

# **GRAFTON HIGH SCHOOL**

Grafton, Massachusetts

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## **OWNER**

**Town of Grafton  
acting through its  
School Building Committee**  
30 Providence Road  
Grafton, Massachusetts

## **ARCHITECT**

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**DECEMBER 17, 2009**

**SMMA PROJECT NO. 09022**

**PROGRESS PROJECT DESCRIPTION**



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# GRAFTON HIGH SCHOOL

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## **GRAFTON HIGH SCHOOL**

### **10 PROJECT DESCRIPTION**

#### **1010 Project Summary**

The Project is the construction of the new Grafton High School next to the site of the existing high school, Providence Street, in Grafton, Massachusetts. The existing high school will be repurposed to serve the upper middle school (grades 7-8) population after the completion of the new high school building.

The project includes new building construction, abatement and demolition of existing structures (Administration & PreK building), rehabilitation of the existing maintenance building into a storage building for outdoor athletic equipment, and construction of access drives, parking and associated site work.

#### **1020 Project Program**

##### **1020.01 Site Program**

The site is bounded by Providence Road to the east, Brigham Hill Road to the south, private property and Lake Ripple to the west and Lake Ripple to the north. Site constraints and the constraint of keeping the existing high school functioning while the new one is constructed will impact construction operations.

Sitework includes construction of new site drives; parking areas for staff, students and visitors (approximately 400 spaces); and truck access to the loading dock.

Exterior grade-mounted mechanical and electrical equipment will be visually and acoustically shielded as necessary.

##### **1020.02 Building Program**

The new Grafton High School will be designed to accommodate 900 students (1100 in core services) and will be approximately 186,351 square feet in size.

Program spaces are typical for a high school of this size, and include general purpose classrooms, science laboratories, fine art and performing arts program spaces, technology, special education classrooms, gymnasium with locker rooms and other support spaces, a 660-seat auditorium with stage and fly space, a student cafeteria and servery with full service kitchen, a library with associated support spaces, administration area, nurse's suite and teacher and administration support spaces.

The building will be designed in accordance with the 7th edition of the Massachusetts State Building Code.

#### **1020.03 MA-CHPS/High Performing Schools Requirements**

The new Grafton High School will be designed and constructed in accordance with the principals of the Massachusetts High Performance Green Schools planning and criteria guidelines (MA-CHPS), published by the Collaborative for High Performance Schools.

A progress MA-CHPS scorecard is included in this Project Description in an Appendix. This scorecard identifies the project design criteria and associated credits which are under consideration for this project.

Specifications will include instructions to Contractor regarding waste management and waste diversion goals (90%), and construction indoor air quality goals.

Note that the points awarded under Policy & Operations (P&OP 1 through 4) are contingent upon the Town committing to certain policies and actions.

#### **1020.04 Additional Sustainable Design Elements**

The following sustainable design elements will be incorporated into the design of the building and site.

**Green Roof:** A "green roof" (or vegetated roof) is a roof with plants on it. The plants grow in a light-weight planting medium which is placed over a conventional roof system. The planting medium retains rainwater which is taken up by the vegetation and transpired into the air. Green roofs are classified as "extensive" (growing medium depth of 6-inches or less, supporting ground-cover type plants such as sedum, herbs or perennials) or "intensive" (deeper growing medium, more diverse, taller plants such as perennials, grasses, shrubs, and small trees). It is proposed that the project incorporate an area of extensive green roof approximately 10,000 square feet; access for maintenance will be provided, but the area will not be accessible to students.

Green roofs protect the roofing membrane from UV radiation and temperature variations, reduce peak rates of storm water run-off from the roof; reduce the building's heating and cooling loads, and improve air quality in the vicinity of the building.

**Rainwater Harvesting System:** This system collects storm water from the building's roofs, stores it in an underground tank, and pipes it into the building for selective use where use of non-potable water is acceptable. In this project, the rainwater will be used to flush toilets. Rainwater harvesting reduces potable water use and the quantity of storm water discharged that has to be treated.

**Dual Flush Toilets:** Dual flush toilets (water closets) offer two options for flushing (liquids or solids), dispensing less water when the liquid option is selected, resulting in savings of water and of water and sewer fees. Dual flush toilets will be provided for staff and female students.

**Displacement Ventilation:** In a displacement ventilation system, cool supply air enters the space at or near floor level, at a low velocity. The cooler supply air displaces the warmer room air, creating a zone of fresh air at the occupant level. Heat and contaminants rise to the ceiling where they are exhausted from the space. Compared to a conventional system in which air is supplied at the ceiling at a relatively high velocity and mixes with air already in the room, displacement ventilation improves ventilation efficiency resulting in better indoor air quality, is quieter, saves energy, and allows HVAC plant capacity to be reduced. Optimal benefits are obtained when this system is used in high heat gain spaces.

