door: Side hinged with observation window and full height handle
h. Controls: Digital panel controls and timer display
i. Location: DLC Classroom

3. Microwave Ovens

a. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

1) General Electric Company (GE)
2) Whirlpool Corporation
3) Sears brands LLC (Kenmore)

b. Mounting: Under cabinet
c. Electric Power supply: As indicated
d. Type: Conventional
e. Capacity: 2.0 cu.ft.
f. Exhaust Fan: Four speed, Vented to outside
g. Oven Door: Side hinged with observation window
h. Controls: Digital panel controls and timer display
i. Power Rating: 1200W
j. Location: (1) ea. Teachers’ Work Room, (1) at DLC Classroom

4. Refrigerator / Freezers

a. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

1) General Electric Company (GE)
2) Whirlpool Corporation
3) Sears brands LLC (Kenmore)

b. Type: Freestanding
c. Dimensions: 30 inches wide by 24 inches deep by 73 inches high
d. Electric Power supply: As indicated
e. Type: Side by side
f. Location: (1) ea. Teacher’s Work Room, (1) Nurse, (1) PE Office, (1) DLC Classroom

5. Dishwashers

a. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

1) General Electric Company (GE)
2) Whirlpool Corporation
3) Sears brands LLC (Kenmore)

b. Water Consumption for Full Load: 3.2 gal
c. Dimensions: 24 inches wide by 23 inches deep by 34 ½ inches high
d. Tub and Door Linner: Stainless steel
e. Electric Power supply: As indicated
f. Sound Level: Maximum 42 dB1
g. Rack System: Nylon-coated sliding dish racks with removable utensil basket.
h. Controls: Touch-pad controls with four wash cycles and hot air and heat-off drying cycle options
i. Location: (1) SPED Pre-K, (1) DLC Classroom

6. Clothes Washers

a. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

1) General Electric Company (GE)
2) Whirlpool Corporation
3) Sears brands LLC (Kenmore)

b. Type: Front Loading unit
c. Dimensions: 27 inches wide by 31 inches deep by 34 ½ inches high
d. Drum: Manufacturer’s Standard
e. Capacity: 3.2 cu. Ft.
f. Electric Power supply: As indicated
g. Controls: Touch-pad controls for water fill levels, wash / rinse water temperatures and variable speed and fabric selectors.
h. Motor: Manufacturer’s standard with built-in overload protector.
i. Features:
   1) Agitator: Impeller
   2) Self-cleaning lint filter
3) Unbalanced load compensator
4) Inlet Hoses: (min. 60 inches)
5) Drain Hoses: (min. 48 inches)
6) Self-leveling legs
8) Spin cycle safety switch
9) End of cycle signal
10) Extra rinse cycle

j. Location: (1) Kitchen, (1) PE Workshop, (1) Nurse, (1) SPED Pre-K

7. Clothes Dryers

a. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

1) General Electric Company (GE)
2) Whirlpool Corporation
3) Sears brands LLC (Kenmore)

b. Type: Front Loading unit
c. Dimensions: 27 inches wide by 31 inches deep by 34 ½ inches high
d. Drum: Manufacturer’s Standard
e. Capacity: 5.7 cu. Ft.
f. Electric Power supply: As indicated
g. Controls: Touch-pad controls for drying cycle, temperature and fabric selectors.
h. Motor: Manufacturer’s standard with built-in overload protector.
i. Features:

1) Removable lint filter
2) Electronic temperature and moisture level sensor control.
3) End of cycle signal
4) Interior drum light
5) Self-leveling legs
6) Antibacterial cycle
7) Built-in poser fuse

j. Location: (1) Kitchen, (1) PE Workshop, (1) Nurse, (1) SPED Pre-K

E1020 Institutional Equipment

Design Intent: The Band/Chorus/Stage Room is intended to support performances facing either the Gymatorium or Adaptive PE spaces. Valance and Draw Curtains shall be provided at openings facing each space. Side legs, borders and cyclorama shall be capable of supporting performances focused toward either space.

A. LEED-S V.4 Submittals shall be provided for products with recycled content. Submittals shall provide documentation indicating percentages by weight of postconsumer and
preconsumer recycled content. Include statement indicating costs for each product having recycled content. Submittals for acoustical panel ceiling products shall demonstrate products are extracted, recovered and manufactured locally (within 500 miles of the project site).

1. Work of this Section contributes to LEED Credit MR.2, MR.3 and MR.4.

B. Equipment Schedule

<table>
<thead>
<tr>
<th>ITEM</th>
<th>HARDWARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dead Hung Main Valance</td>
<td>Pipe Batten</td>
</tr>
<tr>
<td>Dead Hung Main stage curtain</td>
<td>Bi-parting traveler track (roped) and pipe batten</td>
</tr>
<tr>
<td>First electric light pipe</td>
<td>Automated Hoist Section 11 61 44</td>
</tr>
<tr>
<td>Projection screen</td>
<td>Pipe batten and screen</td>
</tr>
<tr>
<td>Motorized scenery pipe</td>
<td>Automated Hoist Section 11 61 44</td>
</tr>
<tr>
<td>Second electric light pipe</td>
<td>Automated Hoist Section 11 61 44</td>
</tr>
<tr>
<td>Motorized scenery pipe</td>
<td>Automated Hoist Section 11 61 44</td>
</tr>
<tr>
<td>Dead Hung Border</td>
<td>Pipe Batten</td>
</tr>
<tr>
<td>Dead Hung mid stage Traveler</td>
<td>Bi-parting traveler track (roped) and pipe batten</td>
</tr>
<tr>
<td>Third electric light pipe</td>
<td>Automated Hoist Section 11 61 44</td>
</tr>
<tr>
<td>Motorized scenery pipe</td>
<td>Automated Hoist Section 11 61 44</td>
</tr>
<tr>
<td>Dead Hung Black Border</td>
<td>Pipe Batten</td>
</tr>
<tr>
<td>Motorized scenery pipe</td>
<td>Automated Hoist Section 11 61 44</td>
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<td>Motorized scenery pipe</td>
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</tr>
<tr>
<td>Motorized scenery pipe</td>
<td>Automated Hoist Section 11 61 44</td>
</tr>
<tr>
<td>Sky Cyclorama</td>
<td>Automated Hoist Section 11 61 44</td>
</tr>
</tbody>
</table>

C. Fabrics

1. Available manufacturers of fabrics include, but are not limited to, the following:

   a. KM Fabrics (Greenville, SC)
   b. Rosebrand (New York, NY)
   c. Dazian (New York, NY)
   d. I.Weiss (New York, NY)

All fabrics shall be woven from inherently flame resistant polyester fibers and shall accord with standard industry practice and the requirements of all local, state and national authorities. This contractor shall supply certificate evidence of compliance and include a 12” x 12” testing swatch sewn in the webbing of each fabric piece.

The front main stage curtain and valance shall be manufactured from polyester velour, weighing 26 ounces per running yard, color selected by architect. The leg curtains, mid stage traveler curtains, and masking ceiling borders shall be manufactured from polyester velour weighing 21 ounces per running yard, black. The cyclorama sky drop shall be manufactured from seamless poly cyc style cloth (light blue).

The tops of all fabric items shall be bound with 3 ¼ inch reinforced inherently flame resistant vinyl webbing secured by three complete runs of number 24 glace thread. Fullness shall be added by box pleating to the webbing, with pleats of equal size located on each vertical seam and at equal intervals between the seams.
not to exceed 12 inches. Brass grommets, number 2, with S-hook shall be centered on each box pleat. Provide 75 percent added fullness for main curtain and valance and 60 percent fullness for mid stage traveler. Other masking border and leg velour to be sewn flat. The sky drop and scrim drop curtains shall be manufactured without pleated fullness and with hidden ties. The front curtain shall have 24” turn backs on leading edges and trailing edges of all sections. All bottom hems of floor length drapery shall be 6 inches; other drapery items shall have 3 inch bottom hems. Side hems shall be 2 inches. The sky drop and scrim shall have a reinforced hidden pipe pocket at the bottom to receive a 1” pipe batten. The sky drop shall have sides finished with webbing and brass grommets 12” on center to accommodate ropes for stretching. Provide weight tape within the bottom hem of all full length drapery. All masking borders and legs to have hidden ties securely attached to webbing.

D. Tracks

1. Available manufacturers of fabrics include, but are not limited to, the following:
   a. Thern Stage Equipment
   b. H&H Specialties
   c. ADC
   d. Equal products

2. All stage curtain tracks shall be heavy duty, ball bearing type, complete with all necessary accessories. Bi-parting tracks shall be furnished with continuous operating lines, end pulleys and ball bearing floor pulleys. Scrim track shall be equipped for walk-along operation and shall have no center lap. Curtain carriers shall incorporate all metal bodies with two wheels and each wheel shall have a race of ball bearings with nylon or neoprene tires. Carriers shall have a swivel and bumper feature to eliminate binding of successive wheels. The length of all tracks on the stage shall be 10 ft. greater than the width of the proscenium opening.

E. Electric Projection Screen

1. Available manufacturers of fabrics include, but are not limited to, the following:
   a. Dalite Screen
   b. Draper, Inc.
   c. Stewart Filmscreen
   d. Equal products

2. Furnish and install one heavy duty motorized projection screen with heavy duty windings, ball bearings, and limit switches preset at the factory. Screen size shall be coordinated by the system integrator. End section of screen housing shall be approximately 12 inches by 12 inches. Provide beam clamps, welded chain hangers, and pipe clamps. Provide 1 ½ inch (inside diameter) schedule 40 supporting pipe batten. This contractor shall furnish and install the screen and shall deliver the control station to the electrical contractor on the job. Connective wiring and mounting of the control station shall be performed by the electrical contractor, but the physical installation of the screen shall be made by the stage rigging contractor. The control station shall be located on the stage side wall 60 inches above finished floor in direct line with the
screen being operated, a second control location to be installed in the control booth or as directed by the architect.

F. Curtain Schedule

1. Main Valance: 40’ wide by 4’ high (75% fullness)
2. Main Traveler 2 panels each 22’ wide x 17’ high (75% fullness)
3. Borders (2) 44’ wide by 3’ high 60% fullness
4. Leg (6) 10’ wide by 17’ high 60% fullness

E20 FURNISHINGS

Design Intent: All classrooms shall receive a combination of built-in base cabinets, wall, cabinets and tall cabinets for storage. In addition each classroom will be provided with countertop workspace and (2) sinks. Elementary-level classrooms shall include student cubbies for up to 26 students. Unless noted otherwise, all built-in casework and countertops in classrooms shall be finished with high-pressure plastic laminate, with clear silicone sealant at perimeter of counter surfaces (middle school Science Classroom and Prep spaces shall receive resin countertops). Filler panels shall be scribed between end units and walls and all exposed ends shall be finished to match cabinet bodies.

E2010 FIXED FURNISHINGS:

Work includes prefabricated casework, countertops, and booth seating.

A. LEED-S V.4: LEED-S V.4 Submittals shall be provided for products demonstrating low VOC’s and for products with recycled content. Submittals shall be provided for each wood or laminated product stating that bonding agent used contains no urea-formaldehyde. Submittals for adhesives and sealants shall include printed statement of VOC content. Submittals shall provide documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content. Submittals for acoustical panel ceiling products shall demonstrate products are extracted, recovered and manufactured locally (within 500 miles of the project site).

1. Work of this Section contributes to LEED Credits MR.2, MR.3, MR.4 and IEQ.2

B. Materials:

1. FSC Content and Salvaged Wood:

a. For wood products in this section, 100% of FSC certified wood, or Salvaged wood (subject to location, quality and approval requirements as noted below) is required.

b. Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade indicated and, where the following products are part of interior woodwork, with requirements of the referenced product standards that apply to product characteristics indicated:
1) Hardboard: AHA A135.4.
2) Medium-Density Fiberboard: ANSI A208.2.
3) Particleboard: ANSI A208.1, Grade M-2.
4) Hardwood Plywood and Face Veneers: HPVA HP-1.

2. Formaldehyde Emission Level for Medium-Density Fiberboard: Comply with requirements of NPA 9.
   a. Product: Subject to compliance with requirements, provide Medite II by Medite Corp.


4. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.
   a. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
      1) Formica Corporation.
      2) Laminart.
      3) Wilsonart
      4) Pionite

5. Adhesive for Bonding Plastic Laminate: Nonflammable Contact Cement or other approved equal. Product must contain less than 80g/L of VOC's and must not contain urea-formaldehyde.

6. Solid surface countertops.
   a. Manufacturer: Subject to compliance with requirements, provide solid surface material by one of the following:
      1) Wilsonart Earthstones
      2) Corian Price Group F & “Private Collection”
      3) LG Hi Macs Volcanics
   b. Edge profile shall be radius
   c. Final sanding steps shall yield a matte finish that is uniform over the entire surface without the appearance of any seams.
   d. Locations: Countertops with sinks, countertops, sills and other locations indicated on the drawings.

C. Hardware and Accessory Materials

1. General: Provide hardware and accessory materials associated with architectural casework. Comply with accessibility requirements of the Mass Access Code and ADA.
2. Hardware Standard: Comply with BHMA A156.9 for items indicated by reference to BHMA numbers or referenced to this standard.

3. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA code number indicated.

4. For concealed hardware provide manufacturer's standard finish that complies with product class requirements of BHMA A156.9.

5. Hardware:
   a. Catches: As follows:
      1. Magnetic Catches

6. Adjustable Shelf Standards
   a. Shelf Rests for Standards: chrome plated steel

7. Shelf Rests: chrome plated steel. Provide 50 extra stock shelf rests to the Owner.

8. Drawer Slides: Side-mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings, complying with BHMA A156.9, Grade 1 and rated for the following loads:
   a. Box Drawer Slides: 100 lbf.
   b. File Drawer Slides: 200 lbf.

9. Grommets, for cable passage through countertops: 2 inch OD, aluminum grommets with 3/4-inch hole and aluminum cap with slot for wire passage. Color will be selected by Architect from manufacturer's standard range.

D. Installation Materials

1. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

2. Screws: Select material, type, size, and finish required for each use. Comply with ASME B18.6.1 for applicable requirements.

3. Nails: Select material, type, size, and finish required for each use. Comply with FS FF-N-105 for applicable requirements.

4. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors.

E. Fabrication, General
1. Interior Woodwork Grade: Provide interior woodwork complying with the referenced quality standard and of the following grade:
   a. Grade: Custom.

2. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to relative humidity conditions existing during time of fabrication and in installation areas.

3. Fabricate woodwork to dimensions, profiles, and details indicated. Radius outside corners of countertops and window sills a minimum of one inch. Ease edges to radius indicated for the following:
   a. Corners of cabinets and edges of solid-wood (lumber) members and rails: 1/16 inch.

4. Complete fabrication, including assembly, finishing, and hardware application, before shipment to Project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
   a. Trial fit assemblies at the fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on approved shop drawings before disassembling for shipment.

5. Shop-cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts and, where located in countertops and similar exposures, seal edges with a water-resistant coating.

F. Plastic Laminate Countertops

1. Quality Standard: Comply with AWI Section 400 requirements for countertops.
   a. Grade: Custom.

2. Type of Top: High-pressure decorative laminate complying with the following:
   a. Grade: GP-50, 0.050-inch nominal thickness.
   b. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
      1. All colors, patterns or textures shall be selected from laminate manufacturer’s Premium and Standard product lines by the architect at the time of submittals.
c. Edge Treatment: As indicated.
d. Core Material: Medium-density particleboard.
e. Scratch (mar) resistant grade.

G. Resin Countertops

1. Epoxy Resin Countertops shall be manufactured by Durcon Incorporated or other approved equal. Material shall be a monolithic, filled epoxy resin product and shall consist of a polymerized cast resin material formulated to provide a work surface with high chemical resistance characteristics. The combination of epoxy resin and asbestos free inert materials shall be oven-cured in molds to obtain maximum chemical resistance, then removed from the molds and oven tempered to achieve maximum physical strength and stability. Surfaces shall have a uniform low-sheen surface and the finished material shall be extremely hard and resistant to scratches and abrasion. Countertop shall be a flat surface 1 ¼” thick with ¼” machined radius top edge with blended radius corners, and supplied loose for field application in the same material and thickness as countertops 4” high. Curbs are to be bonded to the tops at the jobsite. Color to be selected at a later date and time by architect.

H. Shop Finishing of Fixed Furnishings

1. Quality Standard: Comply with AWI Section 1500, unless otherwise indicated.
   a. Grade: Provide finishes of same grades as items to be finished.

2. General: The entire finish of interior architectural woodwork is specified in this Section, shall be shop applied:
   a. Shop Finishing: To the greatest extent possible, finish architectural woodwork at the fabrication shop. Defer only final touch up, cleaning, and polishing until after installation.
   b. To the greatest extent possible, all adhesives, sealants, paints and coatings that are applied onsite and fall within the building weather proofing system shall be selected to have low VOC contents while meeting the other requirements of the specification.

3. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
   a. Backpriming: Apply one coat of sealer or primer compatible with finish coats to concealed surfaces of woodwork, including backs of trim, cabinets, paneling, and ornamental work and the underside of countertops. Apply 2 coats to back of paneling. Concealed surfaces of plastic laminate-clad woodwork do not require backpriming when surfaced with plastic laminate or thermoset decorative overlay.

4. Washcoat for Stained Finish: Apply a vinyl washcoat to woodwork made from closed-grain wood before staining and finishing.
5. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.

6. Filled Finish for Open-Grain Woods: After staining (if any), apply paste wood filler to open-grain woods and wipe off excess. Tint filler to match stained wood.
   a. Apply vinyl washcoat sealer after staining and before filling.

7. Transparent Finish: Comply with requirements indicated below for grade, finish system, staining, and sheen, with sheen measured on 60-degree gloss meter per ASTM D 523.
   a. Grade: Premium.
   b. AWI Finish System TR-6: Catalyzed polyurethane.
   d. Sheen: Satin 30-50 gloss units.

I. Concealed Supports and Blocking for Fixed Furnishings

1. For dimensional lumber, shims, or furring strips provided by this section for hidden-from-view support of the materials of this section, clean, dry, uncontaminated and structurally-sound lumber, without nails or fasteners, that has been salvaged from a demolition project or that has been sourced from a supplier of Salvage materials (see definition of Salvage Materials on EBMC Form, section 018113), may be submitted for use in the project, subject to approval of the project designer.

J. Prefabricated Casework:

1. Manufactured Casework: Unless noted otherwise, casework model numbers are based on products manufactured by Case Systems, or equal. Provide filler panel and finish ends as appropriate.

2. Casework Materials: Provide plastic laminate faced cabinets manufactured with:
   a. Particleboard Core:
      1) All particle board shall be Grade M-3 and shall meet or exceed all requirements as set by ANSI A208.1-2009
         Density 40-50 lbs./cu.ft.
         Moisture Content 10% Max
         Modulus of Rupture 2393 psi
         Modulus of Elasticity 398,900 psi
         Internal Bond 80 psi
         Hardness 500 pounds Min
         Linear Expansion 0.35%
         Thickness Tolerance +/- 0.008”
         Face Screw Holding 247 pounds Min.
   b. MR (Moisture Resistant) Core shall be:
1) Interior-Grade moisture resistant particleboard.
2) Meet or exceed M-3 Grade, according to ANSI-A2008.1-2009.

c. Low Emitting Core shall be:

1) NAUF (No added Urea Formaldehyde) M-2 Particleboard:
   a) For casework core having recycled content.
   b) For casework core being manufactured without the use of urea formaldehyde.
   c) For products having chain of custody certificates certifying that the wood used in the casework complies with FSC requirements.

3. Joinery:

a. Mechanical Joinery:

1) All cabinet body components shall be secured utilizing concealed interlocking mechanical fasteners as approved by the AWI Quality Standards 8th Edition - S2003 sections 400A-T-12, 400B-T10 and 1600 T-11.

4. Surface Material:

a. Acceptable laminate color, pattern, and finish as either scheduled or otherwise indicated on drawings or as selected by Architect from manufacturer’s standards types and nominal thickness including:

   1) General purpose decorative grade HGS: .048” thick
   2) Cabinet decorative liner grade CLS: .020” thick
   3) Non-decorative backer grade BKH: .028” thick
   4) Chemical resistant decorative laminate at the Applied Arts and Robotics Classrooms.

5. Edge banding:

a. PVC

   1) Shall be applied utilizing hot melt adhesive and radiused by automatic trimmers. Edging shall be available in a variety of color options.

6. Adhesives:

a. PVA

   1) Adhesive shall be mechanically applied.
   2) NAUF, no VOC

b. EVA
1) Adhesive shall be mechanically applied.

K. Casework Fabrication

1. General Cabinet Body Construction:
   a. Cabinet Box Style shall be: Standard: Reveal Overlay.
   b. Cabinet Box Core shall be: NAUF & FSC Plywood
   c. Bottoms and ends of cabinets, and tops of wall and tall cabinets (all structural components) shall be 3/4” thick.
   d. All panels shall be manufactured with balanced construction.
   e. Fixed interior components such as fixed shelves, dividers, and cubicle compartments shall be full 3/4” thick and attached with concealed interlocking mechanical fasteners.
   f. Cabinet body exterior surfaces shall be: HGS.
   g. Cabinet finished interior options shall be: Finished at all laminate openings.
   h. Cabinet body interior surfaces shall be: Cabinet Liner Grade CLS.
   i. Cabinet body front edge shall be: 3 mm PVC
   j. Mounting stretchers are ¾” thick structural components fastened to end panels and back by mechanical fasteners, and are concealed by the cabinet back.
   k. When the rear of a cabinet is exposed, a separate finished 3/4” thick decorative laminate back panel may be specified.
   l. Backs of cabinets are ½” thick surfaced both sides for balanced construction and fully captured on both sides and bottom.
   m. A 5mm diameter row hole pattern 32 mm (1-1/4”) on center shall be bored in cabinet ends for adjustable shelves. This row hole pattern shall also serve for hardware mounting and replacement and/or relocation of cabinet components.
   n. An upper ¾” thick stretcher shall be located behind the back panel and attached between the end panels with mechanical fasteners. This stretcher is also fastened to the full sub-top thus capturing the back panel.

2. Base Cabinet Construction:
   a. All base cabinets, except sink cabinets, shall have a solid ¾” thick sub-top of core (as specified above), fastened between the ends with interlocking mechanical fasteners.
   b. Sink cabinets with a split removable back panel shall have a formed metal front brace, and steel corner gussets shall be utilized to support and securely fasten top in all four corners. Front brace shall be powder coated black.

3. Tall Cabinet Construction:
   a. All tall cabinets shall be provided with an intermediate fixed shelf to maintain internal dimensional stability under heavy loading conditions as well as an intermediate ¾” thick stretcher located behind the back panel and be secured between the cabinet ends with mechanical fasteners. The stretcher shall be secured to the shelf through the back with #8 x 2’ plated flat head screws.
4. Wall Cabinet Construction:
   a. All wall cabinet bottoms shall be 1” thick core (type specified above), mechanically fastened between end panels and secured to the bottom back stretcher. A lower ¾” thick stretcher shall be located behind the back panel and attached between the end panels with mechanical fasteners. The stretcher is also secured through the back and into the cabinet bottom.
   b. All wall cabinet exterior bottoms shall be: Match Exterior Surface.
   c. All wall cabinet tops shall be: 3/4”

5. Tall and Wall Cabinet Top Edges shall be: .020” PVC at Top of End Panels, Stretcher & Back

6. Tall, Wall and Hutch Tops shall be: HPL to Match Exterior Surface.

7. Tall, Wall and Hutch Upper Door Reveal shall be: 3 mm (1/8”) Reveal.

8. Toe Base of Cabinet:
   a. Individual bases shall be constructed of: NAUF & FSC Plywood factory applied to base and tall cabinets and shall support and carry the load of the end panels, and the cabinet bottom, directly to the floor. The base shall be let in from the sides and back of the cabinet to allow cabinets to be installed tightly together and tight against a wall, also to conceal the top edge of applied vinyl base molding (not supplied by casework manufacturer). There shall be a front to back center support for all bases over 30” wide.
   b. Toe Base Height: 4”
   c. Toe Base Options: Attached

9. Drawer Fronts and Solid Doors:
   a. All drawer fronts and solid door components shall be: NAUF & FSC Plywood surfaced both sides for balanced construction.
   b. Options shall be: HPL Door and Drawer Front Exterior and Grade CLS on Interior.
   c. Surfaces shall be: HPL Grade HGS
   d. Door and drawer front edge shall be: 3 mm PVC.

10. Drawer Boxes
   a. Drawer box constructed with a full 1/2” thick core shall be: NAUF & FSC Plywood non-racking, non-deflecting platform bottom that is carried directly by “L” shaped, bottom mount drawer glides.
   b. Drawer box at finished interiors shall be: Cabinet Liner Surface to Match Standard Interior.
   c. Slides are secured with 1-1/4” long screws driven through the platform and into the sides. Drawer box sides, backs, sub-front, and bottom shall be 1/2”. The top edge shall be nominal 1 mm (.020”) PVC matching the drawer color. Drawer box corners shall be joined with fluted hardwood dowels and glue spaced at a minimum of 32
mm on center. Drawer box fronts shall be removable and attached to drawer box sub-front with screws from inside of drawer. Horizontal parting rails between drawers shall be 3/4” thick core, with balanced surfaces, secured to and further reinforcing cabinet ends. File drawer box shall have pre-finished dovetail drawer boxes.

11. Doors:
   a. Solid Doors shall be: 3/4” thick core.
   b. Glazed Doors, Framed shall be:
      1) Hinged or sliding 3/4” thick, smoked tempered glass panels. Panels must be a minimum of 1/4” thick. Glazing panel shall be set into the door frame without the use of a separate molding. Glazing shall be held in place with removable stops.
   c. Glazed Doors, Frameless shall be:
      1) Sliding, minimum of 1/4” thick tempered glass panels. All edges to be radius ground and polished.
   d. Sliding Doors shall be:
      1) Extruded aluminum upper track with anodized finish. All tall cabinets shall receive two hanging brackets per door with two rollers per bracket. All other cabinets shall receive two hanging brackets per door with one roller per bracket. The bottom of door shall be captured in a retainer to prevent doors from swinging in or out.
   e. Pocket Doors shall be:
      1) Zinc plated, self-closing, three-way adjustable geometric door hinge with precision steel ball bearing slides.
   f. Grille Doors shall be:
      1) Powder coated platinum finish, grille doors where shown or noted with model number shall have individual lock hasps and number plates.
      2) Single wide grille doors where shown or noted shall have individual, zinc plated, stay-close wire door latches. The wire door latch is a robust, door/side-mounted design made of 13-gauge cold rolled steel. A self-latching lever smoothly travels over the hasp and falls into a positive latched, stay-close position. For security, the door can be locked with a padlock. This option is not available on cabinets with double door configuration.

12. Shelves:
   a. Adjustable:
Easthampton Maple Elementary School  
Design Alternative E.4; Pre-K Through Grade 8  
Schematic Design Specifications

1) Adjustable shelves shall be: NAUF & FSC Plywood core, with balanced surfaces.
2) Adjustable shelves in closed cabinets shall be: 1” for all shelves.
3) All adjustable shelves in open cabinets shall be: 1” thick, except for special use cabinets such as mail, cubical, instrument or locker type units.
4) Adjustable shelf edge on open cabinets shall be: 3 mm on Front, .020” on Back and Sides.
5) Adjustable shelf edge on closed cabinets shall be: 3 mm on Front, .020” on Back and Sides.
6) Adjustable shelf shall be: 23 mm setback option when locks are used.

b. Fixed:

1) Fixed shelves shall be: NAUF & FSC Plywood
2) Fixed shelves shall be: 1” for All Shelves.
3) Fixed shelf surfaces on closed cabinets shall be: Grade CLS on both sides.
4) Fixed shelf surfaces on open cabinets shall be: HGS on both sides.

c. Wire Shelves shall be white, plastic coated.

d. Hardboard Shelves shall be 1/4” thick tempered hardboard. All hardboard shall have a “S2S” surface finish.

13. Specialty Products:

a. Rail Mounted Cabinets:

1) Wall mounted continuous support rail and cabinet mounted interface hooks shall be an anodized finished extruded aluminum.
2) Wall mount support shall come factory pre-drilled 8” on center for mounting to 16” or 24” on center studs and in-wall blocking. Blocking is required per manufacturers’ recommendations and is supplied and installed by other specified trade.
3) Cabinet interface hooks shall be pre-mounted at the factory with deep thread 7 mm x 70 mm specialty screws. Screws shall not be visible in cabinet interior. Hook styles shall be available for single, and triple height adjustment based on the cabinet model number.
4) Cabinet lower leveling bar shall be adjustable from cabinet interior and shall allow for plus or minus 3/8” plumb adjustment without additional materials.
5) Recommended maximum load capacity for base cabinets with a 1-1/8” standard laminate countertop, wall cabinets and tall cabinets shall be 100 lbs per linear foot.
6) Rail mounted casework shall be vertically (dependent on model #) and horizontally adjustable.
7) Core material only available in grade M3 particle board core.
8) Option Leg Supports shall be provided to accommodate heavier loads for tall and base rail cabinets.

b. Mobiles:
Easthampton Maple Elementary School  
Design Alternative E.4; Pre-K Through Grade 8  
Schematic Design Specifications  

1) Mobile top shall have 3 mm edging and shall have an overhang at front, sides and rear to act as a bumper. Mobile top shall be available in a variety of colors. Mobile unit shall be constructed of a 3/4” thick core, as specified, and platform with 3 mm edging. Sides, back and casters will be securely fastened using mechanical fasteners.  
2) Mobile units shall be available with either 4” or 6” nominal height casters.  
3) Mobile back shall be 1” thick specified core.  
4) Mobile unit shall have a maximum load rating of 500 pounds.  
5) Mobiles will have a 3/4” thick finished top with material as specified below.  

   a) HGS laminate.  

L. Prefabricated Casework Finishes  
   1. Plastic Laminate Casework Colors:  
      a. Provide High Pressure Laminate from manufacturers’ standard sued finishes including the following:  
         1) Wilsonart  
         2) Nevamar  
         3) Formica  
         4) Pionite  
         5) Color: Selection from standard range, including all wood grain patterns/colors.  
      
      b. Cabinet Liner .020” thick, high-pressure cabinet liner conforming to ANSI/NEMA 3 LD-2005, Grade CLS. Surface texture shall be similar to exterior finish. Color shall match interior.  
         1) Standard: grey  

   2. Plastic Laminate Countertop Colors:  
      a. Wilsonart  
      b. Nevamar  
      c. Formica  
      d. Pionite  
      e. Color: Selection up to premium range  

   3. Accessories:  
      a. Hinges:  
         1) 5-Knuckle Hinge / Reveal Overlay: Brushed chrome finish.  
         2) Inset 5-Knuckle Hinge: Platinum finish.  

   4. Glazed Door Trim shall be Grey
5. Pulls:

6. Custom Pull: Stainless Steel Bow Pull equal to SC.SS.Bow-128mm from CSH (Custom Service Hardware)

7. Selection from standard colors for countertop supports.

8. Selection from standard colors for table frames.

9. Selection from standard colors for round grommets.

M. Prefabricated Casework Accessories

1. Hardware:
   
a. Hinges:

   1) Concealed Hinges: Hinges shall be: fully concealed, nickel-plated, self-closing, 170 degree swing European style with six way adjustment. Hinge shall be: a minimum of Grade 2 per ANSI/BHMA A156.9. Hinge shall permit door to swing 170 degrees without binding. Doors under 36” high shall have two hinges; 36”-72” high shall have three hinges; over 72” high shall have four hinges.

   b. Pulls:

   1) One pull shall be: located at the centerline of the drawer, regardless of width, to ensure ease of operation and maximize drawer slide life.

      a) Stainless Steel Bow Pull equal to SC.SS.Bow-128mm from CSH (Custom Service Hardware)

   c. Drawer Slides:

   1) Standard drawer: Self-closing, bottom mount epoxy coated with captive roller and positive in stop. Slide shall have 100 lb. load rating, must be: self-closing and must prevent drawer fronts from contacting the cabinet body. Drawer slides must meet or exceed Grade 1 requirements per ANSI A156.9/BHMA with full extension slides on file and paper storage.

   2) File drawer: Full extension, bottom mount epoxy coated with captive roller and positive in stop. Slide shall have 100 lb. load rating, must be: full extension, and prevent drawer fronts from contacting the cabinet body. Drawer slides must meet or exceed Grade 1 requirements per ANSI/BHMA.

   d. Wall Shelving Hardware

   1) Heavy-duty wall shelving hardware, including standards and brackets in an anochrome finish.

   2) Bracket Mounted Shelf Core shall be: NAUF & FSC Plywood.

   3) Bracket Mounted Shelf Edge shall be: .020”.
4) Bracket Mounted Shelf Surface shall be: Thermally Fused.

e. Shelf Clips:

1) Shelf clips shall be injected molded clear plastic, with a double pin engagement 32 mm on center and shall have 3/4” and 1” anti-tip locking tabs as approved in AWI 400B-T-9 for premium Grade. Shelf clips shall be: single pin plastic shelf clip with anti-tip locking tabs, used for all 1/4” hardboard shelves.

f. Coat Hooks shall be Zinc plated, single prong and double prong.

g. Closet Rods shall be Zinc plated rod, 1” diameter with captive sockets.

h. Mirrors:

1) Teacher wardrobe mirrors to be 8” x 10”.

i. Label Holders shall be on all Drawers

j. Locks (where shown or noted only):

1) Lock Locations:

a) Locks on all drawer and doors.

2) Lock type:

a) Five disc tumbler cam locks, chrome plated steel faceplate. All locks keyed alike or keyed differently by room and master keyed. Shall permit a minimum of 50 keying options. Removable lock core permitting owner to easily change lock arrangements. Inactive door of base and wall cabinets shall be secured by using an elbow catch, or a chain pull for tall cabinets.

k. Casters:

1) Shall be available in both 4” (3” diameter wheel) and 6” (5” diameter wheel) nominal heights. 4” casters must have a minimum load rating of 165 lbs per caster and the 6” casters must have a minimum load rating 200 lbs per caster. Shall be ball bearing with 360° swivel. Shall have non-marring wheels available in both locking and non-locking.

l. Catches:

1) Chain Pulls shall be zinc plated, spring loaded door catch used to hold door securely shut.

2) Chain Stops shall be zinc plated, looped chain used to limit door swing as specified, mounting plate at each end of chain shall use (4) #7 x 5/8” screws to secure to cabinet door and end panel. They shall be on cabinets at adjoining walls and where casework and countertops can interfere with the door swing of the tall cabinet.
3) Elbow Catch shall be chrome plated, spring loaded, used to hold non-locking door securely shut.
4) Roller Catch, (not used with self-closing hinges) shall have: heavy-duty, spring-loaded roller, with molded plastic bumper mounted at door top to keep door securely shut.
5) Magnetic Catch, (not used with self-closing hinges) shall have: white plastic housing with 32 mm spaced, elongated holes for screw-attachment to all adjustability.
6) Catches shall be: Magnetic at Base and Wall, 1 Roller at Tall.

m. Tote Tray shall be white, high impact resistant polystyrene, with label holder permanently attached to face of tray. Supported by individual polycarbonate channels mounted to cabinet ends and partitions with two integral 5 mm diameter pins secured with one-euro style screw. Height adjustable on 32mm (1-1/4”) centers.

n. Countertop Supports:
   1) Powder coated, formed metal supports. Must provide attachment points between counter top and wall.

o. Grommets:
   1) Paper Grommets are black.
   2) Round Grommets are available in four colors.
   3) Oval Grommets are black.

N. Prefabricated Casework Schedule:

1. Typical Pre-Kindergarten/ Kindergarten Classrooms:
   a. Cubbies: Z4040 (x 5) for a total of 20 compartments.
      1) Height: 48 inches
      2) Depth: 12 inches
   b. Base Cabinets: Unless noted otherwise, base cabinets shall be 24 inches deep.
      1) 15”W Open Face: B0000
      2) 36” W Accessible Vanity: D1120 (x 2 ea. room)
   c. Tall Cabinets: Unless noted otherwise, tall cabinets shall be 24 inches deep.
      1) 48”W Double Door w/ (4) Adj. Shelves and (1) fixed Shelf: T0100 (x2 per room)
      2) 48”W Blind Corner: T0210/ T0220 (X1 per room). See Drawings for handing
      3) 30”W. Teacher Wardrobe: T2670
   d. Wall Cabinets: Unless noted otherwise, wall cabinets shall be 12 inches deep and 30 inches high.
1) 15”W, Single Door w/ Adj. Shelves: W0110/ W0120 (1 per room)
2) 36”W, Double Door w/ Adj. Shelves: W0100 (x 2 per room)

e. Teacher Station:

1) 16”W File Drawer: B4500 (x1 location)
2) 48”W Blind Corner Cabinet w/ Drawer: B3210/ B3220 (see drawings for handing)

f. Countertop:

1) 7’-6”L x 24”D straight P-Lam. counter with 4”H Back and Sidesplash
2) ‘L’-shaped P-Lam. counter at Teacher Station: 24”D w/ 72”L leg and 27”L return

2. Typical Elementary School Classrooms:

a. Cubbies: Z4020 (x1) and Z4040 (x 6) for a total of 26 compartments.

1) Height: 48 inches
2) Depth: 12 inches

b. Base Cabinets: Unless noted otherwise, base cabinets shall be 24 inches deep.

1) 24”W Door w. Single Drawer: B3310/20 (1 ea. hand)
2) 21”W (4) Drawers: B4040
3) 48”W (Double Door with (2) Drawers: B3170
4) 36” W Accessible Vanity: D1120 (x 2 ea. room)

c. Tall Cabinets: Unless noted otherwise, tall cabinets shall be 24 inches deep.

1) 27”W Double Door w/ (4) Adj. Shelves and (1) fixed Shelf: T0100
2) 30”W. Teacher Wardrobe: T2670

d. Wall Cabinets: Unless noted otherwise, wall cabinets shall be 12 inches deep and 30 inches high.

1) 21”W, Single Door w/ Adj. Shelves: W0110/ W0120 (1 ea. hand)
2) 36”W, Double Door w/ Adj. Shelves: W0100 (x 2 per room)
3) 48”W, double Door w/ Adj. Shelves: W0100 (x 1 per room)

e. Teacher Station:

1) 16”W File Drawer: B4500 (x1 location)
2) 48”W Blind Corner Cabinet w/ Drawer: B3210/ B3220 (see drawings for handing)

f. Countertop:

1) 15’-6”L x 24”D straight P-Lam. counter with 4”H Back and Sidesplashes
2) ‘L’-shaped P-Lam. counter at Teacher Station: 24”D w/ 72”L leg and 27”L return

3. Typical Elementary Breakout Classrooms:
   a. Cubbies: Z4020 (x1) and Z4040 (x 6) for a total of 26 compartments.
      1) Height: 48 inches
      2) Depth: 12 inches
   b. Base Cabinets: Unless noted otherwise, base cabinets shall be 24 inches deep.
      1) 24”W Door w. Single Drawer: B3310/20 (1 ea. hand)
      2) 21”W (4) Drawers: B4040
      3) 48”W (Double Door with (2) Drawers: B3170
      4) 36” W Accessible Vanity: D1120 (x 3 ea. room)
   c. Tall Cabinets: Unless noted otherwise, tall cabinets shall be 24 inches deep.
      1) 27”W Double Door w/ (4) Adj. Shelves and (1) fixed Shelf: T0100
      2) 30”W. Teacher Wardrobe: T2670
   d. Wall Cabinets: Unless noted otherwise, wall cabinets shall be 12 inches deep and 30 inches high.
      1) 21”W, Single Door w/ Adj. Shelves: W0110/ W0120 (1 ea. hand)
      2) 36”W, Double Door w/ Adj. Shelves: W0100 (x 2 per room)
      3) 48”W, double Door w/ Adj. Shelves: W0100 (x 1 per room)
   e. Teacher Station:
      1) 16”W File Drawer: B4500 (x1 location)
      2) 48”W Blind Corner Cabinet w/ Drawer: B3210/ B3220 (see drawings for handing)
   f. Countertop:
      1) 15’-6”L x 24”D straight P-Lam. counter with 4”H Back and Sidesplashes
      2) ‘L’-shaped P-Lam. counter at Teacher Station: 24”D w/ 72”L leg and 27”L return

4. Typical Elementary Art Classroom:
   a. Base Cabinets: Unless noted otherwise, base cabinets shall be 24 inches deep.
      1) 48”W (Double Door with (2) Drawers: B3170 (x2 locations)
      2) 36” W Accessible Vanity: D1120 (x 3 Locations)
      3) 24”W Pull Out Clay Bin: X1760 (Kiln Rm)
      4) 48”W Wedging Table: G8050 (Kiln Rm)
   b. Tall Cabinets: Unless noted otherwise, tall cabinets shall be 24 inches deep.
1) 24”W Smock Storage: T2520
2) 48”W Paper Roll Storage: T0660
3) 48”W Drawing Board Storage: T0700
4) 30”W. Teacher Wardrobe: T2670
5) 48”W Drying Cabinet: T0560 (Kiln Rm)

c. Wall Cabinets: Unless noted otherwise, wall cabinets shall be 12 inches deep and 30 inches high.
   1) 21”W, Single Door w/ Adj. Shelves: W0110/ W0120 (1 ea. hand)
   2) 36”W, Double Door w/ Adj. Shelves: W0100 (x 3 per room)
   3) 48”W, double Door w/ Adj. Shelves: W0100 (x 2 per room)

d. Teacher Station:
   1) 16”W File Drawer: B4500 (x1 location)
   2) 48”W Blind Corner Cabinet w/ Drawer: B3210/ B3220 (see drawings for handing)

e. Countertop:
   1) 17’-10”L x 24”D straight P-Lam. counter with 4”H Back and Sidesplashes
   2) ‘L’-shaped P-Lam. counter at Teacher Station: 24”D w/ 72”L leg and 27”L return

5. Typical Elementary Music Classroom:

a. Base Cabinets: Unless noted otherwise, base cabinets shall be 24 inches deep.
   1) 42”W (Double Door with (2) Drawers: B3170 (x2 locations)
   2) 36” W Accessible Vanity: D1120 (x 1 Location)
   3) 48”W Blind Corner Cabinet: B0210 (x1 Location)

b. Tall Cabinets: Unless noted otherwise, tall cabinets shall be 24 inches deep.
   1) 21”W, 1 Type-C + 9 Type-A compartments: I6250 (x2 locations)
   2) 21”W, 1Type-C + 6 Type-B Compartments: I6150 (x3 locations)
   3) 21”W, 1 Type-C + 1Type-L Compartment: I6440 (x4 locations)
   4) 21”W, 2 Type G Compartments: I6350 (x2 locations)
   5) 21”W, 1 Type-K Compartment: I6600 (x2 locations)
   6) 30”W. Teacher Wardrobe: T2670
   7) 48”W x 16”D Folio Storage: T1940 (x 2 locations)

c. Wall Cabinets: Unless noted otherwise, wall cabinets shall be 12 inches deep and 30 inches high.
   1) 36”W, Double Door w/ Adj. Shelves: W0110/ W0120 (1 ea. hand)
   2) 42”W, Double Door w/ Adj. Shelves: W0100 (x 1 per room)
   3) 48”W, double Door w/ Adj. Shelves: W0100 (x 1 per room)
d. Teacher Station:
   1) 16”W File Drawer: B4500 (x1 location)
   2) 48”W Blind Corner Cabinet w/ Drawer: B3210/ B3220 (see drawings for handing)

e. Countertop:
   1) 12’-10”L x 24”D straight P-Lam. counter with 4”H Back and Sidesplashes
   2) ‘L’-shaped P-Lam. counter at Teacher Station: 24”D w/ 72”L leg and 27”L return

6. Typical Middle School Classrooms:
   a. Base Cabinets: Unless noted otherwise, base cabinets shall be 24 inches deep.
      1) 24”W Door w. Single Drawer: B3310/20 (1 ea. hand)
      2) 21”W (4) Drawers: B4040
      3) 48”W (Double Door with (2) Drawers: B3170
      4) 36” W Accessible Vanity: D1120 (x 2 ea. room)
   b. Tall Cabinets: Unless noted otherwise, tall cabinets shall be 24 inches deep.
      1) 27”W Double Door w/ (4) Adj. Shelves and (1) fixed Shelf: T0100
      2) 30”W. Teacher Wardrobe: T2670
   c. Wall Cabinets: Unless noted otherwise, wall cabinets shall be 12 inches deep and 30 inches high.
      1) 21”W, Single Door w/ Adj. Shelves: W0110/ W0120 (1 ea. hand)
      2) 36”W, Double Door w/ Adj. Shelves: W0100 (x 2 per room)
      3) 48”W, double Door w/ Adj. Shelves: W0100 (x 1 per room)
   d. Teacher Station:
      1) 16”W File Drawer: B4500 (x1 location)
      2) 48”W Blind Corner Cabinet w/ Drawer: B3210/ B3220 (see drawings for handing)
   e. Countertop:
      1) 15’-6”L x 24”D straight P-Lam. counter with 4”H Back and Sidesplashes
      2) ‘L’-shaped P-Lam. counter at Teacher Station: 24”D w/ 72”L leg and 27”L return

7. Typical Middle School Breakout Classrooms:
   a. Base Cabinets: Unless noted otherwise, base cabinets shall be 24 inches deep.
      1) 24”W Door w. Single Drawer: B3310/20 (1 ea. hand)
      2) 21”W (4) Drawers: B4040
3) 48”W (Double Door with (2) Drawers: B3170
4) 36” W Accessible Vanity: D1120 (x 3 ea. room)

b. Tall Cabinets: Unless noted otherwise, tall cabinets shall be 24 inches deep.
   1) 27”W Double Door w/ (4) Adj. Shelves and (1) fixed Shelf: T0100
   2) 30”W. Teacher Wardrobe: T2670

c. Wall Cabinets: Unless noted otherwise, wall cabinets shall be 12 inches deep and 30 inches high.
   1) 21”W, Single Door w/ Adj. Shelves: W0110/ W0120 (1 ea. hand)
   2) 36”W, Double Door w/ Adj. Shelves: W0100 (x 2 per room)
   3) 48”W, double Door w/ Adj. Shelves: W0100 (x 1 per room)

d. Teacher Station:
   1) 16”W File Drawer: B4500 (x1 location)
   2) 48”W Blind Corner Cabinet w/ Drawer: B3210/ B3220 (see drawings for handing)

e. Countertop:
   1) 15’-6”L x 24”D straight P-Lam. counter with 4”H Back and Sidesplashes
   2) ‘L’-shaped P-Lam. counter at Teacher Station: 24”D w/ 72”L leg and 27”L return

8. Typical Science Classrooms:

a. Base Cabinets: Unless noted otherwise, base cabinets shall be 24 inches deep.
   1) 21”W Door w. Single Drawer: B3310/20 (1 ea. hand)
   2) 48”W (Double Door with (2) Drawers: B3170 (x3 locations)
   3) 36” W Accessible Vanity: D1120 (x 4 locations)
   4) 61”W Teacher Demonstration Table: SW661

b. Tall Cabinets: Unless noted otherwise, tall cabinets shall be 24 inches deep.
   1) 36”W Accessible Safety Center: X1040
   2) 48”W Double Glazed Door Microscope Storage: T0330
   3) 24”W Single Glazed Door Torso Storage: T4710
   4) 30”W. Teacher Wardrobe: T2670

c. Wall Cabinets: Unless noted otherwise, wall cabinets shall be 12 inches deep and 30 inches high.
   1) 21”W, Single Door w/ Adj. Shelves: W0110/ W0120 (1 ea. hand)
   2) 36”W, Double Door w/ Adj. Shelves: W0100 (x 4 locations)
   3) 48”W, double Door w/ Adj. Shelves: W0100 (x 3 locations)
d. Teacher Station:

1) 16”W File Drawer: B4500 (x1 location)
2) 48”W Blind Corner Cabinet w/ Drawer: B3210/ B3220 (see drawings for handing)

e. Countertop:

1) 16’-4”L x 24”D straight phenolic counter with 4”H Back and Sidesplashes
2) 27’-10”L x 24”D Straight phenolic counter with 4”H Back and Sidesplashes
3) ‘L’-shaped phenolic counter at Teacher Station: 24”D w/ 72”L leg and 27”L return

9. Middle School Art Classroom:

a. Base Cabinets: Unless noted otherwise, base cabinets shall be 24 inches deep.

1) 48”W (Double Door with (2) Drawers: B3170 (x2 locations)
2) 36” W Accessible Vanity: D1120 (x 3 Locations)
3) 24”W Pull Out Clay Bin: X1760 (Kiln Rm)
4) 48”W Wedging Table: G8050 (Kiln Rm)

b. Tall Cabinets: Unless noted otherwise, tall cabinets shall be 24 inches deep.

1) 24”W Smock Storage: T2520
2) 48”W Paper Roll Storage: T0660
3) 48”W Drawing Board Storage: T0700
4) 30”W. Teacher Wardrobe: T2670
5) 48”W Drying Cabinet: T0560 (Kiln Rm)

c. Wall Cabinets: Unless noted otherwise, wall cabinets shall be 12 inches deep and 30
inches high.

1) 21”W, Single Door w/ Adj. Shelves: W0110/ W0120 (l ea. hand)
2) 36”W, Double Door w/ Adj. Shelves: W0100 (x 3 per room)
3) 48”W, double Door w/ Adj. Shelves: W0100 (x 2 per room)

d. Teacher Station:

1) 16”W File Drawer: B4500 (x1 location)
2) 48”W Blind Corner Cabinet w/ Drawer: B3210/ B3220 (see drawings for handing)

e. Countertop:

1) 17’-10”L x 24”D straight P-Lam. counter with 4”H Back and Sidesplashes
2) ‘L’-shaped P-Lam. counter at Teacher Station: 24”D w/ 72”L leg and 27”L return

10. Middle School Music Classroom:
a. Base Cabinets: Unless noted otherwise, base cabinets shall be 24 inches deep.

1) 42”W (Double Door with (2) Drawers: B3170 (x2 locations)
2) 36” W Accessible Vanity: D1120 (x1 Location)
3) 48”W Blind Corner Cabinet: B0210 (x1 Location)

b. Tall Cabinets: Unless noted otherwise, tall cabinets shall be 24 inches deep.

1) 21”W, 1 Type-C + 9 Type-A compartments: I6250 (x2 locations)
2) 21”W, 1Type-C + 6 Type-B Compartments: I6150 (x3 locations)
3) 21”W, 1 Type-C + 1Type-L Compartment: I6440 (x4 locations)
4) 21”W, 2 Type G Compartments: I6350 (x2 locations)
5) 21”W, 1 Type-K Compartment: I6600 (x2 locations)
6) 30”W. Teacher Wardrobe: T2670
7) 48”W x 16”D Folio Storage: T1940 (x 2 locations)

c. Wall Cabinets: Unless noted otherwise, wall cabinets shall be 12 inches deep and 30 inches high.

1) 36”W, Double Door w/ Adj. Shelves: W0110/ W0120 (I ea. hand)
2) 42”W, Double Door w/ Adj. Shelves: W0100 (x 1 per room)
3) 48”W, double Door w/ Adj. Shelves: W0100 (x 1 per room)

d. Teacher Station:

1) 16”W File Drawer: B4500 (x1 location)
2) 48”W Blind Corner Cabinet w/ Drawer: B3210/ B3220 (see drawings for handing)

e. Countertop:

1) 12'-10”L x 24”D straight P-Lam. counter with 4”H Back and Sidesplashes
2) ‘L’-shaped P-Lam. counter at Teacher Station: 24”D w/ 72”L leg and 27”L return

11. Middle School Band/ Chorus Room:

a. Base Cabinets: Unless noted otherwise, base cabinets shall be 24 inches deep.

1) 30”W (Double Door with (2) Drawers: B3170 (x2 locations)
2) 36” W Accessible Vanity: D1120 (x1 Location)

b. Wall Cabinets: Unless noted otherwise, wall cabinets shall be 12 inches deep and 30 inches high.

1) 30”W, Double Door w/ Adj. Shelves: W0110/ W0120
2) 36”W, Double Door w/ Adj. Shelves: W0100

c. Countertop:

1) 5’-10”L x 24”D straight P-Lam. counter with 4”H Back and Sidesplashes
12. Typical Gang Toilet Room:
   a. Countertop.
      1) 6’-6”L x 24”D, Solid Surface with 4”H Back and Sidesplashes

O. Telescoping Stands:
   1. Basis of Design: To establish a minimum standard of quality, specifications are based on
telescopic seating as manufactured by Interkal, Inc. Seating may be provided by the
following or equal:
      a. Universal Telescopic Seating Company
      b. Hussey Seating Company
   2. General: Provide close deck telescopic bleachers, fully automatic
   3. Type: Wall attached with all necessary anchors, fasteners, blocking and panels
   4. Quantity: 870 inclusive of wheelchair spaces. Seating to consist of 3 sections as shown
on the drawings. All seats shall be provided according to the following:
      a. Number of Banks: 1
      b. Number of tiers: 17
      c. Aisles: As shown on drawings.
      d. Rails: Pipe rails on alternating tiers
      e. Wheelchair Cutouts: Minimum 9 wheelchair spaces required. Distribute evenly.
      f. Dimensions:
         1) Row Rise: 11 ½”
         2) Row Spacing: 24”
         3) Open Dimension: 33’-2 ½”
         4) Closed Dimension: 3’-2 5/8”
         5) Overall Height: 16’-4”
   5. Propulsion: Electrically operated, wide track power system, UL listed, incorporating
friction drive rollers as an integral part of the first row horse assembly. The two friction
roller assemblies are linked by a continuous drive shaft, driven by a ½ HP, 208V, e-Phase
motor. The continuous drive shaft shall control the drive roller operation in a straight,
efficient manner.
   6. Accessories:
a. Foot Level Aisles: Provide footrest level aisles at locations and sizes as shown on the plans and approved shop drawings. At center aisles, provide manufacturer’s standard removable aisle rails for on-deck storage.

b. Last Row Closure: Provide and install a properly supported, flush mounted board between the last row of the bleacher and the wall.

c. Wheelchair Seating:

1) Notch Outs: Provide manufactures standard permanent handicap notch out (2’9”) located as shown on architectural plans. Notch outs must be located at section joints only to avoid interference with understructure. Include all fascia panels, front rails. Fascia panels shall have manufacturers standard polydeck finish to match deck board surface

2) Truncations: Provide manufactures standard permanent handicap notch out (2’9”) located as shown on architectural plans. Notch outs must be located at section joints only to avoid interference with understructure. Include all fascia panels, front rails. Fascia panels shall have manufacturers standard polydeck finish to match deck board surface

d. Front Railing: Provide rigid 33 inch high, fixed tubular steel rail with vertical intermediate members to fill design criteria. Rail to be mounted full width at all ADA wheelchair accommodations. Finish shall be a polyester powder coat. Front rails are to be designed to comply with all applicable codes and remain consistent with all other rails not allowing clearance of a 4 inch sphere.

e. End Railings: Provide self-storing, 42 inches high self-storing end guardrails with tubular supports and vertical intermediate members to comply with all code requirements. Rails shall be fitted to each exposed bank end from third row and above with all steel-to-steel connections. Finish shall be a polyester powder coat.

f. Numbering: Provide seat numbers and row letters for sculpture seat modules. Sequence to be determined by architect or owner.

g. End Panels: Provide the manufacturer’s standard 5/8 inch thick finished plywood end panels to match deck board surface. End panels to completely close off bleachers in the stacked position.

h. Center Aisle P-Rail: Provide manufacturer’s standard removable aisle rail for on-deck storage.

i. Vinyl End Curtains: Provide manufacturer’s standard vinyl end curtains to close off under the bleacher units in the extended position. Curtain color is to be selected from manufacturer’s standard offering.

j. Intermediate Steps: All aisles to include manufacturer’s standard intermediate steps. Top of step to be equal distance between upper and lower deck and shall the same material and finish as the bleacher deck. Intermediate steps to also have abrasive strips.
k. Locks: All bleacher sections shall be equipped with master-key cylinders to prevent access to operate bleachers. Locks to be keyed alike and to the building’s system.

7. Fabrication:

a. Continuous Wheel Channel: Wheel channels shall consist of a one-piece formed steel channel welded to the base of a vertical column. Each wheel channel shall be fitted with not less than eight (8) wheels under each moving row for rows 1 to 10, ten (10) wheels under each moving row for rows 11-15, and twelve (12) wheels starting with row 16.

b. Wheels: 3-1/2” diameter with 1-1/8” non-marring soft rubber face with rounded edges designed to protect wood or synthetic floor. Provide 1/2” diameter axle for all wheels.

c. Columns: Electrically welded closed rectangular steel tube, 2” x 3” minimum size, 14 gauge steel fitted with a front and rear welded gussets at the wheel channel.

d. Row Interlocks: Join each row structure front to rear by means of two (2) interacting steel connections, plus automatic gravity row locks.

Lower: Lower track guides shall be an external superslide rod to guarantee positive engagement of vertical supports without binding and assures smooth operation over uneven floor conditions.

Upper: Upper track guides shall completely interlock adjacent understructure support. A welded stop to ensure correct extension of bleacher unit on deck support. Use of bolt and nut stops are not acceptable, due to risk of loosening.

e. Diagonal Braces Structural formed steel truss fitted to rows 4 and beyond. Bracing shall be attached to the rear riser at optimum locations to insure structural integrity. Bracing will be designed and shaped to support a minimum load of 1000(lbs) of both compression and tension forces created when the bleacher is loaded.

f. Deck Supports: Shall be of structural steel, 11 gauge spaced not greater than 60” on center for maximum deck stiffness.

1) Rollers: Every deck support not attached to a vertical post will have an integral nylon roller to avoid steel-to-steel friction points for more efficient operation.

g. Decking: All deck boards shall consist of 19/32” nominal Douglas Fir BC grade plywood with exterior glue and solid crossbands. An extruded aluminum “H” connector shall be placed between plywood panels. Exposed wear surfaces shall be finished with a layer of high Density polyethylene plastic .025 - .030 thick in either a Dark Brown or Light Gray color complimentary to the seat option. Deck finishes, such as clear coat, requiring more than simple touch up to restore it to a new appearance after wear occurs is unacceptable.
h. Welds: All welds shall be made at the factory by welders that are AWS certified on the equipment and process used.

i. Nose Beam: Nose beams shall be one-piece 13-gauge galvanized steel. 13-gauge steel is utilized for the necessary structural integrity to accommodate section lengths up to 25’

j. Rear Riser: Rear risers shall be one-piece formed 14-gauge, grade 50, galvanized steel, with a continuous access joint to fully encapsulate footrest panel for ease of cleaning and additional structural support. 14-gauge roll formed steel is utilized for the necessary structural integrity to accommodate section lengths up to 25’.

k. Splice Plates: Each section joint shall be tied together with two structural steel members per row, employing a minimum of four steel to steel through bolt connections at the nose beam and a minimum of eight steel to steel through bolt connections at the lower steel rear riser. Gauge of splice plates to match the gauge of the nose beam and rear riser. Splice plates employing steel to plywood deck board attachments will not be acceptable. Gauge of splice plates to match the gauge of the nose beam and rear riser. In order to minimize deflections and keep rows in alignment during operation, splice connections shall transfer both axial loads (tension/compression) and bending.

l. Fasteners: All structural connections shall be made with S.A.E. grade 5 or better stress rated bolts. The use of self-tapping bolts is not acceptable.

m. Finish: Steel understructure abraded, cleaned and finished with russet brown water base acrylic paint. Steel risers and nose beams finished with corrosion resistant silver bray matte finish with galvanized alloy painting.

8. Seat Options: Provide sculpture seat modules as follows:

   a. 18-inch wide one-piece individual seating modules shall be constructed of high-density polyethylene

   b. Each module shall have two longitudinal and five transverse internal ribs to provide additional structural integrity and resistance to impact.

   c. Each module shall have a full ½” interlock to the adjacent module both around the perimeter and along the internal ribs to eliminate pinching hazards and assure proper alignment

   d. A steel-to-steel attachment of each module to a minimum 14 gauge galvanized steel nosebeam shall be provided for maximum rigidity. All such mounting hardware shall be concealed

   e. End caps shall be provided at the ends of each bank of seating as well as at each aisle

   f. End caps shall be provided at the ends of each bank of seating as well as at each aisle

   g. Color to be selected from the manufacturer’s standard colors.
P. Window Treatments:

Design Intent: All exterior windows shall be provided with manually operated, light-filtering, roller shades. All interior doors with lite kits, and serving habitable rooms, shall be provided with manually operated, light-blocking roller shades to prevent views into space.

1. Basis of Design: To establish a minimum standard of quality, specifications are based on manually operated roller shades as manufactured by MechoShade Systems, Inc. Equal products accepted.

2. Manually Operated Shades with Single Rollers:

   a. Chain and Clutch Operating Mechanisms: With continuous loop bead chain and clutch that stops shade movement when bead chain is released.

      1) Bead Chains: Stainless Steel.

         a) Loop Length: Full length of roller shade.
         b) Limit Stops: Provide upper and lower ball stops.
         c) Chain Retainer Type: Chain tensioner, for window shades mounted on doors.

      2) Spring Lift—Assist Mechanisms: Manufacturer’s standard for balancing roller-shade weight and lifting heavy roller shades.

         a) Provide for shadebands that weigh more than 10 lbs or for shades as recommended by manufacturer, whichever criteria are more stringent.

   b. Rollers: Corrosion-resistant steel or extruded aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

      1) Roller Drive-End Location: Right side inside face of shade.
      2) Direction of Shadeband Roll: Regular from back of roller.
      3) Shadeband-to-Roller Attachment: Removable spline fitting integral channel in tube

   c. Mounting Hardware: Brackets or endcap, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories and mounting location and conditions indicated.

   d. Shadebands:
1) Exterior Window Shadeband Material: Light-filtering fabric
2) Interior Door Shadeband Material: Light-blocking fabric
3) Shadeband Bottom Hem Bar: Steel of extruded aluminum.
   a) Type: Enclosed in sealed pocket of shadeband material

e. Installation Accessories:

1) Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
   a) Shape: L-shaped
   b) Height: Manufacturer’s standard height required to conceal roller and shadeband, when shade is fully open, but not less than 4 inches.

2) Endcap Covers: To cover exposed endcaps
3) Installation Accessories Color and Finish: As selected from manufacturer’s full range of options.
4) Side Channels: Manufacturer’s standard aluminum 1 5/16 inch by 1 3/16 inch room darkening single channel shall be provided at each jamb of all light-blocking shades.

3. Shadeband Materials:


1) Light Filtering Fabric: Exterior Windows
   a) Source: Roller shade manufacturer
   b) Type: PVC-coated polyester
   c) Weave: Basketweave
   d) Thickness: 14 mils minimum.
   e) Weight: 14 oz. /sq. yd. minimum
   f) Roll Width: 84 inches
   g) Orientation on Shadeband: Up the bolt.
   h) Openness Factor:

2) For South, Southeast, and Southwest facing windows: 3%

3) For other windows: 5%
a) Color: As selected by architect from full range of manufacturer’s standard options.

4) Light-Blocking Fabric: Interior Doors

a) Source: Roller-shade manufacturer
b) Type: Fiberglass textile with PVC film bonded to both sides
c) Thickness: 14 mils minimum
d) Weight: 14 oz./sq. yd. minimum
e) Roll width: 84 inches
f) Orientation on Shadeband: Up the bolt
g) Features: Washable
h) Color: As selected by architect from manufacturer’s full range of options.

4. Roller Shade Fabrication:

a. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain loop devices; lead content of components, and warning labels.
b. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg. F.

1) Between (inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less ¼ inch per side or ½ inch total, plus or minus 1/8 inch. Length equal to head-to-sill or –floor dimension of opening in which shade is installed less ¼ inch plus or minus 1/8 inch.

2) Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

c. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:

1) Vertical Shades: Where width-to-length ratio of shadeband is equal or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
F SPECIAL CONSTRUCTION AND DEMOLITION

F10 SPECIAL CONSTRUCTION

No Work

F20 SELECTIVE DEMOLITION

F2010 BUILDING ELEMENTS DEMOLITION

A. LEED-S V.4: Submittals shall include certified documentation of material diversions from landfills. This project has a diversion goal of 90 percent or higher
   
   a. This Section of Work contributes to LEED credits MR.P2 and MR.5

B. Demolition scope shall be as defined within the Contract Drawings. Work includes the complete razing of the existing single-story, 135,000 sf White Brook Middle School building, including mechanical mezzanine and natatorium basement.

C. Hazardous Materials: The Building is known to contain hazardous materials, including asbestos, lead paint, fluorescent light ballasts and lamps, electronic goods, and assumed Freon refrigerant and PCB’s. Refer to the Hazardous Materials Report for extent of regulated materials abatement required.

D. Soils Remediation: No scope. Soils have been tested and found to be clean.

G BUILDING SITEWORK

G10 SITE PREPARATION

G1010 SITE CLEARING

A. Site clearing will be limited to stripping of turfs, topsoil and earth material as required to accommodate the proposed building and newly established finish grades.

G1020 SITE DEMOLITION AND RELOCATIONS

A. Construction Fencing: Provide temporary chain link fencing, min. 8 ft. high, around entire work area. Fencing shall be equipped with vehicle gates and man gates as necessary. Contractor shall arrange fencing to allow maintained paths of egress from the building to a safe location on the public way at all times. Where construction operations occur above egress routes, overhead protection shall be provided and inspected daily for continuity.

B. Tree Protection: Contractor shall provide temporary protection around trees scheduled to remain. Barriers shall be set in place 2 ft. outside the drip line.
C. Pavement Demolition

1. Pavement shall be removed to extent indicated on Drawings, or as required to accommodate new Work.
2. Separate areas of pavement to be removed from areas of pavement to remain, by use of saw-cut joints.

D. Granite Curbing: Remove granite curbing to extent indicated on Drawings, or as required to accommodate new Work. Removed sections of granite curbing shall be salvaged for re-use on site.

G1040 HAZARDOUS WASTE REMEDIATION

A. No scope. The soils at the site have been tested and found to be clean.

G1070 EARTHWORK

A. Preloading Requirements

1. Prior to the start of construction, the General Contractor shall conduct a Preconstruction Condition Survey of residential buildings abutting the site.

2. The contractor shall clear and grub the entire building footprint and strip topsoil and debris from the building subgrade. All trees and stumps shall be removed in their entirety.

3. Following the installation of Stone Aggregate Columns in accordance with the requirements of Section 023100, the Contractor shall proof compact the existing soil subgrade within the building pad area prior to the placement of any new fill.

4. The contractor shall place, monitor and remove preload fill, to limit post construction settlement.

5. Contractor shall monitor building settlement points on existing building and settlement platforms throughout preload period.

6. The Contractor shall use suitable soil from off-site sources as fill to achieve final grades.

7. The Contractor shall make excavations in such a manner and to such widths that they will give suitable room for performing the Work and shall furnish and place all sheeting, bracing and supports as necessary.

8. The Contractor shall control erosion, groundwater and surface water run off such that the excavations and areas of fill placement are firm and dry and in all respects acceptable. The Contractor shall prevent the migration of sediment off site, and collect and properly dispose of all discharge water in accordance with local and state requirements and permits.
9. The Contractor should note that groundwater was encountered within five feet of the ground surface in some of the geotechnical investigations. The Contractor shall make provisions in his bid to perform any dewatering required to maintain a dry and stable subgrade, and to complete the work. The presence of groundwater shall not constitute a change in the contract price.

10. The Contractor shall backfill the site to the final grades and compact the subgrade in intermediate layers to the requirements set forth in this Section.

11. General Preloading Requirements:

   a. Sand and Gravel Fill shall be a natural soil obtained from an off-site commercial source. It shall be free of ice, snow, roots, sod, rubbish, oil, hazardous material and other deleterious or organic matter. It shall be graded within the following limits:

<table>
<thead>
<tr>
<th>U. S. Standard Sieve Size</th>
<th>Percent Finer by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 inch</td>
<td>100</td>
</tr>
<tr>
<td>½ inch</td>
<td>50-85</td>
</tr>
<tr>
<td>No. 4</td>
<td>40-75</td>
</tr>
<tr>
<td>No. 40</td>
<td>10-35</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-8</td>
</tr>
</tbody>
</table>

   b. Gravel Base Course Fill shall be a natural soil obtained from an off-site commercial source. It shall be free of ice, snow, roots, sod, rubbish, oil, hazardous material and other deleterious or organic matter. It shall be graded within the following limits:

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
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<td>100</td>
</tr>
<tr>
<td>½ inch</td>
<td>50-85</td>
</tr>
<tr>
<td>No. 4</td>
<td>40-75</td>
</tr>
<tr>
<td>No. 10</td>
<td>30-60</td>
</tr>
<tr>
<td>No. 40</td>
<td>10-35</td>
</tr>
<tr>
<td>No. 100</td>
<td>5-20</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-8</td>
</tr>
</tbody>
</table>

   c. Granular Fill shall be a natural soil obtained from an off-site commercial source. It shall be free of ice, snow, roots, sod, rubbish, oil, hazardous material and other deleterious or organic matter. It shall be graded within the following limits:

<table>
<thead>
<tr>
<th>U. S. Standard Sieve Size</th>
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</tr>
</thead>
<tbody>
<tr>
<td>4 inch</td>
<td>100</td>
</tr>
<tr>
<td>No. 10</td>
<td>30-90</td>
</tr>
<tr>
<td>No. 40</td>
<td>10-70</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-15</td>
</tr>
</tbody>
</table>
d. Sand and Gravel and Granular Fill materials obtained from off-site sources shall be acceptable for use only when accompanied by an LSP Opinion stating that the soils do not contain detectable quantities of oil and/or hazardous materials.

e. It is the intent of the Owner to reuse existing on site topsoil, where ever possible. To facilitate this purpose the Contractor should strip the existing topsoil from the site prior to the importation of any new fill. Existing topsoil should be stockpiled on site until needed. If additional topsoil needs to be imported to meet project requirements, it should meet the following requirements. Topsoil (Loam) shall consist of fertile, friable natural topsoil without admixture of subsoil, refuse, or other foreign matter, and come from a well-drained site. It shall be a soil as determined by mechanical analysis (ASTM D-422), based on the “USDA Classification System,” with textural properties as follows:

<table>
<thead>
<tr>
<th>Soil Component Type</th>
<th>Range of Percentage in Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clay (less than 0.002 mm dia.)</td>
<td>max. 2.5%</td>
</tr>
<tr>
<td>Silt (0.002-0.05 mm dia. range)</td>
<td>5% to 20%</td>
</tr>
<tr>
<td>Sand (0.05-2.0 mm dia. range)</td>
<td>60% to 90%</td>
</tr>
<tr>
<td></td>
<td>- 25% fine</td>
</tr>
<tr>
<td></td>
<td>- 40% medium</td>
</tr>
<tr>
<td></td>
<td>- 35% coarse</td>
</tr>
<tr>
<td>Acidity</td>
<td>6.0 to 7.0 (per ASTM D-4972)</td>
</tr>
<tr>
<td>Organic Matter</td>
<td>min. 4% max. 8%</td>
</tr>
</tbody>
</table>

f. Topsoil shall be screened to remove all stumps, roots, weeds, litter and any other deleterious material, including stones over ½” in any dimension.

g. Crushed Stone shall be durable crushed rock or crushed gravel stone, free of ice, snow, sand, silt, clay, loam, shale, or other deleterious matter, graded within the following limits:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Finer by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>h. 1 inch</td>
<td>100</td>
</tr>
<tr>
<td>3/4 inch</td>
<td>90-100</td>
</tr>
<tr>
<td>1/2 - inch</td>
<td>10-50</td>
</tr>
<tr>
<td>3/8 - inch</td>
<td>0-20</td>
</tr>
<tr>
<td>No.4</td>
<td>0-5</td>
</tr>
</tbody>
</table>

i. Dense-graded crushed stone shall consist of hard, durable particles of stone or gravel and natural or crushed sand that conforms to section M2.01.7 of the Standard Specifications and shall conform to the following grade requirements:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Finer by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. 3 inch</td>
<td>100</td>
</tr>
<tr>
<td>1-1/2 inch</td>
<td>70-100</td>
</tr>
<tr>
<td>3/4 inch</td>
<td>50-85</td>
</tr>
<tr>
<td>No.4</td>
<td>30-55</td>
</tr>
</tbody>
</table>
j. The non-woven geotextile shall meet or exceed the property values specified herein. It shall be comprised of polymeric yarns or fibers or weld or drawn strands oriented into stable network which will retain its structure during handling, placement, and long term service. The non-woven geotextile shall be capable or withstanding direct exposure to sunlight for 30 days with no measurable deterioration. It will be used as shown on the drawings and shall consist of polypropylene and/or polyethylene material which meet the following average roll values:

<table>
<thead>
<tr>
<th>Fabric Property</th>
<th>Test Method</th>
<th>Fabric Requirement (min.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grab Tensile Strength, lbs</td>
<td>ASTM-D-4632</td>
<td>110</td>
</tr>
<tr>
<td>Burst Strength, psi</td>
<td>ASTM-D-3786</td>
<td>100</td>
</tr>
<tr>
<td>(Diaphragm Method)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trapezoidal Tear, lbs</td>
<td>ASTM-D-4533</td>
<td>50</td>
</tr>
<tr>
<td>Method - 14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equivalent Opening Size, CW-02215</td>
<td>(Corps of Engineers)</td>
<td>70 max</td>
</tr>
<tr>
<td>US Standard Sieve</td>
<td>ASTM-D-4833</td>
<td>70</td>
</tr>
</tbody>
</table>

k. Riprap shall meet requirements for Dumped Riprap as specified in the Commonwealth of Massachusetts, Massachusetts Highway Department, Standard Specifications for Highway and Bridges, Section M2.02.2.

B. Layout and Grades

1. The Contractor shall establish permanent bench marks and replace as directed any, which are destroyed or disturbed. The Contractor shall maintain sufficient reference points at all times during construction to properly perform site grading. The existing survey benchmark shall be protected throughout the construction project.

2. Finished grades, contours, and elevations indicated on the Drawings describe final surface elevation for completed construction. The words “finished grade” as used herein shall mean final grade elevations indicated on the Drawings. Spot elevations shall govern over proposed contours. Where not otherwise indicated, project site areas shall be given uniform slope between points and existing established grades.

C. Quality Assurance

1. Field inspection and testing may be performed by the Engineer at the Owner’s expense to supplement the Contractor’s Quality Control testing. Classification of all materials will be made by the Engineer whose decision shall be final and binding on the Contractor.

2. The Contractor shall be responsible for managing and tracking all materials excavated and placed in stockpiles for testing.
3. The Contractor shall perform in place density tests in accordance with ASTM D2922 or D3017 as the Work progresses, to determine the degree of compaction. Any corrective work required as a result of such tests, such as additional compaction, or a decrease in the thickness of layers, shall be performed by the Contractor at no additional expense to Owner. In place density testing shall be made at the Contractor’s expense by a qualified geotechnical testing laboratory.

4. The Engineer’s duties do not include the supervision or direction of the actual work by the Contractor, his employees or agents. Neither the presence of the Engineer nor any observation and testing by the Engineer shall excuse the Contractor from defects discovered in his Work at that time or subsequent to the testing.

5. Contractor shall perform in place density testing at a minimum frequency of one test per lift but no less than one test per 200 cubic yards of material placed in any one lift. Compaction testing will be performed in accordance with ASTM D1557, D2922, and D3017.

6. Subgrades shall be approved for compactness and material composition prior to placing subsequent lifts. If inspections indicate Work does not meet specified requirements, the work shall be removed, replaced, and compacted at no additional cost to Owner.

D. Regulatory Requirements

1. All excavations shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926.650 Subpart P), State, and local requirements. Where conflict between OSHA, State, and local regulations exists, the most stringent requirements shall apply.

E. Materials

1. Sand and Gravel Fill shall be used as fill beneath footings, the upper 12 inches below floor slabs, the upper 12 inches below pavement, and for other areas shown on the plans. It shall be a natural soil obtained from an off-site commercial source. It shall be free of ice, snow, roots, sod, rubbish, oil, hazardous material and other deleterious or organic matter. It shall be graded within the following limits:

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<td>10-35</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-8</td>
</tr>
</tbody>
</table>

2. Granular Fill shall be used as fill for excavations at depths greater than 12 inches below footings, floor slabs and pavements, and for other areas shown on the plans as required to achieve final grades. It shall be a natural soil obtained from an off-site commercial source. It shall be free of ice, snow, roots, sod, rubbish, oil, hazardous material and other deleterious or organic matter. It shall be graded within the following limits:
3. Sand and Gravel and Granular Fill materials obtained from off-site sources shall be acceptable for use only when accompanied by an LSP Opinion stating that the soils do not contain detectable quantities of oil and/or hazardous materials.

4. It is the intent of the Owner to reuse existing on site topsoil, where ever possible. To facilitate this purpose the Contractor should strip the existing topsoil from the site prior to the importation of any new fill. Existing topsoil should be stockpiled on site until needed. If additional topsoil needs to be imported to meet project requirements, it should meet the following requirements. Topsoil (Loam) shall consist of fertile, friable natural topsoil without admixture of subsoil, refuse, or other foreign matter, and come from a well-drained site. It shall be a soil as determined by mechanical analysis (ASTM D-422), based on the “USDA Classification System,” with textural properties as follows:

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<thead>
<tr>
<th>Soil Component Type</th>
<th>Range of Percentage in Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clay (less than 0.002 mm dia.)</td>
<td>max. 2.5%</td>
</tr>
<tr>
<td>Silt (0.002-0.05 mm dia. range)</td>
<td>5% to 20%</td>
</tr>
<tr>
<td>Sand (0.05-2.0 mm dia. range)</td>
<td>60% to 90%</td>
</tr>
<tr>
<td></td>
<td>- 25% fine</td>
</tr>
<tr>
<td></td>
<td>- 40% medium</td>
</tr>
<tr>
<td></td>
<td>- 35% coarse</td>
</tr>
<tr>
<td>Acidity</td>
<td>6.0 to 7.0 (per ASTM D-4972)</td>
</tr>
<tr>
<td>Organic Matter</td>
<td>min. 4% max. 8%</td>
</tr>
</tbody>
</table>

5. Topsoil shall be screened to remove all stumps, roots, weeds, litter and any other deleterious material, including stones over ½” in any dimension.

6. Crushed Stone shall be durable crushed rock or crushed gravel stone, free of ice, snow, sand, silt, clay, loam, shale, or other deleterious matter, graded within the following limits:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Finer by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - inch</td>
<td>100</td>
</tr>
<tr>
<td>3/4 - inch</td>
<td>90-100</td>
</tr>
<tr>
<td>1/2 - inch</td>
<td>10-50</td>
</tr>
<tr>
<td>3/8 - inch</td>
<td>0-20</td>
</tr>
<tr>
<td>No. 4</td>
<td>0-5</td>
</tr>
</tbody>
</table>

7. Riprap shall meet requirements for Dumped Riprap as specified in the Commonwealth of Massachusetts, Massachusetts Highway Department, Standard Specifications for Highway and Bridges, Section M2.02.2.
G20 SITE IMPROVEMENTS

G2010 ROADWAYS

A. Provide new 24’ wide asphalt driveways as shown on plans. Bituminous to be 4” thick MDOT hot mix asphalt, anticipate a 12” deep compacted aggregate subbase according to the geotech requirements.

B. All Roadways to receive 6” high exposed granite curbing. Curbing to be mortared and place in concrete footing.

G2020 PARKING LOTS

A. Design Requirements: Provide asphalt aggregate mixture as recommended by local or state paving authorities to suit project conditions. Use locally available materials and gradations which meet standard state highway specifications and exhibit satisfactory records of previous installations.

B. Regulatory Requirements:

1. Conform to applicable requirements for paving work on public property.

2. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Use temporary striping, flagmen, barricades, warning signs, and warning lights as required.

C. Materials:

1. General: Use materials and gradations that have performed satisfactorily in previous installations.

2. Base Course: As indicated on Drawings, complying with applicable state highway specifications regarding source, quality, gradation, liquid limit, plasticity index and mix proportioning.

   a. Unless otherwise specified in applicable state highway specifications, provide base course aggregate fabricated from minimum 30 percent recycled rubble or concrete.

3. Asphalt Cement: Fabricated from minimum 15 percent recycled asphalt and complying with ASTM D 3381; Table 2 AC-10, AC-20, or AC-30, viscosity grade, depending on local mean annual air temperature as indicated below:
TEMPERATURE CONDITION | ASPHALT GRADES
---|---
Cold, mean annual air temperature at 45 degrees F or lower | AC-10 85/100 pen.
Warm, mean annual air temperature between 45 degrees F and 75 degrees F | AC-20 60/70 pen.
Hot, mean annual air temperature at 75 degrees F or higher | AC-30

4. **Prime Coat**: A medium curing cut-back asphalt or an asphalt penetrating prime coat consisting of either ASTM D 2397 or ASTM D 2399, MC-30 or SS-1h.

5. **Tack Coat**: Emulsified asphalt; ASTM D 2397 or ASTM D 2399, SS-1h, CSS-1, or CSS-1h, diluted with one part water to one part emulsified asphalt.

6. **Mineral Filler**: Rock or slag dust, hydraulic cement, or other inert material complying with AASHTO M-17/ASTM D 242, if recommended by applicable state highway department standards.

7. **Asphalt-Aggregate Mixture**: Unless otherwise indicated on Drawings, the Design Mix shall have a minimum stability based on a 50-blow Marshall complying with ASTM D 1559 of 1000 pounds with a flow between 8 and 16. The Design Mix shall be within sieve analysis and bitumen ranges below:

**D. Equipment**

1. Maintain equipment in satisfactory operating condition and correct breakdowns in a manner that will not delay or be detrimental to progress of paving operations

**E. Auxiliary Materials**

1. **Joint Sealant**: ASTM D 6690 or AASHTO M 324, Type II or III, hot applied, single component, polymer-modified bituminous sealant.

**F. Pavement Markings**

1. **Manufacturers**: Subject to compliance with project requirements, manufacturers offering specified Products which may be incorporated into the Work include, but are not limited to, the following:
   a. Pittsburgh Paints; Pittsburgh, PA
   b. Sherwin-Williams Company; Cleveland, OH
   c. McCormick Paint Works; Rockvill, MD
2. Materials:
   
a. Ready-mixed; pigments fully ground maintaining a soft paste consistency, capable of readily and uniformly dispersing to a complete homogeneous mixture providing good flowing and brushing properties capable of drying or curing free of streaks or sags. Dry to traffic and touch in 2 hours.


1. 1st Coat:
   
a. PPG: ZoneLine 100% Acrylic Traffic Marking Paint, 11-XX; MDF 7 mils.


2. 2nd Coat:
   
a. PPG: ZoneLine 100% Acrylic Traffic Marking Paint, 11-XX; MDF 7 mils.


G2030 PEDESTRIAN PLAZAS AND WALKWAYS

A. All ADA curb cuts to be achieved with a transition curb and raised dome detectable warning strip.

B. Concrete Unit Paving: Basis of Design Unilock 6 x 12 pavers, Landscape Architect to select from full range of colors, over 12” compacted aggregate subbase compacted in 3” lifts maximum. Unit paving to received edge restraints at all edges. Pavers to receive a sand setting bed.

G2040 SITE DEVELOPMENT

A. Bike Storage

   1. Bike rack allowance: 12 bike racks-basis of design: Landscape Forms The Loop.

B. Decorative Benches

   1. Benches shall be curved metal design with redwood seat slats and back, with cast iron leg/supports for in-ground mounting: leg/support finish to be black powder coat, all fasteners to be stainless steel. Bench shall have supports set in concrete footing as detailed. Installation shall be completed in accordance with manufacturer’s instructions.

C. Trash Receptacles

   1. Trash Receptacles shall be decorative square shaped, welded metal rod style, with 30 gallon plastic liner, and hinged door for access to liner: finish to be black powder coat.
Receptacle shall have surface mount tabs and be bolted to ground surface as detailed. Installation shall be completed in accordance with manufacturer’s instructions.

D. Tire Stops

1. Tire stops shall be steel reinforced, precast concrete 5000 psi minimum, 6’ long x 9” wide, with minimum two ¾” pre-drilled holes for anchoring. The tire stops shall include two #5x24” reinforcing anchor bars set in pre-drilled holes and pounded thru pavement. Anchor bars shall be countersunk at least 1” deep and hole shall be filled with mortar.

E. Traffic Control Signs

1. All traffic control signs shall be reflective aluminum and conform to MassDOT Standard Specifications.

2. Handicap/Accessible parking signs and pavement markings shall be as per ADA and Mass. Architectural Access Board latest codes and standards.

3. Posts to be standard 8’ tall steel U-channel posts with dark green baked enamel finish.

G2050 ATHLETIC AND PLAYGROUND AREAS

A. Exterior tennis courts shall be surfaced with 3” MDOT hot mix asphalt over a 12” compacted aggregate subbase. This area is to receive line striping for five (5) tennis courts and five sets of nets and posts. The tennis court area is to be surrounded with 10’ height black vinyl coated chain link fence with minimum of four single 7’ height access gates.

B. Playground areas shall have rubberized surfacing surrounded by cast in place concrete walks or edging. Rubberized surface thickness and cushion attenuation shall follow safety standards for fall height.

C. Play equipment for the pre-K play area shall include assembled structure with platforms, poly-log balance beam and boulders, slides and climbers, double tot swing, tot see-saw, curved balance beam, crawl-thru log, and fossil sand table.

D. Play equipment for the elementary play area shall include natural elements such as boulders, log beams, concrete boulder structures with rope bridges and climbing nets, individual climber structures, track-ride, balance challenge course. All rope netting shall have steel core.

G2080 LANDSCAPING

A. All planting areas shall receive min. 6” loam. Lawn areas shall be seeded with hydroseed blends. Erosion control fabric to be provided on all slopes 3:1 or greater.

B. Athletic field areas shall receive min. 6” loam and be seeded with athletic hydroseed blends.

C. All trees shall be min. 3” caliper and balled and burlapped.
D. Tree planting soils shall be amended to 8-10% organic content.

E. Lawn planting soils shall be amended to 4-5% organic content.

G30 SITE MECHANICAL UTILITIES

G3010 WATER SUPPLY

A. Domestic Water: Provide labor, materials, and equipment necessary to construct the exterior water system complete, including connections to existing pipelines and testing, all as indicated on the Drawings and as specified, including but not limited to the following

1. Installation of ductile iron pipe, fittings, accessories, and appurtenant work, at the locations and to the lines and grades indicated on the Contract Drawings.

2. The installation of hydrants, gate valves and boxes and concrete thrust blocks.

3. Furnishing and installation of all materials required to connect to existing water mains, replace existing services, install new gate valves, remove existing gate valves, install corporation cocks, saddles, curb stops, service boxes, and abandoning of the existing water system (if applicable), all as shown on the Contract Drawings. All valves, 24 inches and larger shall be butterfly valves. All abandoned pipes shall be cut and capped at the main.

4. In accordance with 528 CMR 12.00, work on the fire protection system, including hydrants and exterior underground piping, shall be performed by a Licensed Fire Protection Sprinkler Systems Contractor. The fire protection exterior underground piping will terminate at the valved tee connection to the water distribution system. The tee and valve will not be considered part of the fire protection system work

B. Unless otherwise indicated on the Drawings, exterior water lines shall be installed from a point 10 feet outside the building foundation walls to the potable water source

C. Ductile Iron Pipe and Fittings

1. General: Provide piping materials and factory fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Engineer to comply with installation requirements. Provide pipe fittings and accessories of same materials and class as pipes with joining method, as indicated. The piping shall be manufactured by an established manufacturer of good reputation in the industry and in a permanent plant adapted to meet all the design requirements of the pipe.

   a. Ductile iron pipe shall be that of a manufacturer who can demonstrate at least five years of successful experience in manufacturing ductile iron pipe. The pipe shall be equipped with push on type, restrained joint, or mechanical joints, as required.

   b. All ductile iron water pipe shall conform to American Water Works Association (AWWA) C150 and AWWA C151.
The ductile iron pipe shall be Class 52 Class and furnished in minimum nominal 18-foot lengths, with Push-on or Mechanical Joints as manufactured by U.S. Pipe and Foundry Company, Atlantic States Cast Iron Pipe Co., Clow Corporation, or approved equal with gaskets conforming to AWWA C111 "Rubber Gasket Joints". A minimum of two brass wedges per joint shall be used to maintain conductivity and facilitate lock-on.

d. All ductile iron pipes shall be rated for a minimum operating pressure of 350 psi.

e. The exterior of ductile iron pipe shall be coated with a layer of arc-sprayed zinc per ISO 8179. The mass of the zinc applied shall be 200 g/m2 of pipe surface area. A finishing layer asphaltic topcoat shall be applied to the zinc. The mean dry film thickness of the finishing layer shall not be less than 3 mils. with a local minimum not less than 2 mils. The zinc coating system shall conform to ISO 8179-1 “Ductile iron pipes-External zinc-based coating-Part 1: Metallic zinc with finishing layer. Second edition 2004-06-01.”

f. The ductile iron water pipe shall be double cement lined inside and then asphalt seal coated in accordance with AWWA C104 and AWWA C151. The pipe shall be furnished along with necessary materials and equipment recommended by the manufacturer for use in joining pipe lengths and fittings.

g. All water pipe shall be encased in polyethylene film when the trench is backfilled with control density fill.

h. Fittings shall be ASTM A-536 ductile iron with mechanical joint fittings. All fittings 3 inches through 48 inches in diameter shall meet or exceed the requirements of AWWA C110. Compact fittings shall be ductile iron meeting or exceeding the requirements of AWWA C153. Fittings shall have the same lining and coating as the pipe specified above. All fittings shall be marked with the weight and shall have distinctly cast upon them the pressure rating, the manufacturer's identification, nominal diameter of openings and the number of degrees or fraction of the circle on all bends. All fittings 4 through 24 inches shall be Class 350. All fittings greater than 24 inches shall be as specified above except they shall be Class 250. Compact fittings shall only be used in sizes 4 through 24 inches. Fittings shall conform to the weights, excluding accessories, and dimension shown in the latest edition of the Handbook of Ductile Iron Pipe and come complete with all joint accessories as required. All accessories (gland, gaskets, T-bolts, and nuts) shall be in accordance with AWWA C111. All mechanical joint bolts (T-bolts) shall be Cor-Ten or equal.

i. In order to provide positive joint restraint, valve anchor tees valves and restrained joints shall be used on fire services and on the 6-inch branch connections for hydrants.

j. Caps and plugs installed in all new work as indicated on the Contract Drawings shall be provided with a threaded corporation or bleeder valve so that air and water pressure can be relieved prior to future connection.

k. Contractor shall provide all adapters and fittings such as transition couplings, as determined in the field, necessary to complete all cross connections, whether or not specifically stated in the Contract Drawings and Specifications.

l. All pipe shall be marked with the class, thickness designation, and initials of the manufacturer.
m. If required the manufacturer shall supply the Engineer with certificates of compliance with these Specifications and certification that each piece of ductile iron pipe has been tested at the foundry with the Ball Impression Test, Ring Bending, or equal.

n. Thrust blocks shall be used at all bends and fittings as shown on the details. In addition, all bends and fittings shall be restrained with Megalug Series 1100 mechanical joint restraint. In the event that the use of thrust blocks is not practical or allowed, the Contractor shall provide an alternate method of joint restraint, at no additional cost to the owner, as approved and/or as directed by the Engineer. Restraint length calculations and restrained joint locations shall be provided by the contractor and submitted to the engineer for review. Restraint length values shall be calculated per the manufacturer’s standards.

1) Restraint for standardized mechanical joints shall be incorporated in the design of the follower gland and shall impart multiple wedging action against the pipe, increasing its resistance as the pressure increases. The assembled joint shall maintain its flexibility after burial and shall maintain its integrity by a controlled and limited expansion of each joint during the wedging action. Restraining glands shall be manufactured of high strength ductile iron conforming to the requirements of ASTM A536, Grade 65-45-12. Wedging mechanisms shall be manufactured of ductile iron, heat treated to a hardness of 370 BHN minimum. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee head bolts conforming to the requirements of ANSI/AWWA A21.11/C111 and ANSI/AWWA A21.53/C153 of latest revision. Twist-off nuts shall be incorporated in the design of the wedge activation screws to ensure proper torque. The mechanical joint restraining device shall have a water working pressure rating of 350 psi minimum (in sizes 4” thru 16”) with a safety factor of at least 2:1 against separation when tested in a dead-end situation.

2) Restraint for push-on ductile iron pipe shall consist of a wedge action restraint ring on the spigot joined to a split ductile iron ring behind the bell. The restraint ring shall have individually actuated wedges that increase their resistance to pull-out as pressure or external forces increase. The restraint ring and its wedging components shall be made of minimum grade 65-45-12 ductile iron conforming to ASTM A536. The wedges shall be heat treated to a minimum hardness of 370 BHN. Torque limiting twist off nuts shall be used to ensure proper actuation of the restraining wedges. The split ring shall be made of a minimum grade of 65-45-12 ductile iron conforming to ASTM A536. The connecting tie rods that join the two rings shall be made of low alloy steel that conforms to ANSI/AWWA C111/A21.11. The assembly shall have a rated pressure with a minimum two to one safety factor of 350 PSI in the sixteen-inch size and below 250 PSI in the eighteen through thirty-six-inch sizes. Push on joints on ductile iron pipe shall be restrained with Megalug Series 1700 restraint harness.

o. Insulation shall be manufactured by Thermal Pipe Systems, Atlas Insulation, or Insulated Piping Systems Inc., or other approved manufacturer. Insulation shall be factory foamed-in-place polyurethane foam insulation having nominal thickness of 1 1/2-inch, with an in-place density of 2.5 pcf, and a "K" factor of 0.16 BTU*in./hr.*°F*sq. ft. Straight joints between insulated pipe lengths and the end sections of non-insulated pipe shall be sealed with heat shrinkable wrap-around polyethylene as supplied by manufacturer and installed in field by Contractor. Insulation jacket shall be 20-gauge corrugated aluminum preformed to be fastened...
with stainless steel screws and bands. Jacket shall have one layer of one mil polyethylene film with a protective coat of 40-pound virgin Kraft paper to act as a moisture and galvanic corrosion barrier.

p. Pipe for use with split couplings shall be as specified except that the ends shall not have bells or beads but shall have cast or machined shoulders or grooves as necessary for the couplings to be used and shall conform to the specifications of the manufacturer of the couplings. If split couplings are used with grooved ductile-iron pipe, the minimum pipe wall thickness shall be as follows:

<table>
<thead>
<tr>
<th>Nominal Pipe Size (In.)</th>
<th>Thickness Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-12</td>
<td>53</td>
</tr>
<tr>
<td>14-18</td>
<td>54</td>
</tr>
<tr>
<td>20</td>
<td>55</td>
</tr>
<tr>
<td>24</td>
<td>56</td>
</tr>
</tbody>
</table>

q. Pipe for use with sleeve-type couplings shall be as specified except that the ends shall be plain (without bells or beads). The ends shall be cast or machined at right angles to the axis.

D. Couplings and Adapters For Ductile Iron Pipe

1. Sleeve type couplings for plain end pipe shall be provided with plain rubber gaskets and steel, tee head bolts with nuts. Couplings shall be Dresser style 38 or 138, furnished preassembled, as manufactured by Dresser Industries, Inc., Smith Blair, Coupling Systems, Inc., or equal.

2. Couplings or adapters as required for connecting existing pipe to new pipe or new pipe to new pipe shall be furnished as required and designed for compatibility with the pipe and operating pressures encountered. Couplings shall be Dresser Style 162 as manufactured by Dresser Industries Inc., or equal. Flanged adapters shall be Dresser Style 128, or equal. Couplings for ductile iron to cast iron pipe shall be Style 53, and for ductile iron to transite pipe shall be style 153, as manufactured by Dresser Industries, Inc., or as manufactured by Smith Blair, Coupling Systems, Inc. or equal. Transition couplings shall be Style 162 as manufactured by Dresser Industries, Inc. or approved equal.

3. Split couplings may be used for connecting gray cast iron or ductile iron. If split couplings are used with grooved ductile iron pipe, the minimum pipe wall thickness shall be as specified. Split couplings shall be made of malleable iron and shall be suitable for use with grooved-end or shouldered-end, cast iron pipe. They shall be Victaulic couplings made by the Victaulic Company of America, Elizabeth, New Jersey; Gruvagrip couplings made by Gustin-Bacon Manufacturing Company, Kansas City, Missouri; Groove couplings made by Eastern Malleable Iron Company, Pittsburgh, Pennsylvania; or equal products.

4. Flexible Couplings: Sleeve type couplings for plain end ductile iron pipe shall be provided with plain rubber gaskets and steel, track head bolts with nuts.
5. Couplings shall be furnished pre-assembled by the manufacturer.

6. Couplings shall be given a shop coat compatible with the same outside coating as the pipe specified above.

7. All couplings shall be furnished with the pipe stop removed.

8. Couplings shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe. The gaskets shall have metallic tips to provide electrical continuity through the joint.

9. The Contractor shall provide suitable filling rings where the layout of the flanged piping is such as to necessitate their use. In materials, workmanship, facing, and drilling, such rings shall conform to the 125-pound ANSI Standard. Filling rings shall be of suitable length with nonparallel faces and corresponding drilling, if necessary, to ensure correct assembly of the adjoining piping or equipment.

10. Couplings for exposed pipe shall be of steel and shall be Dresser Style 38, Smith-Blair Style 411, Baker Allsteel, or equal. The couplings shall be provided with steel bolts and nuts.

11. At the Contractor's option, flexible connections in the piping shall be sleeve-type couplings, split couplings or mechanical joint pipe as herein specified.

E. Inspection, Tests, and Acceptance For Ductile Iron Pipe

1. All pipe delivered to the job site shall be accompanied by test reports certifying that the pipe and fittings conform to "AWWA Standard for Ductile Iron Pipe, for Water and Other Liquids" (AWWA H3) and (AWWA C151).

2. All tests shall be made in accordance with the methods prescribed by the above mentioned AWWA Standards, and the acceptance or rejection shall be based on the test results.

3. Pipe which does not conform to the requirements of this contract shall be immediately removed and replaced by the Contractor.

4. All ductile iron pipe to be installed under this Contract may be inspected at the foundry for compliance with these Specifications by an independent testing laboratory selected by the Owner. The Contractor shall require the manufacturer's cooperation in these inspections. The cost of foundry inspection of all pipe approved for this Contract, plus the cost of the inspection of a reasonable amount of disapproved pipe, will be borne by the Owner.

F. Flanged Joints For Ductile Iron Pipe

1. For flanged joints, gaskets shall be ring gaskets of rubber with cloth insertion. Gaskets twelve (12)-inches in diameter and smaller shall be 1/16-inch thick, gaskets larger than twelve (12)-inch shall be 3/32-inch thick.

2. Flanged joints shall be made with bolts, bolt studs with a nut on each end, or studs with nuts where the flange is tapped. The number and size of bolts shall conform to the same ANSI Standard as the flanges. Bolts and nuts shall, except as otherwise specified or noted on the Contract Drawings, be Grade B conforming to the ASTM Standard Specification for Carbon Steel, Externally and Internally Threaded Standard Fasteners, Designation A307. Bolts and studs shall be of the same quality as machine bolts. Flanged ductile iron pipe from 3 to 48-inches in diameter shall be classified by Underwriters Laboratories Inc. in accordance with AWWA C115.
G. PVC Water Pipe

1. General: Provide pipes of the following materials of class indicated. Provide pipe fittings and accessories of same materials and class as pipes with joining method, as indicated. The piping shall be manufactured by an established manufacturer of good reputation in the industry and in a permanent plant adapted to meet all the design requirements of the pipe.

2. PVC pipe used for water mains shall be polyvinyl chloride (PVC) pipe, Class 150 with integral thickened wall bells, as manufactured by Manville Corporation, Certain Teed Corporation, Capco or approved equal. Pipe shall be made from clean, virgin approved Class 12454 B PVC compound conforming to AWWA Specification C900.

3. All pipe shall meet with cast iron pipe equivalent outside diameters.

4. All pipe and fittings shall be marked with size, class, material, grade, and initials of the manufacturer. The pipe shall be furnished in standard 20-foot lengths.

5. All pipes shall be suitable for use as a pressure conduit for potable water.

6. Each pipe length shall be hydrostatic proof tested to four times the class pressure of the pipe for a minimum of five seconds.

7. The pipe shall withstand without failure an impact of 100 ft./lb. for pipe sizes 8 inches and smaller from a freely falling missile; with a 2-inch radius nose at 70°F., as per ASTM D2444. There shall be no visible evidence of shattering, cracking or splitting when energy is imposed.

8. Randomly selected samples shall be quick burst tested in accordance with ASTM D1599. The pipe shall withstand without failure a pressure of 755 psi applied in 60 to 70 seconds at 73°F.

9. The pipe shall not balloon, burst or weep as defined in ASTM D1598 when tested at a sustained pressure of 500 psi applied for 1,000 hours as specified in ASTM D2241.

10. The inside surface of each length of pipe shall be free from nicks, scratches and other surface defects and blemishes. The pipe shall be homogeneous throughout free of any bubbles, voids or inclusions.

11. If requested, the manufacturer shall supply the Engineer with certificates of compliance with specifications and certifications that each piece of PVC pipe conforms to AWWA Specification C900 and has been tested with the Drop Impact Test in accordance with ASTM D2444.

12. The integral socket bell of the PVC pipe shall meet the same strength requirements as that of the pipe. The bell shall have grooves into which an elastomeric gasket with solid cross section is inserted. This joint shall conform to the requirements of ASTM D3139 and shall provide for expansion and contraction of the pipe.

13. Removable elastomeric gaskets for PVC pipe and fittings shall meet the requirements of ASTM F477 and shall be capable of withstanding pH's as high as 9.5. The elastomeric gasket shall provide a tight seal that protects the line from shock and vibration, and compensates for expansion and contraction of pipe lengths. The elastomeric gasket shall not support the growth of bacteria.

14. Lubricant used for joint assembly shall be non-toxic, shall not support the growth of bacteria and shall have no deteriorating effect on the gasket material.
15. Restrained joints shall be furnished for installation where shown on the Contract Drawings. Restraints for mechanical joint fittings shall be Series 1100 PV Megalug as manufactured by EBAA Iron Sales Co. or approved equal. Restraints for push-on joints shall be Series 2000PV as manufactured by EBAA Iron Sales Co. or approved equal.

H. BUTTERFLY VALVES

1. Butterfly valves shall be cast iron ASTM A 126 Class B body and shall have integrally cast mechanical joint ends, and Type 304 stainless steel body seat made integral with the valve body. Valves and components shall meet all requirements of AWWA C504.

2. Valve vane shall be constructed of high strength cast iron ASTM A48 Class 40.

3. Valve shafts for sizes up to and including 12-inch shall be one-piece stainless steel extending full size through the disc and bearings. Valve shafts for 14-inch and larger shall be 18 8 stainless steel stub shaft design keyed to the vane with stainless steel taper pins.

4. Valve seats shall be Buna N vulcanized mechanically secured to the vane with an integral stainless steel seat retaining ring and self-locking Series 300 stainless steel screw fasteners. Valve seats located in the body on the valve shall be retained by mechanical means without rings, screws, etc. All seats shall provide full 360 coverage and be field adjustable and replaceable.

5. Valve bearings shall be sleeve type, corrosion resistant, and self-lubricating with load not to exceed 2,500 pounds per square inch.

6. Valve operator shall be traveling nut type suited for buried service. Operator shall produce required operating torque to seat, unseat or hold the vane steady in any intermediate position. Operator shall produce required operating torque with a maximum input of 150 ft. lbs. on the wrench nut. All actuator components between input and stops shall withstand without damage an input torque of 300 ft lbs. minimum. It must be fully gasketed and grease packed and designed to withstand submersion in water to 10 pounds per square inch. Valves shall have 2-inch standard AWWA operating nuts. All valves shall open right (clockwise). Valves shall have hydrostatic and leakage tests conducted in accordance with AWWA C504. Valves 12-inch and less shall be tested bubble-tight at a rated working pressure of 200 psi. Valves 14-inch and larger shall have a rated working pressure of 150 psi.

7. Butterfly valves shall be as manufactured by M & H Valve Company, Dresser, Clow, or approved equal.

I. RESILIENT WEDGE GATE VALVES

1. Resilient wedge gate valves shall be iron body, resilient seated type. The valves shall be designed for 250 psi working pressure and 400 psi test pressure.

2. Valves are to have O ring seals and a nonrising stem. Valves shall have a 2-inch operating nut. Valves shall open right (clockwise).

3. Resilient gate valves shall meet the most recent version of the AWWA standard specification AWWA C509.

4. Resilient wedge valves shall have mechanical joint ends.
5. Valves shall be as manufactured by U.S. Pipe and Foundry Company Metroseal 250, American Flow Control Model AFC2500, or Mueller Resilient Wedge Gate Valves.

6. Valve boxes shall be cast iron, asphalt coated, sliding, heavy pattern type, consisting of three (3) pieces; a flanged bottom piece, a flanged top piece, and a cover with two (2) lifting holes and the word "water" cast on the top. A minimum 6-inch overlap is required between sliding sections. The valve box shall be designed and constructed to prevent direct transmission of traffic loads to the pipe or valve. The inside diameter of boxes shall be at least 4 1/2 inches and lengths shall be as necessary to suit ground elevation. The top of the cover shall be flush with the top of the box rim. Box covers shall be round frame and cover.

7. Valves shall be connected directly to valve anchor tees at all hydrant branches.

J. Tapping Sleeves And Valves

1. Tapping sleeves shall be of ductile iron construction, meeting ASTM A536 Grade 65-45-12. Side flange seals shall be O-Ring type of round, oval or rectangular cross-section shape. Sizes 12" and smaller must be capable of working on Class ABCD pipe diameters without changing either half of sleeve. Sizes 14" and larger must be specified to which class is needed. All sleeves are to include the end joint accessories and split glands necessary to assemble sleeve to pipe. Sleeve shall be coated with asphaltic varnish in compliance with NSF-61.

2. Tapping valves shall conform to the requirements specified above for gate valves except that all Tapping sleeves and valves shall consist of a ductile iron flanged by mechanical joint sleeves and a tapping type gate valve with one flange and one mechanical joint end. The Contractor shall be responsible for verifying the outside diameter of the pipe to be tapped.

3. The valve shall be provided with an oversized seat to permit the use of full-size cutters. Before backfilling, all exposed portions of any bolts used to hold the two halves of the sleeves together shall be heavily coated with two coats of bituminous paint comparable to Inertol No. 66 Special Heavy. Sleeves shall be of ductile iron furnished with O-ring gaskets.

4. Bolts on bonnet and stuffing box shall be stainless steel (316 stainless steel), stuffing boxes shall be “O” ring type as indicated. Gaskets shall cover the entire flange surface.

K. Post Indicator Valve

1. Post indicating valve assembly shall consist of a buried butterfly valve and above-grade indicator actuator of the traveling nut type with a tamper-proof switch.

2. Posts shall have two large window openings that shall be fitted with a heavy clear Plexiglas. Aluminum target plates, with large words OPEN and SHUT cast in large, easy-to-read, raised letters shall be located directly behind each window in such a position that the appropriate words appears as the valve is opened.

3. The target mechanism shall consist of an internal rotating member that contains a 2¾-inch hole on four sides.

4. The outer member is stationary and shall contain similar holes.

5. A fail-safe spring shall be included on the post to preclude accidental closing.
6. Stem, indicators, and all working parts shall be fully protected from moisture and weather damage.

7. The butterfly valve and post assembly shall be Underwriters Laboratory listed and Factory Mutual approved.

8. Valves shall be manufactured in accordance with AWWA C504, Class 150B.

L. Hydrants

1. General: Provide Hydrants as indicated. The Hydrants shall be manufactured by an established manufacturer of good reputation in the industry and in a permanent plant adapted to meet all the design requirements of the hydrant.
   a. Fire hydrants shall meet or exceed AWWA C-502, latest revision and shall comply with Factory Mutual Research Corporation and Underwriters’ Laboratories UL 246 Standard. Rated water working pressure shall be 200 psi, test pressure shall be 400 psi.

2. The main valve closure shall be of the compression type, opening against the pressure and closing with the pressure.

3. Hydrants shall be of the breakaway type: The upper barrel shall connect to the lower barrel with a breakable traffic flange and 8 bolts and nuts. This connection shall allow 360-degree rotation of the upper nozzle section.

4. The main valve opening shall be 5-1/4 inch and be designed so that removal of seat, drain valve mechanism, internal rod and all working parts can be removed through top of hydrant. These parts shall be removable without disturbing the ground line joint or the nozzle section of the hydrant. The bronze seat shall be threaded into mating threads of bronze for easy field removal.

5. The draining system of the hydrant shall be bronze and activated by the main stem without use of auxiliary rod, toggles, pins, etc. The drain mechanism shall be completely closed after no more than three turns of the operating nut in the opening direction. There should be a minimum of (2) inside ports and (4) drain port outlets to the exterior of the hydrant. Drain shut off to be by direct compression closure.

6. The operating nut, main stem, coupling and main valve assembly shall be capable of withstanding input torque of 200 ft. lbs. in opening or closing directions. There shall be an internal top housing with triple O-Rings to seal operating threads from the waterway and accommodate an anti-friction washer.

7. Fire hydrants shall have 6-inch mechanical joint inlet connections to the main, two 2 1/2-inch hose connections, 180-degrees apart, and one 4 1/2-inch steamer connection. The hose and steamer connections shall have National Standard Thread. The standpipe shall have an 8 1/2-inch minimum diameter. All nozzle caps shall be cast iron and shall be secured to the hydrant barrel with chains.

8. Hydrant shall be marked with an arrow and the word "open" to indicate the direction to turn the stem to open the hydrant. Hydrants shall open to the right (clockwise) and have a bronze operating nut that shall be pentagonal in shape, 1-1/2 inch from point to opposite flat.

9. The upper barrel shall be ductile iron with markings identifying size, model and year of manufacture. The lower barrel shall be ductile iron.
j. The hydrant shall have a minimum working pressure of 200 psi. Hydrant design shall be of positive automatic drain type to prevent freezing.

k. Hydrants shall be thoroughly cleaned and given two (2) shop or field coats of paint in accordance with AWWA C502 and the instruction of the paint manufacturer. Paint color shall be the standard hydrant color of the City of Worcester (high-visibility yellow).

l. If the hydrant is delivered with the manufacturer’s standard color, the hydrant shall be given one (1) matching field coat of alkyd gloss enamel. If the hydrant is delivered with no standard color, the hydrant shall be given two (2) coats of alkyd gloss enamel according to the colors specified by the City of Worcester.

m. All exposed metal surfaces will be painted.

n. Hydrant paint shall be as manufactured by Sherman-Williams, PPG Industries, Pittsburgh, PA; Koppers Company, Inc., Pittsburgh, PA; Tnemec Company, Inc. Kansas City, MO; or approved equal.

o. Alkyd gloss enamel shall be Series 54-300 by PPG; Glamortex by Koppers; 2H-Tneme by Tnemec or approved equal.

p. Hydrants shall be Kennedy Guardian K81D or equal and approved by the City of Worcester.

M. Hydrant Safety Flange Repair Kit

1. Safety flange repair kits shall come complete with stem coupling, safety flange, flange gasket, replacement bolts and nuts and hydrant lubricating oil.

2. Safety flange repair kits shall be compatible with hydrant furnished.

N. Hydrant Extension Kits

1. Extension kits shall come complete with extension barrel, extension stem, stem coupling and hardware, flange, flange gasket, 8 bolts and nuts and hydrant lubricating oil.

2. Extension kits shall be compatible with hydrant furnished.

O. Service Tubing, Corporations, Stops, Saddles, And Valve Boxes

1. Service tubing shall meet the requirements of Federal Specification WW-T 7996 and shall conform to ASTM specification B75, B68 and B88 as they apply to Type K Copper Tubing.

2. Copper Tube Size (CTS) Polyethylene Tubing for domestic water uses shall conform to AWWA C901, ASTM D3350, and ASTM D2737 and shall have a working pressure rating of 200 psi. Tracer wire shall be attached to the tubing and connected to upstream piping of the associated water meter for the water service, as applicable.

3. The Contractor shall furnish and install, including necessary taps and connections, corporation stops, CTS Polyethylene Tubing, curb stops and wastes.

4. The corporation stops shall meet the most recent revision of the AWWA standard "Threads for Underground Service Line Fittings." (AWWA C800).
5. Corporation stops shall be sized as shown on the drawings and be brass compression-type with CC thread (Mueller Brand with compression nut with set screw). Corporation stops shall open right (clockwise).

6. Curb Stops: Curb stops shall be sized as shown on the drawings and be brass compression-type with drain (Mueller Brand with compression nut with set screw). Curb stops shall open right (clockwise).

7. Tapping Saddles: Service connections shall be tapped with Size 2” X 8” double strap service saddles.

8. Fittings and Boxes: Service boxes shall be cast iron. Extension service boxes of the required length and having slide-type adjustment shall be installed at all service box locations. The boxes shall have housings of sufficient size to completely cover the curb stop and shall be complete with identifying covers.

9. Service boxes shall be 2 ½” Buffalo Style, heavy cast iron, tar coated, sliding type, consisting of three (3) pieces; a flanged bottom piece, a flanged top piece and bolted cover with the word "water" cast on the top. A minimum 6-inch overlap is required between sliding sections. The boxes lengths shall be as necessary to suit ground elevation.

P. Frostproof Pedestal Fountain (If Required)

1. Frostproof Pedestal fountain shall be factory-assembled with cast iron base and receptor shield. Receptor to be stainless steel with rounded corners, Projector shall be vandal-resistant, two stream, mound-building type, and shall have below frost line self-closing, foot operated valve, and diaphragm-type automatic stream regulator.

2. No lead solder shall be used in the fabrication of the waterways.

3. Fountain shall be Halsey Taylor Model 4880 or an approved equal.

Q. Identification

1. Detectable Underground Warning Tapes: Acid and alkali-resistant polyethylene plastic film warning tape, 6-inches wide by 4-mils. minimum thickness, with continuously printed caption in black letters "CAUTION - xxxxx LINE BURIED BELOW." The text and color of the tape shall be as shown in the table below. The tape shall have a metallic core encased in a protective jacket for corrosion protection and be detectable by a metal detector when the tape is buried up to 2.5-feet deep.

<table>
<thead>
<tr>
<th>Color</th>
<th>Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Red</td>
<td>Electric</td>
</tr>
<tr>
<td>High Visibility Safety Yellow</td>
<td>Gas, Oil, Steam</td>
</tr>
<tr>
<td>Safety Alert Orange</td>
<td>Telephone, Communications, Cable Television</td>
</tr>
</tbody>
</table>
Color | Utility
--- | ---
Safety Precaution Blue | Water System, Irrigation
Safety Green | Sanitary Sewer, Storm Sewer
White | Proposed Excavation

G3020 SANITARY SEWER

A. Work Included: Provide labor, materials, and equipment necessary to construct the sanitary sewer system complete, including connection to existing structures and testing, as indicated on the Drawings and as specified.

B. Unless otherwise indicated on the Drawings, building sewer service lines shall be installed from a point 10 feet outside the building foundation walls to the point of disposal.

C. Precast Concrete Vaults And Tanks

1. The precast reinforced concrete vault and tank structures shall be designed by a Massachusetts Registered Professional Engineer employed by the Contractor, in accordance with the applicable sections of the following references.

b. American Concrete Institute, ACI 318 “Building Code Requirements for Reinforced Concrete.”
d. Precast Concrete Institute, “Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products, MNL-116.

2. The structures shall be designed for the following loads and possible combinations thereof:

a. Lateral soil pressure=60 PCF (H), where H is the height from grade as shown on the Contract Drawings, to the point of the structure being considered.

b. Soil weight shall be assumed to be 120 PCF.
c. AASHTO HS-20-44 loading.
d. Weight of precast concrete structure.
e. Initial handling and erection loading, including design of galvanized lifting hooks using safety factor = 4.0.

3. Investigate buoyancy and soil bearing considerations assuming the groundwater elevation is one-foot below the ground surface.

4. Concrete shall have a minimum 28-day compressive strength of 5,000 psi using Type II or III Portland cement with 8% maximum content of tricalcium aluminate, ASTM C150. A “normal dosage” of air-entraining agent shall be added to the concrete during the mixing cycle. Reinforcement shall be deformed billet-steel ASTM A615 or 7-wire strand ASTM A416, Grade 270 (if prestressed).

5. Dimensions and opening sizes and locations shall be as indicated on the Contract Drawings.

6. Pipe Connections: Vault and tank structures shall have pipe openings to accept the type of pipe specified. Pipe opening shall be minimum size required to receive the pipe and shall be accurately set to conform to the required line and grade. Sewer pipe shall be joined to the wall of the concrete structure with flexible pipe sleeves as indicated on the drawings. Flexible pipe sleeves shall be cast in the walls of the structure during the manufacturing process. Flexible pipe sleeves shall be NPC Kor-N-Seal Pipe-to-Manhole Connector as manufactured by Trelleborg Pipe Seals Milford, Inc., Milford, NH; Z-Lok as manufactured by A-Lok Products, Inc., Tullytown, PA; Tylox CIB Series Cast-In Boot Connector as manufactured by Hamilton Kent, Winchester, TN; or approved equal.

7. Bituminous Waterproofing: The exterior surfaces of precast concrete structures shall be given two heavy coats of bituminous waterproofing material. The material shall be No. 35-J-10 Hi Building Bituminous Coating made by Mobil Chemical Company, Edison, NJ; Bitumastic Super Service Black made by Koppers Company, Inc., Pittsburgh, PA; Bitumastic 300M made by Caroline Company, St. Louis, MO; Sonoshield HLM 5000 as manufactured by BASF Corporation Building Systems, Shakopee, MN; or acceptable equivalent products. The waterproofing material shall be applied by brush or spray and in accordance with the instructions of the manufacturer. Time shall be allowed between coats to permit sufficient drying so that the application of the second coat has no effect on the first coat.

8. Brick Masonry: Bricks shall be sound, hard, uniformly burned, regular, and uniform in shape and size. Underburned or salmon brick shall not be acceptable. Only whole brick shall be used.

a. Bricks for raising manhole and catch basin frames to finished grade shall conform to ASTM C32, Grade MS.
b. Mortar shall be in conformance with ASTM C270, Type M. The mortar shall be composed of one part Portland cement, 3-1/2 parts sand, and ¼ parts hydrated lime, by volume. Portland cement shall be ASTM C150, Type II; hydrated lime shall be Type S conforming to ASTM D207.

c. Sand shall be washed, cleaned, screened, well-graded with all particles passing a No. 4 sieve, and conform to ASTM C33.

D. Precast Concrete Manholes


2. Manhole Top: Precast concrete of concentric cone, eccentric cone, or flat slab top type, as necessary for the installation as indicated in the Contract Drawings. Tops shall be designed to meet H20 loadings.


4. Cement: Type II.

5. Concrete strength: 4,000 psi minimum.

6. Precast concrete sections shall have tongue and groove joints.

7. Horizontal Joints: Joints between sections of concrete structures shall be sealed with a flexible, watertight joint, made with preformed butyl rubber joint sealant conforming to ASTM C990 or with a rubber gasket joint conforming to ASTM C443. Sealants and/or gaskets shall be installed in accordance with the manufacturer’s written instructions.

8. Manhole Steps: Steps for manholes shall be non-skid raised edge-front steel reinforced polypropylene plastic type with at least 13-inch wide stepping surface. Steps shall meet the requirements of ASTM C-478 and AASHTO M-199. Steel shall be 1/2-inch grade 60 conforming to ASTM A615 encapsulated with molded copolymer polypropylene. The polypropylene shall conform to ASTM D-4101. Rungs shall protrude no more than 6 inches from the wall. The portion of the legs to be embedded in the precast section shall have fins and be tapered to ensure a secure bond. Steps shall start a foot above the shelf of the manhole floor and continued twelve inches on center spacing up through the completed height of the unit. The steps shall finish no lower than twenty-four (24)-inches below the rim elevation. Placement into precast walls shall be by a method recommended by the supplier of the precast manhole sections. Steps shall be installed per the manufacturer’s specifications.
9. Pipe Connections: Sewer manhole shall have pipe openings to accept the type of pipe specified. Pipe opening shall be minimum size require to receive the pipe and shall be accurately set to conform to the required line and grade. Sewer pipe shall be joined to the wall of the concrete manhole with flexible manhole sleeves as indicated on the drawings. Flexible manhole sleeves shall be cast in the walls of the manholes during the manufacturing process. Flexible manhole sleeves shall be NPC Kor-N-Seal Pipe-to-Manhole Connector as manufactured by Trelleborg Pipe Seals Milford, Inc., Milford, NH; Z-Lok as manufactured by A-Lok Products, Inc., Tullytown, PA; Tylox CIB Series Cast-In Boot Connector as manufactured by Hamilton Kent, Winchester, TN; or approved equal.

10. Bituminous Waterproofing: The exterior surfaces of precast manholes shall be given two heavy coats of bituminous waterproofing material. The material shall be No. 35-J-10 Hi Building Bituminous Coating made by Mobil Chemical Company, Edison, NJ; Bitumastic Super Service Black made by Koppers Company, Inc., Pittsburgh, PA; Bitumastic 300M made by Caroline Company, St. Louis, MO; Sonoshield HLM 5000 as manufactured by BASF Corporation Building Systems, Shakopee, MN; or acceptable equivalent products. The waterproofing material shall be applied by brush or spray and in accordance with the instructions of the manufacturer. Time shall be allowed between coats to permit sufficient drying so that the application of the second coat has no effect on the first coat.

11. Sanitary Sewer Brick Masonry: Bricks shall be sound, hard, uniformly burned, regular, and uniform in shape and size. Underburned or salmon brick shall not be acceptable. Only whole brick shall be used.
   a. Bricks for channels and shelves shall conform to ASTM C32, Grade SS except that the mean of five tests for absorptions shall not exceed 8 percent and no individual brick exceed 11 percent.
   b. Brick for raising manhole frames to finished grade shall conform to ASTM C32, Grade MS.
   c. Mortar shall be in conformance with ASTM C270, Type M. The mortar shall be composed of one part Portland cement, 3-1/2 parts sand, and ¼ parts hydrated lime, by volume. Portland cement shall be ASTM C150, Type II; hydrated lime shall be Type S conforming to ASTM D207.
   d. Sand shall be washed, cleaned, screened, well-graded with all particles passing a No. 4 sieve, and conform to ASTM C33.

12. In sewer manholes, the invert channel within the structure shall be an inverted arch with bricks laid as stretchers and on edge and so constructed as to conform in shape to the lower half of the pipe. The shelf in manholes shall consist of bricks laid flat and the top of the shelf shall be at the elevation of the top of the pipe, as indicated on the Contract Drawings, and shall be sloped to flow toward the channel.
13. Inverts in sewer manholes shall conform accurately to size of the adjoining pipe. Side inverts and main inverts where the direction changes shall be laid out in smooth curves of the longest possible radius which is tangent, within the manhole, to the centerline of the adjoining pipe lines.

14. Sewer manholes shall be constructed with drop connections when the proposed invert of the connection is at least 2 feet above the manhole invert. All drop connections will be of the external type. The drop pipe shall be constructed of SDR 35 PVC sewer pipe. The drop piping and horizontal cleanout sections will be sized the same as the sewer main piping and shall enter the manhole at the invert elevation of the main. The drop portion of the piping shall be secured with anchor straps. The drop piping shall be encased with control density fill.

15. For all manhole depths greater than 10 feet, the inside diameter of the manholes shall be at least 5’-0”.

16. Safety landings shall be installed inside manholes greater than 16-feet in depth.

17. When installing manholes on existing lines and when flows cannot be diverted, drop-over manholes shall be used. Drop-over manholes shall be precast with openings cast in the sidewalls of sufficient size to fit over the existing line(s) to remain in service. Drop-over manholes shall be set on a precast or cast-in-place concrete base slab. Drop-over manholes shall be manufactured to the same requirements and dimensions as standard manholes.

E. Concrete Block Manholes

1. Concrete block manholes shall only be utilized when it is not feasible to utilize a precast concrete manhole and then only with written approval from the Owner’s Representative.

2. Concrete block manholes shall be minimum 48 inches inside diameter and built of standard solid manhole barrel blocks set on a cast-in-place cement concrete base or precast concrete sectional base plate. The upper 2 feet of masonry shall be built using batter blocks. All joint spaces shall be completely filled, horizontal and vertical. All block shall be thoroughly wet before joining. A leveling course of two bricks at the top shall be used to meet proper grade. Cement concrete blocks shall be machine made solid segments conforming to the requirements for Concrete Masonry Units for Construction of Catch Basin and Manholes, ASTM C139. Blocks shall be 6 inches in width with the inside and outside surfaces curved to the necessary radius and so designed that the interior surfaces of the structures shall be cylindrical. The top batter courses shall be designed to reduce uniformly the inside section of the structure to the
top size and shape. The blocks used in the top course shall be designed to produce a surface 8 inches in width upon which to seat the frame.

F. Manhole Frames And Covers

1. Frames and covers shall be of cast iron conforming to the requirements of ASTM A48, Class No. 30 and shall be manufactured by General Foundries Inc., North Brunswick, New Jersey; East Jordan Iron Works (formerly LeBaron Foundry, Inc.), East Jordan, Michigan; Neenah Foundry Company, Neenah, Wisconsin; or approved equal. Manhole covers shall be machined to fit securely and evenly on the frame. Frames and covers shall be designed to accept H20 loads, have a diamond surface finish, and frame height of 6 to 9-inches. Covers shall bear the word “SEWER” in 3-inch high letters. Covers shall be equal to Item Numbers 12665 and 12685 (6” and 8-1/8” frame heights, respectively) as manufactured by General Foundries Inc. Catalog numbers are provided to establish a standard of quality and configuration of castings.

G. PVC Pipe

1. General: Provide pipes of the following materials of class indicated. Provide pipe fittings and accessories of same materials and class as pipes with joining method, as indicated. The piping shall be manufactured by an established manufacturer of good reputation in the industry and in a permanent plant adapted to meet all the design requirements of the pipe.

2. PVC Sewer Pipe

   a. PVC (Polyvinyl Chloride) Gravity Sewer Pipe and Fittings: ASTM D3034, SDR 35, for elastomeric gasket joints. Pipe 18 to 36 inches in diameter shall conform to ASTM F679, T-1 heavy wall. The pipe shall have an SDR ration of 35 and a pipe stiffness of 46 psi.

   b. Joints: PVC pipe shall have an integral wall bell and spigot push-on joint with elastomeric gaskets secured in place in the bell of the pipe. The bell shall consist of an integral wall section with solid cross section elastomeric gasket, factory assembled, securely locked in place to prevent displacement during assembly. Pipe joints shall conform to ASTM D3212 and elastomeric gaskets shall conform to ASTM F477.

   c. Spigot pipe ends shall be supplied with bevels from the manufacturer to ensure proper insertion. Each spigot end shall have an “assembly stripe” imprinted thereon to which the bell end of the mated pipe will extend upon proper joining of the two pipes.

   d. PVC gravity sewer fittings and accessories shall be as manufactured and furnished by the pipe supplier or approved equal and have bell and spigot configurations compatible with that of the pipe.
3. PVC Sewer Force Main Pipe

   a. PVC Pressure Pipe (Force Main): ASTM D2241, SDR 21, for elastomeric gasket joints. PVC resin compound shall conform to ASTM D1784 and rubber gaskets shall conform to ASTM D1869 and F477. Pipe shall be provided in 20-foot nominal lengths.

   b. Fittings: Fittings shall be made of PVC compound meeting ASTM D1784. Fittings shall be Class 200 and conform to the requirements of SDR 21. Fittings joint gaskets shall conform to ASTM F477.

   c. Thrust blocks shall be used at bends and fittings as shown on the details. In the event that the use of thrust blocks is not practical, the Contractor shall provide an alternate method of joint restraint, at no additional cost, as approved and/or directed by the Engineer.

   d. If restrained joints are to be used in lieu of thrust blocks, restraint length values shall be calculated per the manufacturer’s standards. Restraint length calculations and restrained joint locations shall be provided by the Contractor and sent to the Engineer for review.

4. PVC Conduit

   a. PVC Schedule 40: Provide PVC Pipe, Schedule 40, where shown on the Contract Drawings. Pipe shall comply with ASTM D1785 and be manufactured from virgin PVC plastic conforming to ASTM D1784. Pipe shall be Underwriter’s Laboratories listed for use in underground installations.

   b. Joints and solvent cements shall conform to ASTM 2564.

H. Ductile Iron Pipe And Fittings

1. General: Provide pipes of the following materials of class indicated. Provide pipe fittings and accessories of same materials and class as pipes with joining method, as indicated. The piping shall be manufactured by an established manufacturer of good reputation in the industry and in a permanent plant adapted to meet all the design requirements of the pipe.

   a. Ductile iron pipe shall be that of a manufacturer who can demonstrate at least five years of successful experience in manufacturing ductile iron pipe. The pipe shall be equipped with push on type, restrained joint, or mechanical joints, as required.

   b. All ductile iron drain pipe shall conform to American Water Works Association (AWWA) C150 and AWWA C151.

   c. The ductile iron pipe shall be Class 52 and furnished in minimum nominal 18-foot lengths, with Push-on or Mechanical Joints as manufactured by U.S. Pipe and Foundry Company, Atlantic States Cast Iron Pipe Co., Clow Corporation, or approved equal with gaskets conforming to AWWA C111 "Rubber Gasket Joints".
d. The ductile iron sewer pipe shall be PROTECTO 401 Ceramic Epoxy lined and the pipe exterior asphalt seal coated in accordance with AWWA C104.

e. The pipe shall be furnished along with necessary materials and equipment recommended by the manufacturer for use in joining pipe lengths and fittings.

f. Fittings shall be short body ductile iron Class 350 Mechanical Joint, conforming to ANSI Specification AWWA C153, latest edition, for pipe sizes 16 inches and smaller, and Class 350 standard Mechanical Joint fittings conforming to AWWA C110, latest edition, for pipe sizes 16 through 24 inches, unless specifically stated otherwise in the Specifications or on the Contract Drawings. Fittings shall have the same lining and coating as the pipe specified above. All fittings shall be marked with the weight and shall have distinctly cast upon them the pressure rating, the manufacturer's identification, nominal diameter of openings and the number of degrees or fraction of the circle on all bends. Fittings greater than 24 inches shall be as specified above except they shall be Class 250. All accessories (gland, gaskets, T-bolts, and nuts) shall be in accordance with AWWA C111. All mechanical joint bolts (T-bolts) shall be Cor-Ten or equal.

g. Contractor shall provide all adapters and fittings such as transition couplings, as determined in the field, necessary to complete all cross connections, whether or not specifically stated in the Contract Drawings and Specifications.

h. All pipes shall be marked with the class, thickness designation, and initials of the manufacturer.

i. If required the manufacturer shall supply the Engineer with certificates of compliance with these Specifications and certification that each piece of ductile iron pipe has been tested at the foundry with the Ball Impression Test, Ring Bending, or equal.

j. Pipe for use with sleeve-type couplings shall be as specified except that the ends shall be plain (without bells or beads). The ends shall be cast or machined at right angles to the axis.

I. Inspection, Tests, And Acceptance For Ductile Iron Pipe

1. All pipe delivered to the job site shall be accompanied by test reports certifying that the pipe and fittings conform to "AWWA Standard for Ductile Iron Pipe, for Water and Other Liquids" (AWWA H3) and (AWWA C151).

2. All tests shall be made in accordance with the methods prescribed by the above mentioned AWWA Standards, and the acceptance or rejection shall be based on the test results.

3. Pipe which does not conform to the requirements of this contract shall be immediately removed and replaced by the Contractor.

4. All ductile iron pipe to be installed under this Contract may be inspected at the foundry for compliance with these Specifications by an independent testing laboratory selected by the Owner. The Contractor shall require the manufacturer's cooperation in these
inspections. The cost of foundry inspection of all pipe approved for this Contract, plus the cost of the inspection of a reasonable amount of disapproved pipe, will be borne by the Owner.

J. **Sleeve Couplings For Ductile Iron Pipe**

1. Sleeve couplings and accessories shall be pressure rated at least equal to that of the pipe. Couplings shall be cast iron and shall be Dresser Style 53 or 153, Rockwell Style 441, Baker Series 4245 or acceptable equivalent product. The couplings shall be provided with Cor-Ten bolts and nuts or approved equal.

2. After assembly, all exterior surfaces including the bolts and nuts shall be thoroughly coated with two coats of heavy-duty protective coating. The interior of the coupling shall be epoxy coated. Coating shall be a minimum of 10 mils. and a maximum of 20 mils. dry film thickness thermosetting epoxy.

K. **Cleanouts**

1. General: Provide cast-iron ferrule and countersunk brass cleanout plug, with round cast-iron access frame and heavy-duty, secured, scoriated cast-iron cover.

2. The sewer cleanouts shall be minimum 6-inch diameter or sized to match the service pipe, whichever is greater. The cleanout shall be complete with a flush mount over. The cleanout cover shall be clearly marked “SEWER” and shall be minimum eight inches in diameter or two inches greater than the cleanout size, whichever is greater. Cleanouts shall include a watertight cap.

L. **Sewer Couplings**

1. Sewer Couplings shall be pressure rated at least equal to that of the pipe. The coupling sleeve shall be 1/4-inch minimum thickness elastomeric polyvinylchloride with a minimum tensile strength of 1500 psi. The sleeve shall fit snugly onto the pipe to be joined and be resistant to common chemicals present in sewerage. Adjustable pipe clamps shall consist of a slotted band that mate with the worm gear screw and a screw housing all manufactured of stainless steel, and suitable for underground service.

M. **Sanitary Sewer Pump Station**

1. **Precast Concrete Chambers**

   a. The wet well and valve pit shall be precast concrete structures of the dimensions shown on the Contract Documents. Refer to Sections 2.1 and 2.2 for precast concrete structure material requirements.

   b. The wet well and valve pit shall each receive two coats of bituminous damp proofing on both the inside and outside surfaces of the structures.
c. All inlet and outlet connections to the wet well and valve pit shall be watertight and shall be installed at the elevations as shown on the Contract Documents.

1) The connections shall be sealed with modular, mechanical seals, consisting of rubber links shaped to continuously fill the annular space between the pipe and the wall openings. The pressure plates shall be molded of glass reinforced nylon. Hardware shall be mild steel with a 60,000 psi minimum tensile strength and 2-part Zinc Dichromate coating per ASTM B-633 and Organic Coating, tested in accordance with ASTM B-117 to pass a 1,500-hour salt spray test (or 316 Stainless Steel).

2) Sleeves shall be provided at all wall openings for piping. The sleeves shall be steel made from heavy-wall welded or seamless pipe cast into the wall of the wet well and valve pit. A full circle waterstop plate acts as a positive seal and anchor to prevent thrust movement. The 2" collar/waterstop shall be continuously welded on both sides. The sleeves shall be hot dip galvanized coated.

d. The Contractor shall submit buoyancy calculations for sewer pump station structures assuming groundwater is three (3) feet below finish grade. If buoyancy is determined to be an issue the structure(s) shall be modified to prevent uplift. All buoyancy calculations and sewer pump station structure designs shall be prepared and stamped by a Professional Engineer licensed in the Commonwealth of Massachusetts.

2. Access Hatches

a. The access hatches shall be manufactured by the Bilco Company, Halliday Products, U.S.F. Fabrication, or approved equal.

b. Wet well and valve pit access doors shall be installed where indicated on the plans. The access doors shall be pre-assembled from the manufacturer.

c. The cover shall be reinforced to support H-20 wheel loading. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing. Operation of the cover shall not be affected by the temperature. The entire door, including all hardware components, shall be highly corrosion resistant. The cover shall be ¼” aluminum diamond pattern.

d. The channel frame shall be ¼” extruded aluminum with bend down anchor tabs around the perimeter. A continuous EPDM gasket shall be mechanically attached to the aluminum frame to create a barrier around the entire perimeter of the cover and significantly reduce the amount of dirt and debris that may enter the channel frame.

e. The hinges shall be specifically designed for horizontal installation and shall be through bolted to the cover with tamperproof Type 316 stainless steel lock bolts.
Easthampton Maple Elementary School  
Design Alternative E.4; Pre-K Through Grade 8  
Schematic Design Specifications  

and shall be through bolted to the frame with Type 316 stainless steel bolts and locknuts.

f. Provide a 1-1/2” drain coupling located in the right front corner of the channel frame.

g. Lifting Mechanisms: The manufacturer shall provide the required number and size of compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and to act as a check in retarding downward motion of the cover when closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe fastened to a formed ¼” gusset support plate.

h. A removable exterior turn/lift handle with a spring-loaded ball detent shall be provided to open the cover and the latch release shall be protected by a flush, gasketed, removable screw plug.

i. Hardware:
   1) Hinges: Heavy forged Type 316 stainless steel hinges, each having a minimum ¼” diameter Type 316 stainless steel pin, shall be provided and shall pivot so the cover does not protrude into the channel frame.
   2) Cover shall be equipped with a hold arm which automatically locks the cover in the open position.
   3) Cover shall be fitted with the required number and size of compression spring operators. Springs and spring tubes shall be Type 316 stainless steel.
   4) A Type 316 stainless steel snap lock with fixed handle shall be mounted on the underside of the cover.
   5) Hardware shall be Type 316 stainless steel throughout.

j. Finishes: Factory finish shall be mill finish aluminum with bituminous coating applied to the exterior of the frame.

3. Sanitary Sewer Pump System

a. Pumps shall be of the submersible type with 2-vane enclosed impeller. All openings in the pump impeller and volute case shall be large enough to pass a 3” diameter sphere. The Contractor shall furnish and install a complete non-clog pumping system consisting of submersible non-clog pumps and lift-out rail system, valves, controls, access covers and all other appurtenances to make a complete system. Pumps, control panel, and rail packages shall all be supplied by the same pump supplier.

b. The Contractor shall provide a duplex pump assembly consisting of two non-clog submersible pumps with a discharge flange that is 4-inch standard. Pump and motor assembly shall be FM listed for Class 1, Group D hazardous location service. A non-witness performance test on each pump at the pump manufacturer shall be performed to guarantee pump performance. The results of the tests shall be
submitted to the designer for review and comment. Each pump shall have a capacity of 120 gallons per minute (gpm) at a total dynamic head (TDH) of 12.0 feet and shall use a 1.5 HP motor operating at 1150 RPM.

c. Motor

1) The pump motor shall be of the sealed submersible type rated 1.5 horsepower at 1150 RPM, 60 Hertz. The motor shall be three phase 208 volts. Three phase motors shall be NEMA B type.

2) Stator winding shall be of the open type with Class H inverter duty insulation good for 356ºF (180ºC) maximum operating temperature. Winding housing shall be filled with clean high dielectric oil that lubricates bearings and seals and transfers heat from windings and rotor to outer shell. Air-filled motors which do not have the superior heat dissipating capabilities of oil-filled motors shall not be considered equal.

3) Motor shall have two heavy duty ball bearings to support pump shaft and take radial and thrust loads and a sleeve guide bushing directly above the lower seal to take radial load and act as flame path for seal chamber. Ball bearings shall be designed for 50,000 hours B-10 life. Stator shall be heat shrunk into motor assembly.

4) A heat sensor thermostat shall be attached to and embedded in the winding and be connected in series with the motor starter contactor coil to stop motor if temperature of winding is more than 248ºF (120°C). Thermostat to reset automatically when motor cools to safe operating temperature. Three heat sensors to be used on three phase motors.

5) Common motor pump shaft shall be of 416 stainless steel.

d. Seals

1) Motor shall be protected by two mechanical seals mounted in tandem with a seal chamber between the seals. Seal chamber shall be oil filled to lubricate seal face and to transmit heat from shaft to outer shell.

2) Seal face shall be carbon and ceramic and lapped to a flatness of one light band.

3) A double electrode shall be mounted in the seal chamber to detect any water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control box. This signal shall not stop the motor but shall act as a warning only, indicating service is required.

e. Impeller

1) The impeller shall be ductile iron and of the 2-vane solids handling enclosed type. Vane inlet tips shall be carefully rounded to prevent stringy material from catching the vanes. Pump-out vane shall be used in front and back chamber.
Impeller shall be dynamically balanced. Impeller shall be driven by stainless steel shaft key and impeller held in place with lock screw and washer.

2) Impeller and motor shall lift off as a unit without disturbing discharge piping.

d. Pump Case

1) The volute case shall be of cast iron and have a flanged center line discharge. Discharge flange shall be 4-inch standard with bolt holes straddling centerline.

2) A bronze wear ring shall be pressed into the case for guiding the impeller neck and to prevent corrosion freeze-up. Wear ring shall be held from rotating by locking with a stainless steel set screw in end of ring.

g. Pump and Motor Castings

1) All castings shall be of high tensile cast iron and shall be treated with phosphate and chromate rinse. All fasteners shall be 302 stainless steel.

h. Bearing End Cap

1) Upper motor bearing cap shall be a separate casting for easy mounting and replacement.

i. Power Cables

1) Power cord and control cord shall be double sealed. The power and control conductor shall be single strand sealed with epoxy potting compound and then clamped in place with rubber seal bushing to seal outer jacket against leakage and to provide for strain pull. Cords shall withstand a pull of 300 pounds to meet FM requirements.

2) Insulation of power and control cords shall be type SOOW. Both control and power cords shall have a green carrier ground conductor that attaches to motor frame.

j. Lift-Out Rail System

1) Each submersible pump shall be provided with a lift-out slide rail system as supplied by the same pump supplier. The lift out rail system shall be compatible with pumps supplied. The lift-out rail system shall be of non-sparking design and shall be listed for explosion-proof service.

2) Each lift-out system shall consist of a ductile iron discharge base, brass faced pump attaching and sealing plate, brass pump guide plate, and cast iron elbow. All exposed nuts, bolts, and fasteners shall be 300 series stainless steel. No fabricated steel parts shall be used.

3) The discharge elbow shall be 4”x4”. The elbow shall bolt onto the base and have standard 125 lb. flanges.

4) A sealing plate shall be attached to the pump. A simple downward sliding motion of the pump and guide plate on the guide rails shall cause the unit to be
automatically connected and sealed to the base. The mating face of the sealing plate and base shall be machined to provide a metal-to-metal, leak-proof seal at all operating pressures.

5) The guide rails shall consist of two rail pipes used to guide the pump from the surface to the discharge base connection. The guide rails shall be 1-1/2” schedule 40 stainless steel pipe. The weight of the pump shall bear solely on the discharge base and not on the guide rails. Rail systems which require the pump to be supported by legs which might interfere with the flow of solids into the pump suction will not be considered equal. The guide rails shall be firmly attached to the access hatch frame. Systems deeper than 21 feet shall use an intermediate guide for each 21 feet of wet well depth.

6) An adequate length of stainless steel lifting chains shall be supplied for removing the pumps. The chains shall be of sufficient length and shall include an adequate number of lifting rings to provide ease of pump removal.

k. Piping

1) The piping in the wet well, valve vault, and sanitary sewer force main cleanout manhole shall be flanged ductile iron pipe in the sizes indicated on the Contract Drawings. Flanged pipe shall be made with a minimum Class 53 thickness pipe in accordance with AWWA/ANSI C151/A21.51 and flanges screwed on, faced and drilled in accordance with AWWA/ANSI C110/A21.10 and AWWA/ANSI C115/A21.15. Flanged fittings shall be ductile iron in accordance with ANSI/AWWA C110/A21.10 and 125# ANSI B16.1 faced and drilled. All exterior piping from the valve vault to the cleanout manhole and from the cleanout manhole to the discharge manhole shall be PVC, SDR-21. The discharge piping shall exit the valve vault with at least 5 feet of cover. The Contractor shall supply the necessary fittings to transition from ductile iron piping to PVC piping.

l. Valves

1) Resilient wedge gate valves shall be flanged, ductile iron body, resilient seated type. The valves shall be designed for 250-psi working pressure and 400-psi test pressure. Valves shall have O ring seals and a nonrising stem. Valves shall meet or exceed the requirements of AWWA C-509 and C-515 and will be UL listed and FM approved. Valves shall have wheel handle operators.

2) Check valves shall be flanged, of the full body type, with a domed access cover and be of the swing type. The valve shall be designed, manufactured and tested in accordance with the requirements of AWWA C-508.
   a) The valves shall be provided with flanges in accordance with ANSI B16.1, Class 125.
   b) The valve body shall be full flow equal to nominal pipe diameter at all points through the valve. The 4 in. (350mm) valve shall be capable of passing a 3
in. (75mm) sphere. The seating surface shall be at a 45-degree angle to minimize disc travel. A threaded port with pipe plug shall be provided on the bottom of the valve to allow for field installation of a backflow actuator or oil cushion without special tools or removing the valve from the line.

c) The top access port shall be full size, allowing removal of the disc without removing the valve from the line. The access cover shall be domed in shape to provide flushing action over the disc for operating in lines containing high solids content. A threaded port with pipe plug shall be provided in the access cover to allow for field installation of a mechanical, disc position indicator.

d) The disc shall be of one-piece construction, precision molded with an integral O-ring type sealing surface, and contain alloy steel and nylon reinforcement in the flexible hinge area. The flex portion of the disc shall be warranted for twenty-five years. Non-Slam closing characteristics shall be provided through a short 35-degree disc stroke and a memory disc return action to provide a cracking pressure of 0.25 psig.

e) The valve disc shall be cycle tested 1,000,000 times in accordance with ANSI/AWWA C508 and show no signs of wear, cracking, or distortion to the valve disc or seat and shall remain drop tight at both high and low pressures.

f) The valve body and cover shall be constructed of ASTM A536 Grade 65-45-12 ductile iron.

g) The disc shall be precision molded Buna-N (NBR), ASTM D2000-BG.

h) A screw-type backflow actuator shall be provided to allow opening of the valve during no-flow conditions. Buna-N seals shall be used to seal the stainless steel stem in a Lead-Free bronze bushing. The backflow device shall be of the rising-stem type to indicate position. A stainless steel T-handle shall be provided for ease of operation.

i) A mechanical indicator shall be provided to provide disc position indication on the valves. The indicator shall have continuous contact with the disc under all operating conditions to assure accurate disc position indication.

j) The valve shall be provided with a bottom mounted oil dashpot (oil cushion) to provide hydraulic control of the final 10% of valve closure and reduce valve slam and water hammer normally associated with rapid flow reversal conditions on pump shut down. The dashpot shall consist of a high-pressure hydraulic cylinder, adjustable external flow control valve, oil reservoir, pressure gauge, stainless steel air inlet valve, and piping designed to control the closing speed of the last 10% of travel in 1-5 seconds. A threaded brass dashpot bushing unit with a grease fitting for lubrication shall connect the cylinder to the valve and shall have an air gap to prevent hydraulic fluid from entering the valve and contaminating the water system. A snubber
rod fitted with O-ring seals and rod wiper scrapers shall make contact with the lower portion of the disc’s stainless steel strike plate.

k) Check valves shall have a working pressure rating of 250psi. All valves shall be hydrostatically tested and seat tested to demonstrate zero leakage.

l) The exterior and interior of the valve shall be coated with an NSF/ANSI 61 approved fusion bonded epoxy coating.

m) Check valves shall be suitable for horizontal mounting.

m. Float Switches

1) Pump(s) on, off, and alarm levels shall be controlled by non-mercury mechanical float switches. Switches shall consist of a non-mercury mechanical float switch sealed in a corrosion-resistant polypropylene housing with a minimum of 18 gauge, 2 wire, SJOW/A jacketed cable. The cable shall be of sufficient length to reach the junction box with no splices. The level controls shall be suspended from a stainless steel bracket so that adjustment or replacement may be done without the use of any tools. Level controls shall be UL/CSA listed. The float switches shall be set at the elevations indicated on the Contract Drawings.

n. Three Phase Duplex Control Panel

1) A NEMA 3R steel three phase duplex control panel shall be mounted on the new Animal Science Building as indicated on the Contract Documents. The Contractor shall provide all necessary hardware, conduit, and cables to connect the control panel to the power supply from the building and to the pump station wet well.

2) All electrical components shall be mounted in a NEMA 3R galvanized steel enclosure. The enclosure shall be 14-gauge galvanized steel and shall have a hasp for padlocking.

3) A separate hinged dead front inner door shall be provided in the enclosure. All control switches, lights, and overload resets shall be mounted through the inner door. The pump circuit breaker and control circuit breaker shall be mounted with operating handles through the inner door and shall have locking tabs that prevent the inner door from being opened with the breakers in the “ON” position.

4) Both the inner door and the back panel shall be a minimum of 14-gauge galvanized steel, and shall be painted on both sides with a white enamel finish.

5) Equipment mounted in the control panel shall include: pump circuit breaker, control circuit breaker, alarm circuit fuse, control circuit fuse, I.E.C. rated motor starter with 3-pole ambient compensated bi-metal overload relay for each pump, two (2) pump hand-off-auto switches, alarm test switch, two (2) pump run lights, seal leak lights, alternator relay (solid state), control circuit
transformer with primary fusing, override relay, terminal blocks, lead/lag alternate selector switch, ground lugs, and all necessary wiring and brackets.

6) The control panel shall be fitted with a red lexan (polycarbonate) alarm light. The light shall be approximately 3” high by 3-1/2” diameter. The globe shall be mounted on top of the enclosure with a neoprene gasket. The lens cannot be removed from the exterior of the enclosure. The lens may be removed by entering the interior of the enclosure and removing four (4) #8 screws. The bulb shall be 25-watt minimum high intensity-medium base type. The bulb shall be easily replaced by removing a thumb screw from the support bracket on the interior of the panel.

7) The alarm shall have a bright glow and flash during high water conditions. The alarm light will go out when the water level drops.

8) An elapsed time meter shall be provided for each pump to record the actual running time of the motor. The elapsed time meter shall be energized by an auxiliary contact from the motor starter or contactor and be wired in parallel with the pump run light. The elapsed time meter shall have a maximum reading of 99,999.99 hours and be non-resettable.

9) A set of dry contacts shall be provided for the remote monitoring of a panel function. Functions may include high water, low water, seal failure, or pump running conditions. The dry contacts shall close upon the detection of said condition. Contacts shall be rated for 3 amps.

10) The panel shall contain a control circuit transformer, which shall reduce the control circuit voltage to 24 volts. The 24 volts shall be supplied to all lights, switches, relays, and floats.

11) Intrinsically safe relays shall be provided for the float switches in the wet well. The float switches shall be incapable of releasing sufficient electrical or thermal energy under normal conditions to cause ignition of a specific hazardous atmospheric mixture suitable for use in Division I locations. The intrinsically safe relay shall read circuits up to 3,000 ohms resistance. The power transmitted through the float switch shall be held to a maximum of 12 vdc and 3 ma. The duplex panel shall use three relays (pump off-on, override, high water).

12) A lightning arrester shall be supplied in the Control Panel. The arrester shall protect the equipment from over-voltages caused by lightning discharges. The arrester shall be rated at 650 volts RMS L-G.

13) An acknowledge alarm circuit with horn shall be provided to indicate an alarm condition. The horn shall be energized by either the alarm float switch or the alarm test switch and operate in conjunction with the alarm light. The horn shall be weatherproof and be rated for 103 db at 10 ft. There shall be an exterior acknowledge switch that will silence the horn but allow the light to remain flashing during an alarm condition.
14) A low-level cutoff and alarm circuit shall be supplied in the control panel. The circuit shall override the entire system and prevent pump operation below a pre-determined level. The circuit shall also signal the panel alarm. The circuit shall use a normally closed float switch.

15) The Control Panel shall contain a phase monitor/relay. The monitor/relay shall protect pump motors against phase loss, under voltage, and phase reversal conditions. When incorrect phase sequence or phase loss occurs or if the three-phase voltages fall below the drop out voltages (field adjustable), the monitor/relay shall drop out the pumps and signal the panel alarm. The pumps and alarm shall return to normal after the condition(s) are corrected.

16) The Control Panel shall contain seal leak circuitry. The seal leak circuitry shall contain a test switch and light that will allow the integrity of the circuit to be tested.

17) All internal wiring shall be neat and color coded. Each wire shall be different color or stripe (except for ground), and all incoming wires shall terminate into a box clamp type terminal block. All control wires shall be 14 Ga. Type TEW rated for 105 degrees Celsius.

18) A schematic diagram (showing wire color) shall be permanently fastened to the inside of the enclosure. An Installation and Service Manual shall also be included with each control panel.

19) The control panel shall be U.L. listed as an assembly.

o. Control System

1) The control system for the pump chamber shall have the capability to perform the following tasks: start lead pump (Pump Number 1) when water level reaches lead pump “On” elevation, start lag pump (Pump Number 2) when water level reaches lag pump “On” elevation, turn the operating pump(s) off when the water level reaches pump(s) “Off” elevation in wet well, activate an alarm when the level reaches a high water level, and activate an alarm condition if the water level reaches a low level in the chamber. All alarm and pump on and off levels shall be activated by float switches placed at the elevations shown on the Contract Drawings. The control panel also shall be capable of alternating starts of Pump Number 1 and 2. The high-water alarm condition shall activate an alarm horn and an alarm beacon mounted on the top of the control cabinet. Within the control panel, lights shall be provided and labeled for each of the alarm conditions to make it possible to determine what caused the alarm. The Contractor is responsible for providing a fully functioning system as described.

p. Alarm Signaling

2) The Contractor shall provide alarm signaling as indicted for the pump station at the control panel. Any and all alarm conditions from the pump chamber shall be
relayed to the annunciator panel as a single "Pump Chamber Alarm Condition". The annunciator panel shall be mounted in the building in a location as indicated on the Electrical Drawings.

N. Identification

1. Detectable Underground Warning Tapes: Acid and alkali-resistant, polyethylene plastic film warming tape, 6-inches wide by 4-mils. minimum thickness, with continuously printed caption in black letters “CAUTION – xxxx LINE BURIED BELOW.” The text and color of the tape shall be as shown in the table below. The tape shall have a metallic core encased in a protective jacket for corrosion protection and be detectable by a metal detector when the tape is buried up to 2.5 feet deep.

<table>
<thead>
<tr>
<th>Color</th>
<th>Utility</th>
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</thead>
<tbody>
<tr>
<td>Safety Red</td>
<td>Electric</td>
</tr>
<tr>
<td>High Visibility Safety Yellow</td>
<td>Gas, Oil, Steam</td>
</tr>
<tr>
<td>Safety Alert Orange</td>
<td>Telephone, Communications, Cable Television</td>
</tr>
<tr>
<td>Safety Precaution Blue</td>
<td>Water System, Irrigation</td>
</tr>
<tr>
<td>Safety Green</td>
<td>Sanitary Sewer, Storm Sewer</td>
</tr>
<tr>
<td>White</td>
<td>Proposed Excavation</td>
</tr>
</tbody>
</table>

G3030 STORM SEWER

A. Work Included: Provide labor, materials, and equipment necessary to construct the storm drainage system complete, including connections to existing structures and testing, as indicated on the Drawings and as specified.

B. Unless otherwise indicated on the Drawings, building drain service lines shall be installed from a point 10 feet outside the building foundation walls to the point of disposal.

C. Precast Concrete Vaults And Tanks

1. The precast reinforced concrete vault and tank structures shall be designed by a Massachusetts Registered Professional Engineer employed by the Contractor, in accordance with the applicable sections of the following references:

   b. American Concrete Institute, ACI 318 "Building Code Requirements for Reinforced Concrete."
   c. AASHTO, "Standard Specifications for Highway Bridges."
   d. Precast Concrete Institute, "Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products, MNL-116."
2. The structures shall be designed for the following loads and possible combinations thereof:
   
   a. Lateral soil pressure = 60 PCF (H), where H is the height from grade, as shown on the Contract Drawings, to the point of the structure being considered.
   
   b. Soil weight shall be assumed to be 120 PCF.
   
   c. AASHTO HS-20-44 loading.
   
   d. Weight of precast concrete structure.
   
   e. Initial handling and erection loadings, including design of galvanized lifting hooks using a safety factor = 4.0.

3. Investigate buoyancy and soil bearing considerations assuming the groundwater elevation is one-foot below the ground surface.

4. Concrete shall have a minimum 28-day compressive strength of 5,000 psi using Type II or III Portland cement with 8% maximum content of tricalcium aluminate, ASTM C150. A "normal dosage" of air-entraining agent shall be added to the concrete during the mixing cycle. Reinforcement shall be deformed billet-steel ASTM A615 or 7-wire strand ASTM A416, Grade 270 (if prestressed).

5. Dimensions and opening sizes and locations shall be as indicated on the Contract Drawings.

6. Pipe Connections: Vault and tank structures shall have pipe openings to accept the type of pipe specified. Pipe opening shall be minimum size required to receive the pipe and shall be accurately set to conform to the required line and grade. Sewer pipe shall be joined to the wall of the concrete structure with flexible pipe sleeves as indicated on the drawings. Flexible pipe sleeves shall be cast in the walls of the structure during the manufacturing process. Flexible pipe sleeves shall be NPC Kor-N-Seal Pipe-to-Manhole Connector as manufactured by Trelleborg Pipe Seals Milford, Inc., Milford, NH; Z-Lok as manufactured by A-Lok Products, Inc., Tullytown, PA; Tylox CIB Series Cast-In Boot Connector as manufactured by Hamilton Kent, Winchester, TN; or approved equal.

7. Bituminous Waterproofing: The exterior surfaces of precast structures shall be given two heavy coats of bituminous waterproofing material. The material shall be No. 35-J-10 Hi Building Bituminous Coating made by Mobil Chemical Company, Edison, NJ; Bitumastic Super Service Black made by Koppers Company, Inc., Pittsburgh, PA; Bitumastic 300M made by Caroline Company, St. Louis, MO; Sonoshield HLM 5000 as manufactured by BASF Corporation Building Systems, Shakopee, MN; or acceptable equivalent products. The waterproofing material shall be applied by brush or spray and in accordance with the instructions of the manufacturer. Time shall be allowed between coats to permit sufficient drying so that the application of the second coat has no effect on the first coat.
8. Storm Drainage Brick Masonry: Bricks shall be sound, hard, uniformly burned, regular, and uniform in shape and size. Underburned or salmon brick shall not be acceptable. Only whole brick shall be used.
   a. Bricks for raising manhole and catch basin frames to finished grade shall conform to ASTM C32, Grade MS.
   b. Mortar shall be in conformance with ASTM C270, Type M. The mortar shall be composed of one part Portland cement, 3-1/2 parts sand, and ¼ parts hydrated lime, by volume. Portland cement shall be ASTM C150, Type II; hydrated lime shall be Type S conforming to ASTM D207.
   c. Sand shall be washed, cleaned, screened, well-graded with all particles passing a No. 4 sieve, and conform to ASTM C33

D. Manholes And Catch Basins


2. Manhole Top: Precast concrete, of concentric cone, eccentric cone, or flat slab top type, as indicated in the Contract Drawings. Tops shall be designed to meet H20 loadings.


4. Cement: Type II.

5. Concrete strength: 4,000 psi minimum.

6. Precast concrete sections shall have tongue and groove joints.

7. Horizontal Joints: Joints between sections of concrete structures shall be sealed with a flexible, watertight joint, made with preformed butyl rubber joint sealant conforming to ASTM C990 or with a rubber gasket joint conforming to ASTM C443. Sealants and/or gaskets shall be installed in accordance with the manufacturer’s written instructions.

8. Manhole Steps: Steps for manholes shall be non-skid raised edge-front steel reinforced polypropylene plastic type with at least 13 inches wide stepping surface. Steps shall meet the requirements of ASTM C-478 and AASHTO M-199. Steel shall be 1/2-inch grade 60 conforming to ASTM A615 encapsulated with molded copolymer polypropylene. The polypropylene shall conform to ASTM D-4101. Rungs shall protrude no more than 6 inches from the wall. The portion of the legs to be embedded in the precast section shall have fins and be tapered to ensure a secure bond. Steps shall start a foot above the shelf of the manhole floor and continued twelve inches on center spacing up through the completed height of the unit. The steps shall finish no lower
than twenty-four (24)-inches below the rim elevation. Placement into precast walls shall be by a method recommended by the supplier of the precast manhole sections. Steps shall be installed per the manufacturer’s specifications.

9. Pipe Connections: Drainage structures shall have plain beveled openings to accept the type of pipe specified. Pipe openings shall be minimum size required to receive the pipe and shall be accurately set to conform to the required line and grade. Drain pipe shall be joined to the wall of the concrete manhole or catch basin with non-shrink grout or flexible manhole sleeve as indicated on the drawings. Grout mixture shall follow instructions provided by manufacturer. Flexible manhole sleeves shall be cast in the walls of the manholes during the manufacturing process. Flexible manhole sleeves shall be NPC Kor-N-Seal Pipe-to-Manhole Connector as manufactured by Trelleborg Pipe Seals Milford, Inc., Milford, NH; Z-Lok as manufactured by A-Lok Products, Inc., Tullytown, PA; Tylox CIB Series Cast-In Boot Connector as manufactured by Hamilton Kent, Winchester, TN; or approved equal.

10. Drain manholes shall be constructed with drop connections when the proposed invert of the connection is at least 2.75 feet above the manhole invert. All drop manholes will be of the external type. The drop pipe shall be constructed of minimum SDR 35 PVC. The drop piping and horizontal cleanout sections will be sized the same as the drain main piping and shall enter the manhole at invert elevation. The drop portion of the piping shall be secured with anchor straps. The drop piping shall be encased with control density fill.

11. Storm Drainage Brick Masonry: Bricks shall be sound, hard, uniformly burned, regular, and uniform in shape and size. Underburned or salmon brick shall not be acceptable. Only whole brick shall be used.
   a. Bricks for raising manhole and catch basin frames to finished grade shall conform to ASTM C32, Grade MS.
   b. Mortar shall be in conformance with ASTM C270, Type M. The mortar shall be composed of one part Portland cement, 3-1/2 parts sand, and ¼ parts hydrated lime, by volume. Portland cement shall be ASTM C150, Type II; hydrated lime shall be Type S conforming to ASTM D207.
   c. Sand shall be washed, cleaned, screened, well-graded with all particles passing a No. 4 sieve, and conform to ASTM C33.

12. Inverts in drain manholes shall be constructed of cement concrete shaped to conform accurately to size of the adjoining pipe. Side inverts and main inverts where the direction changes shall be laid out in smooth curves of the longest possible radius which is tangent, within the manhole, to the centerline of the adjoining pipe lines.
13. For all manhole depths greater than 10 feet, the inside diameter of the manholes shall be at least 5'-0”.

14. Safety landings will be installed inside manholes greater than 16-feet in depth.

15. When installing manholes on existing lines and when flows cannot be diverted, drop-over manholes shall be used. Drop-over manholes shall be precast with opening cast in the sidewalls of sufficient size to fit over the existing line(s) to remain in service. Drop-over manholes shall be set on a precast or cast-in-place concrete base slab. Drop-over manholes shall be manufactured to the same requirements and dimensions as standard manholes.

E. Concrete Block Manholes

1. Concrete block manholes shall only be utilized when it is not feasible to utilize a precast concrete manhole and then only with written approval from the Owner’s Representative.

2. Concrete block drain manholes shall be minimum 48 inches inside diameter and built of standard solid manhole barrel blocks set on a concrete or precast sectional plate base. The upper 2 feet of masonry shall be built using batter blocks. All joint spaces shall be completely filled, horizontal and vertical. All block to be thoroughly wet before jointing. A leveling course of two bricks at the top shall be used to meet proper grade. Cement concrete blocks shall be machine-made solid segments conforming to the requirements for Concrete Masonry Units for Construction of Catch Basin and Manholes, ASTM-C-139. Blocks shall be 6 inches in width with the inside and outside surfaces curved to the necessary radius and so designed that the interior surfaces of the structures shall be cylindrical. The top batter courses shall be designed to reduce uniformly the inside section of the structure to the top size and shape. The blocks used in the top courses shall be designed to produce a surface 8 inches in width upon which to seat the frame.

F. Manhole Frames and Covers

1. Frames and covers shall be of cast iron conforming to the requirements of ASTM A48, Class No. 30 and shall be manufactured by General Foundries Inc., North Brunswick, New Jersey; East Jordan Iron Works (formerly LeBaron Foundry, Inc.), East Jordan, Michigan; Neenah Foundry Company, Neenah, Wisconsin; or approved equal. Manhole covers shall be machined to fit securely and evenly on the frame. Frames and covers shall be designed to accept H2O loads, have a diamond surface finish, and frame height of 6 to 9-inches. Covers shall be equal to Item Numbers 12665 and 12685 (6” and 8-1/8” frame heights, respectively) as manufactured by General Foundries Inc. Catalog numbers are provided to establish a standard of quality and configuration of castings. Covers shall bear the word “DRAIN” in 3-inch-high letters.

G. Catch Basin Frames and Grates
1. Catch basin grates located at low points shall consist of a 24-inch square grate with a minimum frame height of 8 inches unless otherwise noted on the drawings. Frames and grates shall be of cast iron and designed to accept H20 loads. Catch Basin Frames and Grates shall be manufactured by General Foundries Inc., North Brunswick, New Jersey; East Jordan Iron Works (formerly LeBaron Foundry, Inc.), East Jordan, Michigan; Neenah Foundry Company, Neenah, Wisconsin; or approved equal. Single frames and grates shall be equal to Item Numbers 22444-SQH, 22464-SQH, and 22484-SQH (4”, 6”, and 8” frame heights, respectively) as manufactured by General Foundries Inc. ADA Compliant frames and grates shall be equal to Item Numbers 22444-ADA, 22464-ADA, and 22484-ADA (4”, 6”, and 8” frame heights, respectively) as manufactured by General Foundries Inc. Double frames and grates shall be equal to Item Numbers 24844-SQH, 24864-SQH, and 24884-SQH (4”, 6”, and 8” frame heights, respectively) as manufactured by General Foundries Inc. Four and three-flange frames shall be provided as required. Catalog numbers are provided to establish a standard of quality and configuration of castings.

2. Catch basin cascade frames and grates shall consist of a 24-inch square grate with a minimum frame height of 8 inches unless otherwise noted on the drawings. Frames and grates shall be of cast iron and designed to accept H20 loads. Cascade frames and grates shall be manufactured by General Foundries Inc., North Brunswick, New Jersey; East Jordan Iron Works (formerly LeBaron Foundry, Inc.), East Jordan, Michigan; Neenah Foundry Company, Neenah, Wisconsin; or approved equal. Cascade frames and grates shall be equal to Item Numbers 22444-CAS, 22464-CAS, and 22484-CAS (4”, 6”, and 8” frame heights, respectively) as manufactured by General Foundries Inc. Four and three-flange frames shall be provided as required. Catalog numbers are provided to establish a standard of quality and configuration of castings.

H. Catch Basin Hoods

1. All catch basins shall have hoods installed over the outlet pipe. Hoods shall be cast iron removable or hinged traps that fit over the catch basin outlet pipe. Traps shall be approximately 19-inches wide by 18-inches high and extend 11-inches from the wall of the structure. Catch Basin Hoods shall be manufactured by General Foundries Inc., North Brunswick, New Jersey; East Jordan Iron Works (formerly LeBaron Foundry, Inc.), East Jordan, Michigan; Neenah Foundry Company, Neenah, Wisconsin; or approved equal. Hoods shall be equal to Item Number MATRP as manufactured by General Foundries Inc. Catalog numbers are provided to establish a standard of quality and configuration of castings.

I. Area Drain

1. Area drains required for this contract shall be manufactured from PVC pipe stock, utilizing a thermo-molding process to reform the pipe stock to the specified configuration. The drainage pipe connection stubs shall be manufactured from PVC pipe stock and formed to provide a watertight connection with the specified pipe system.
This joint tightness shall conform to ASTM D3212 for joints for drain and sewer plastic pipe using flexible elastomeric seals conforming to ASTM F477. The pipe bell spigot shall be joined to the main body of the area drain. A PVC cap shall be installed at the bottom of the area drain sump. The raw material used to manufacture the pipe stock that is used to manufacture the main body and pipe stubs of the surface drainage inlets shall conform to ASTM D1784 cell class 12454. Area drains shall be manufactured by Nyloplast or approved equal.

2. Grates and frames furnished for all area drainage shall be ductile iron for sizes 8”, 10”, 12”, 15”, 18” and 24” and shall be made specifically for each basin so as to provide a round bottom flange that closely matches the diameter of the surface drainage inlet. Grates for area drains shall be capable of supporting H-20 wheel loading for vehicular traffic areas or H-10 loading for pedestrian traffic areas unless otherwise noted. 12” and 15” square grates shall be hinged to the frame using pins. Metal used in the manufacture of the castings shall conform to ASTM A536 grade 70-50-05 for ductile iron. Grates shall be provided painted black. Grates in walkways shall meet ADA requirements. Grates in planting beds shall be domed grates. The grates furnished for area drains bioretention areas shall be 24” in diameter. Area drain grates shall be manufactured by Nyloplast or approved equal.

J. Inline Drains

1. The inline drain required for this contract shall be manufactured from PVC pipe stock, utilizing a thermos-molding process to reform the pipe stock to the furnished configuration. The drainage pipe connection stubs shall be manufactured from PVC pipe stock and formed to provide a watertight connection with the specified pipe system. This joint tightness shall conform to ASTM D3212 for joints for drain and sewer plastic pipe using flexible elastomeric seals. The flexible elastomeric seals shall conform to ASTM F477. The pipe bell spigot shall be joined to the inline drain body by use of a swage mechanical joint. The ram material used to manufacture the pipe stock that is used to manufacture the inline drain body and pipe stubs of the surface drainage inlets shall conform to ASTM D1784 cell class 12454.

2. The grates furnished for all surface drainage inlets shall be ductile iron grates for sizes 8”, 10”, 12”, 15”, 18”, and 30” shall be made specifically for each fitting so as to provide a round bottom flange that closely matches the diameter of the surface drainage inlet. Grates for inline drains shall be capable of supporting H-20 wheel loading for traffic areas or H-10 loading for pedestrian areas. 12” and 15” square grates will be hinged to the frame using pins. Metal used in the manufacture of the castings shall conform to ASTM A536 grade 70-50-05 for ductile iron. Grates shall be provided painted black.

K. Manufactured trench drains
1. Trench drains shall be a pre-engineered, manufactured system that conforms to the
design loading requirements of AASHTO H-20 and HS-20 (minimum) with the following
minimum requirements:

   a. Channels shall be manufactured from polyester resin polymer concrete with an
      integrally cast-in ductile iron edge rail. Each edge rail shall be at least ¼” thick.
   b. The polymer concrete shall be frost proof, dilute acid and alkali resistant, and salt
      proof (B117 Salt Spray Test Compliant) with the minimum properties as follows:

      1) Compressive Strength: 14,000 psi
      2) Flexural Strength: 4,000 psi
      3) Tensile Strength: 1,500 psi
      4) Water Absorption: 0.07%
   c. The system shall be 12” nominal internal width with a 14.2” overall width and a
      built-in slope of 0.5%. Channel invert shall have a partial radius in the trench
      bottom. All channels shall be interlocking with a male/female joint.
   d. Trench drain grates shall be slotted ductile iron conforming to ASTM 536-84, Grade
      65-45-12. After removal of grates, there shall be uninterrupted access to the trench
      to aid maintenance.
   e. Units shall have horizontal cast in anchoring keys on the outside wall to ensure
      maximum mechanical bond to the surrounding bedding material and pavement
      surface.
   f. The trench drain shall have a locking device that directly connects the grate to the
      frame.
   g. Channel shall be designed to withstand loading to Load Class F as outlined by EN
      1433. Grate type shall be appropriate to meet the system load class specified.
   h. Trench drain system shall be installed in strict accordance with manufacturer's
      installation instructions, recommendations, and shop drawings.

L. Water Quality Structure

1. The water quality drainage structure models indicated on the Contract Drawings are
   Stormceptor® as manufactured by the Stormceptor Corporation, Rockville, MD.
   Equivalent structures include Vortechs as manufactured by Vortechics, Inc. of Portland,
   ME, and Downstream Defender as manufactured by Hydro International of Portland,
   ME. Other acceptable equivalent manufactured devices may be used if following
   requirements are met. Prior to acceptance, the contractor shall receive written
   approval for use of said substitution from the Town of Worcester and/or their
   authorized representatives.
2. The water quality structure shall have a proven laboratory test record of having the capability to remove a minimum of 80% of the sediment load from the low-flow storm conditions from the total catchment area of the drainage system. Laboratory testing methods shall conform to the “Technology Acceptance Reciprocity Partnership” (TARP) Tier II protocol or other acceptable equivalent method and shall have the capability of removing clay and silt size particles.

3. The available water quality structure laboratory performance documentation shall achieve a grade of “2” or better as rated through the “Massachusetts Stormwater Evaluation Project” (MAStep).

4. The water quality structure shall be installed underground as part of the stormwater system.

5. The structure shall be constructed of precast concrete components.

6. Precast Concrete Sections: All precast concrete components shall be designed and manufactured to a minimum live load of AASHTO HS-20 truck loading.

7. Joints: The concrete joints shall be watertight and meet the design criteria according to ASTM C443.

8. Frame and Cover: The frame and cover shall clearly indicate with lettering the unit’s name cast into the cover to allow for easy identification in the field.

9. Concrete: Precast concrete components shall meet the requirements of ASTM C478.

10. Fiberglass: The fiberglass portion of the water treatment structure shall be constructed in accordance with ASTM D409, Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks. The internal fiberglass insert shall be bolted and sealed watertight inside the reinforced concrete component.

11. The water quality structure shall be vertically oriented with easy access to facilitate maintenance.

12. The first 16 inches of oil storage should be lined with fiberglass or other coating acceptable to the Engineer to provide double-wall containment of any hydrocarbon-based material.

13. Water quality structure shall be equipped with high flow bypass that shall be physically separated from the separation area to prevent mixing.

14. The structure shall be maintainable from the surface via access points without requiring entry into the structure.

15. The structure shall be designed to prevent the formation of secondary eddy currents or scour conditions.

16. The structure shall be able to be installed to the invert elevations of the drainage system as detailed on the Contract Drawings.

17. The water quality structure shall be capable of containing floatable substances such as oil and gasoline within the structure during normal operation as well as periods of service and repair. Floatables containment shall be achieved without the use of floatable additives.
18. The water quality structure shall not be compromised by backwater conditions i.e., trapped pollutants should not be resuspended and scoured from the interceptor during backwater conditions.

19. Calculations stamped by a Professional Engineer shall be supplied to demonstrate that the water quality structures will accept the design flow rates without causing a backwater condition.

20. Inspection: All precast concrete sections shall be inspected to ensure that dimensions, appearance, and quality of the product meet the requirements of ASTM C478.

M. Ductile Iron Pipe And Fittings

1. General: Provide pipes of the following materials of class indicated. Provide pipe fittings and accessories of same materials and class as pipes with joining method, as indicated. The piping shall be manufactured by an established manufacturer of good reputation in the industry and in a permanent plant adapted to meet all the design requirements of the pipe.

   a. Ductile iron pipe shall be that of a manufacturer who can demonstrate at least five years of successful experience in manufacturing ductile iron pipe. The pipe shall be equipped with push on type, restrained joint, or mechanical joints, as required.

   b. All ductile iron drain pipe shall conform to American Water Works Association (AWWA) C150 and AWWA C151.

   c. The ductile iron pipe shall be Class 52 and furnished in minimum nominal 18-foot lengths, with Push-on as manufactured by U.S. Pipe and Foundry Company, Atlantic States Cast Iron Pipe Co., Clow Corporation, or approved equal with gaskets conforming to AWWA C111 "Rubber Gasket Joints".

   d. Ductile iron drain pipe shall be cement-mortar lined and the pipe exterior asphalt seal coated in accordance with AWWA C104.

   e. The pipe shall be furnished along with necessary materials and equipment recommended by the manufacturer for use in joining pipe lengths and fittings.

   f. Fittings shall be ASTM A-536 ductile iron with mechanical joint fittings. All fittings 3 inches through 48 inches in diameter shall meet or exceed the requirements of AWWA C110. Compact fittings shall be ductile iron meeting or exceeding the requirements of AWWA C153. Fittings shall have the same lining and coating as the pipe specified above. All fittings shall be marked with the weight and shall have distinctly cast upon them the pressure rating, the manufacturer's identification, nominal diameter of openings and the number of degrees or fraction of the circle on all bends. All fittings 4 through 24 inches shall be Class 350. All fittings greater than 24 inches shall be as specified above except they shall be Class 250. Compact fittings shall only be used in sizes 4 through 24 inches. Fittings shall conform to the weights, excluding accessories, and dimension shown in the latest edition of the Handbook of Ductile Iron Pipe and come complete with all joint accessories as
required. All accessories (gland, gaskets, T-bolts, and nuts) shall be in accordance with AWWA C111. All mechanical joint bolts (T-bolts) shall be Cor-Ten or equal.

g. Contractor shall provide all adapters and fittings such as transition couplings, as determined in the field, necessary to complete all cross connections, whether or not specifically stated in the Contract Drawings and Specifications.

h. All pipes shall be marked with the class, thickness designation, and initials of the manufacturer.

i. If required the manufacturer shall supply the Engineer with certificates of compliance with these Specifications and certification that each piece of ductile iron pipe has been tested at the foundry with the Ball Impression Test, Ring Bending, or equal.

j. Pipe for use with sleeve-type couplings shall be as specified except that the ends shall be plain (without bells or beads). The ends shall be cast or machined at right angles to the axis.

2. Inspection, Tests, and Acceptance For Ductile Iron Pipe

a. All pipe delivered to the job site shall be accompanied by test reports certifying that the pipe and fittings conform to "AWWA Standard for Ductile Iron Pipe, for Water and Other Liquids" (AWWA H3) and (AWWA C151).

b. All tests shall be made in accordance with the methods prescribed by the above mentioned AWWA Standards, and the acceptance or rejection shall be based on the test results.

c. Pipe which does not conform to the requirements of this contract shall be immediately removed and replaced by the Contractor.

d. All ductile iron pipe to be installed under this Contract may be inspected at the foundry for compliance with these Specifications by an independent testing laboratory selected by the Owner. The Contractor shall require the manufacturer's cooperation in these inspections. The cost of foundry inspection of all pipe approved for this Contract, plus the cost of the inspection of a reasonable amount of disapproved pipe, will be borne by the Owner.

3. Sleeve Couplings For Ductile Iron Pipe

a. Sleeve couplings and accessories shall be pressure rated at least equal to that of the pipe. Couplings shall be cast iron and shall be Dresser Style 53 or 153, Rockwell Style 441, Baker Series 4245 or acceptable equivalent product. The couplings shall be provided with Cor-Ten bolts and nuts or approved equal.

b. After assembly, all exterior surfaces including the bolts and nuts shall be thoroughly coated with two coats of heavy-duty protective coating. The interior of the coupling shall be epoxy coated. Coating shall be a minimum of 10 mils. and a maximum of 20 mils. dry film thickness thermosetting epoxy.

N. Hub and Spigot Cast Iron Soil Pipe And Fittings
1. Hub and Spigot Cast Iron pipe and fittings shall be manufactured from gray cast iron and shall conform to ASTM A74. Joints shall be made using a compression gasket manufactured from an elastomer meeting the requirements of ASTM C564. Installation shall comply with manufacturer’s recommendations and applicable code requirements.

O. PVC Drainage Pipe

1. General: Provide pipes of the following materials of class indicated. Provide pipe fittings and accessories of same materials and class as pipes with joining method, as indicated. The piping shall be manufactured by an established manufacturer of good reputation in the industry and in a permanent plant adapted to meet all the design requirements of the pipe.

2. PVC (Polyvinyl Chloride) Gravity Sewer Pipe and Fittings: ASTM D3034, SDR 35, for elastomeric gasket joints. Pipe 18 to 36 inches in diameter shall conform to ASTM F679, T-1 heavy wall. The pipe shall have an SDR ration of 35 and a pipe stiffness of 46 psi.

3. Joints: PVC pipe shall have an integral wall bell and spigot push-on joint with elastomeric gaskets secured in place in the bell of the pipe. The bell shall consist of an integral wall section with solid cross section elastomeric gasket, factory assembled, securely locked in place to prevent displacement during assembly. Pipe joints shall conform to ASTM D3212 and elastomeric gaskets shall conform to ASTM F477.

4. Spigot pipe ends shall be supplied with bevels from the manufacturer to ensure proper insertion. Each spigot end shall have an “assembly stripe” imprinted thereon to which the bell end of the mated pipe will extend upon proper joining of the two pipes.

5. PVC gravity sewer fittings and accessories shall be as manufactured and furnished by the pipe supplier or approved equal and have bell and spigot configurations compatible with that of the pipe.

P. Corrugated Polyethylene Pipe

1. General: Provide pipes of the following materials of class indicated. Provide pipe fittings and accessories of same materials and class as pipes with joining method, as indicated. The piping shall be manufactured by an established manufacturer of good reputation in the industry and in a permanent plant adapted to meet all the design requirements of the pipe.

a. Corrugated polyethylene pipe shall have an interior surface that is smooth and even, free from roughness, projections, indentations, offsets, or irregularities of any kind.

1) Pipe shall conform to AASHTO M252, Type S for 4- through 10-inch diameter pipes.

2) Pipe shall conform to AASHTO M294, Type S or ASTM F2306 for 12- through 60-inch diameter pipes.

3) Fittings shall conform to AASHTO M252, AASHTO M294 or ASTM F2306. Bell and spigot connections shall utilize a spun-on or welded bell and valley or saddle
Easthampton Maple Elementary School
Design Alternative E.4; Pre-K Through Grade 8
Schematic Design Specifications

1. General: Provide pipes of the following materials of class indicated. Provide pipe fittings and accessories of same materials and class as pipes with joining method, as indicated. The piping shall be manufactured by an established manufacturer of good reputation in the industry and in a permanent plant adapted to meet all the design requirements of the pipe.

   a. The pipe shall have an interior surface, which is smooth and even, free from roughness, projections, indentations, offsets, or irregularities of any kind. Pipe shall conform to ASTM "Specifications for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe," Designation: C76 and shall be Wall B for the Class IV and V, as noted on the drawings, and with additions and exceptions as follows:

2. Corrugated Polyethylene Flared End Section

   a. The pipe shall have an interior surface that is smooth and even, free from roughness, projections, indentations, offsets, or irregularities of any kind. Flared end section shall be high-density polyethylene meeting ASTM D3350 minimum cell classification 213320C. Metal threaded fastening rods shall be stainless steel.

3. Joints on Corrugated Polyethylene Pipe

   a. The pipe and fitting joints shall be bell-and spigot with watertight gaskets in accordance with the requirements of ASTM D3212.

   b. Gaskets shall meet the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly.

   c. Pipe entrances at catch basins shall be made with a mortar made with Type II cement. Mortar mixture shall follow instructions provided by cement manufacturer. Pipe connections at drain manholes and water quality structures shall be made with integral flexible rubber sleeves and Corrugated Pipe Adapters designed for use with the pipe and sleeves.

Q. Reinforced Concrete Pipe (Class IV; 12 Through 48 Inches)

   1. General: Provide pipes of the following materials of class indicated. Provide pipe fittings and accessories of same materials and class as pipes with joining method, as indicated. The piping shall be manufactured by an established manufacturer of good reputation in the industry and in a permanent plant adapted to meet all the design requirements of the pipe.

   a. The pipe shall have an interior surface, which is smooth and even, free from roughness, projections, indentations, offsets, or irregularities of any kind. Pipe shall conform to ASTM "Specifications for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe," Designation: C76 and shall be Wall B for the Class IV and V, as noted on the drawings, and with additions and exceptions as follows:
b. Type II cement shall be used unless otherwise approved by the Engineer. Admixtures shall not be used except with prior approval of the Engineer.

c. Elliptical reinforcement will not be permitted. Longitudinal reinforcement shall be continuous. Reinforcement shall have a minimum cover of ¾ inch. Pipe shall have no lifting holes.

d. Absorption shall be as specified under "Tests of Materials and Pipe Units."

e. Pipes manufactured by the centrifugal process or in vertical forms shall be cast of wet mix concrete. Concrete cast in vertical forms shall be consolidated by internal or external mechanical vibration or both. The vibrating equipment shall be operated at high speed (more than 5,000 rpm) and have a low amplitude. Pipes manufactured by the modified packer process shall have a supplementary concrete densification operation that shall assure the attainment of full bond between reinforcement and concrete and also eliminate any displacement of the reinforcement. Additional passes with the revolving packerhead or the use of additional vibrators attached to the platform or exterior forms will not be acceptable.

f. Pipe units shall have a minimum laying length of 8-feet except as otherwise indicated or allowed by the Engineer.

g. Pipe may be rejected for any of the following reasons:

1) Exposure of any wires, positioning spacers or chairs used to hold the reinforcement cage in position, or steel reinforcement in any surface of the pipe, except as permitted by Section 8.2 of ASTM C76.

2) Transverse reinforcing steel found to be in excess of 1/4-inch out of specified position after the pipe is molded.

3) Any shattering or flaking of concrete as a crack.

4) Voids, with the exception of a few minor bugholes, on the interior and exterior surfaces of the pipe exceeding 1/4-inch in depth, unless properly and soundly pointed with mortar or other approved material.

5) A hollow spot (identified by tapping the internal surface of the pipe) which is greater than 30-inches in length or wider than 3 times the specified wall thickness.

6) Defects that indicate imperfect molding of concrete; or any surface defect indicating honeycomb or open texture (rock pockets) greater in size than area equal to a square with a side dimension of 2½ times the wall thickness or deeper than two times the maximum graded aggregate size; or local deficiency of cement resulting in loosely bonded concrete.

7) Any of the following:

   a) A crack having a width of 0.005 to 0.01-inches throughout a continuous length of 36-inches or more.

   b) A crack having a width of 0.0 to 0.03-inches or more throughout a continuous length of 1-foot or more.
c) Any crack greater than 0.005-inches extending through the wall of the pipe and having a length in excess of the wall thickness.

d) Any crack showing two visible lines of separation for a continuous length 2-feet or more, or an interrupted length of 3-feet or more anywhere in evidence, both inside and outside.

e) Cracks anywhere greater than 0.03-inches in width.

f) Application of any wash coat of cement or grout to the pipe will not be permitted without approval of the Engineer. Any pipe dressing procedures shall be subject to the approval of the Engineer.

2. Joints on Reinforced Concrete Pipe:

   a. Pipe joints for all reinforced concrete pipe shall be of the rubber gasket type in which the gaskets are in compression and which will permit both longitudinal and angular movement. Each unit of pipe shall be provided with proper ends made of concrete formed true to size and formed on machined rings to ensure accurate joint surfaces.

   b. Joints and gaskets for pipe shall be the O-ring gasket type and shall conform to the requirements of ASTM C443 and the additional requirements specified.

   c. Joints shall be of such design that when tested under an average internal hydrostatic pressure of 13 pounds per square inch for a period of 10 minutes, no visible leakage will result. The diameters of the joint surfaces which compress the gasket shall not vary from the true diameters by more than 1/16-in or the amount permitted by the appropriate above-mentioned ASTM Standard Specifications, whichever is less.

   d. Gaskets shall be of a composition and texture which is resistant to common ingredients of sewage, industrial wastes, and groundwater, and which will endure permanently under the conditions likely to be imposed by this service. Gaskets shall be the product of a manufacturer regularly engaged in the manufacture of rubber gaskets for pipe joints.

3. Flared End Sections: Reinforced Concrete Pipe flared end sections shall conform to requirements of AASHTO M170, minimum Class IV.

R. Subsurface Infiltration Chambers

1. Subsurface detention chambers shall be HDPE chamber system as manufactured by StormTech, Cultec, or similar. The chambers will be handled, stored, and installed according to manufacturer’s specifications and details. The chambers will be placed on a drainage course bed with a minimum of depth of six inches. The chambers shall not be placed with backfill depths greater than 96” to surface as per manufacturer’s details.

2. The nominal storage volume of stormwater chambers shall be 74.9 cubic feet per chamber, including the volume of drainage course bedding.
3. The galley shall have both of its ends open to allow for unimpeded hydraulic flows and for visual inspection and maintenance of the row’s entire length. The galley shall have a circular, indented, flat surface on the top for an inspection port or clean-out.

4. The galley shall be analyzed and designed using AASHTO methods for thermoplastic culverts contained in the LRFD Bridge Design Specifications, 2nd Edition, including Interim Specifications through 2001. Design live load shall be the AASHTO HS20 vehicle. Design shall consider earth and live loads as appropriate for the specified depth of fill.

5. The end cap shall be designed to fit into any corrugation of a galley, which allows capping a galley that has its length trimmed and segmenting rows into storage basins of various lengths.

6. The end cap shall have saw guides to allow easy cutting for various diameters of pipe that may be used to inlet the system. The end cap shall have excess structural adequacies to allow cutting an orifice of the required size at any invert elevation.

7. The primary face of an end cap shall be curved outward to resist horizontal loads generated near the edges of beds.

S. Filter Fabric

1. Filter Fabric used, as a drainage medium shall consist of a non-woven fabric made from polypropylene or polyethylene filaments or yarns. The fabric shall be inert to organic chemicals commonly encountered in the soil. Edges of filter fabric shall overlap a minimum of one foot. The fabric shall conform to the following recommended property tests:

<table>
<thead>
<tr>
<th>Property</th>
<th>Unit</th>
<th>Test Method</th>
<th>Minimum Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>oz/sy</td>
<td>ASTM D-5261-92</td>
<td>4.8</td>
</tr>
<tr>
<td>Grab Strength</td>
<td>lbs</td>
<td>ASTM D-4632-91</td>
<td>120</td>
</tr>
<tr>
<td>Grab Elongation</td>
<td>percent</td>
<td>ASTM D-4632-91</td>
<td>50</td>
</tr>
<tr>
<td>Trapezoid Tear Strength</td>
<td>lbs</td>
<td>ASTM D-4533-91</td>
<td>50</td>
</tr>
<tr>
<td>Mullen Burst Strength</td>
<td>psi</td>
<td>ASTM D-3786-87</td>
<td>225</td>
</tr>
<tr>
<td>Puncture Strength</td>
<td>lbs</td>
<td>ASTM D-4833-00</td>
<td>65</td>
</tr>
<tr>
<td>Apparent Opening Size (AOS)</td>
<td>U.S. std. Size Sieve</td>
<td>ASTM D-4751-99A</td>
<td>70</td>
</tr>
</tbody>
</table>

T. CRUSHED STONE
1. Crushed stone shall consist of durable crushed rock or durable crushed gravel stone, free from ice and snow, sand, clay, loam, or other deleterious or organic material. The crushed stone shall be uniformly blended and shall conform to the following requirements.

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>3/4-inch Stone</th>
<th>1/2-inch Stone</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-inch</td>
<td>100</td>
<td>---</td>
</tr>
<tr>
<td>3/4-inch</td>
<td>90-100</td>
<td>---</td>
</tr>
<tr>
<td>5/8-inch</td>
<td>---</td>
<td>100</td>
</tr>
<tr>
<td>1/2-inch</td>
<td>10-50</td>
<td>85-100</td>
</tr>
<tr>
<td>3/8-inch</td>
<td>0-20</td>
<td>15-45</td>
</tr>
<tr>
<td>No. 4</td>
<td>0-5</td>
<td>0-15</td>
</tr>
<tr>
<td>No. 8</td>
<td>---</td>
<td>0-5</td>
</tr>
</tbody>
</table>

U. Drain Couplings

2. Drain Couplings shall be pressure rated at least equal to that of the pipe. The coupling sleeve shall be 1/4-inch minimum thickness elastomeric polyvinylchloride with a minimum tensile strength of 1500 psi. The sleeve shall fit snugly onto the pipe to be joined and be resistant to common chemicals present in storm water. Adjustable pipe clamps shall consist of a slotted band that mate with the worm gear screw and a screw housing all manufactured of stainless steel, and suitable for underground service.

V. CLEANOUTS

1. General: Provide cast-iron ferrule and countersunk brass cleanout plug, with round cast-iron access frame and heavy-duty, secured, scoriated cast-iron cover.

2. The drain cleanouts shall be minimum 6-inch diameter or sized to match the service pipe, whichever is greater. The cleanout shall be complete with a flush mount over. The cleanout cover shall be clearly marked “DRAIN” and shall be minimum eight inches in diameter or two inches greater than the cleanout size, whichever is greater. Cleanouts shall include a watertight cap.

W. IDENTIFICATION
1. Detectable Underground Warning Tapes: Acid and alkali-resistant polyethylene plastic film warning tape, 6-inches wide by 4-mils minimum thickness, with continuously printed caption in black letters "CAUTION - xxxx LINE BURIED BELOW." The text and color of the tape shall be as shown in the table below. The tape shall have a metallic core encased in a protective jacket for corrosion protection and be detectable by a metal detector when the tape is buried up to 2.5-feet deep.

<table>
<thead>
<tr>
<th>Color</th>
<th>Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Red</td>
<td>Electric</td>
</tr>
<tr>
<td>High Visibility Safety Yellow</td>
<td>Gas, Oil, Steam</td>
</tr>
<tr>
<td>Safety Alert Orange</td>
<td>Telephone, Communications, Cable Television</td>
</tr>
<tr>
<td>Safety Precaution Blue</td>
<td>Water System, Irrigation</td>
</tr>
<tr>
<td>Safety Green</td>
<td>Sanitary Sewer, Storm Sewer</td>
</tr>
<tr>
<td>White</td>
<td>Proposed Excavation</td>
</tr>
</tbody>
</table>

G40  SITE ELECTRICAL UTILITIES

G4010  Electrical Distribution

A. A new pad mounted transformer shall be provided at the ... to step down voltage to 480 / 277 V incoming electrical service.

B. A new 400 KW, 3Ph, 480 / 277V standby generator with outdoor rated weatherproof enclosure shall be provided in the ... 

6. Provide concrete encased duct bank for emergency service cables.

G4020  Site Lighting

A. New site lighting shall consist of LED type fixtures and shall be designed to maintain required safety illumination levels while minimizing light pollution to abutting properties.

1. Parking Lot Lighting: It is anticipated that approximately nine 20 foot poles will be required to illuminate parking areas.
2. Walkway Lighting: It is anticipated that approximately six 12 foot poles will be required to illuminate pedestrian walkways.

3. Athletic Field Lighting: To greatest extent possible existing fixtures, by Musco Sports Lighting, shall be relocated and re-used at the new football field location.

G4030 Site Communications and Security

A. Cable TV and Telephone will originate from....and enter the building ...

End of Project Manual