**Photovoltaic Array:** The building will be designed to include a PV Ready roof for a capable of generating 50 kW. A solar photovoltaic (PV) system consists of an array of panels that collect energy from the sun and convert it to electricity. The new Grafton High School will explore installing a demonstration PV system for purposes of science curriculum integration.

**Data Acquisition System:** The Data Acquisition System (DAS) monitors the performance of the additional sustainable design elements, including the photovoltaic installation and rainwater harvesting. The DAS links to the educational program via the computers in the science labs and to a monitor in the main lobby. The DAS can be upgraded to display the HVAC mechanical system's performance as well.

### **1030 Existing Conditions**

The existing Grafton High School building will remain in operation while (and after) the new building has been completed and is ready for occupancy. Parking on site during construction will be restricted; temporary on-site parking for students and staff will be provided but may be limited.

The other existing buildings and structures on the site will be occupied when construction begins, and some will be demolished under this Contract.

### **1040 Future Contract Work**

FF&E will provide moveable furniture, fixtures and equipment under separate contracts to be designed and bid within six months of anticipated occupancy.

Technology equipment will be designed and bid under a separate contract within six months of anticipated occupancy; infrastructure and coordination will be under this base contract.

## 20 PROPOSAL, BIDDING AND CONTRACTING

### 2010 Early Bid Packages

The decision for selecting the project procurement method (Design / Bid / Build or CM at Risk) has not yet been made by the committee. This decision will influence the construction start date. Assuming a Construction Manager at Risk is retained, there will likely be one or two early packages, bid and awarded before the final construction contract for the new building is awarded. These packages could likely include:

- Construction of temporary off-site parking area, to be used during construction.
- Site preparation.
- Building Footings & Foundations
- Building Superstructure.

### 2020 Bidding and Award of Construction Contract

The decision for selecting the project procurement method (Design / Bid / Build or CM at Risk) has not yet been made by the committee. This decision will influence the construction start date.

If the D/B/B method is elected, then the Project will be publically advertised and bid in accordance with M.G.L. Chapter 30 and M.G.L. Chapter 149, Section 44, the statutes governing bidding for public works projects in Massachusetts.

Bidders and filed sub-bidders will be required to be certified.

The successful general bidder and filed sub-bidders will be required to comply with the Town of Grafton's Equal Employment Opportunity and Affirmative Action (EEO/AA) policies.

### 2030 Contract Forms

**Agreement and General Conditions:** At this time, it is assumed that standard AIA Documents A101 and A201, modified to incorporate statutory provisions, will be used as the basis for the Agreement and General Conditions.

**Subcontract Forms:** Subcontracts between the Contractor and the subcontractors for filed sub-bid trades will be in the form set forth in M.G.L. Ch. 149, s.44F.

**Bonds:** The Contractor will be required to furnish Performance and Payment Bonds in the full amount of the Contract Price.

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**A SUBSTRUCTURE**

**A10 FOUNDATIONS**

**A1010 Standard Foundations**

**A1010.01 Wall Foundations**

16" thick reinforced, cast-in-place concrete walls on continuous strip footings, around the perimeter of the building, extending at least 4'-0" below finished grade.

**A1010.02 Column Foundations**

Individual spread footings at columns with allowable bearing pressures as recommended in the Geotechnical Evaluation Report.

**A1020 Special Foundations**

Exterior Columns: 2' x 2' (or equivalent size) reinforced concrete piers on reinforced spread footings located a minimum of 4 feet below grade.

**A1030 Slab on Grade**

**A1020.01 Standard Slabs on Grade**

Cast-in-place concrete slab, 4 ½" thick at the classroom wings; 5" thick at the stage, cafeteria and other spaces subjected to heavy-duty use; and 6" thick at mechanical rooms. Slabs on grade will be reinforced with welded wire fabric, placed over a vapor barrier on a layer of insulation over a base course of approximately 8" of compacted gravel. The exact details of the slab-on-grade subgrade preparation will be determined from the recommendations set forth in the Geotechnical Evaluation Report.

**A1020.02 Inclined Slabs on Grade**

**Auditorium:** Slab on grade; 5-inches thick concrete reinforced with welded wire fabric.

**A1020.03 Pits and Bases**

**Elevator Pits:** Constructed with 10" reinforced concrete walls with a 12" thick reinforced concrete foundation mat incorporating a sump pit as required. The design will accommodate the hydraulic piston and 2 buffers. Waterstops will be provided at construction joints between the pit walls and bottom mat.

#### **A1020.04 Below Grade Waterproofing and Dampproofing**

**Dampproofing:** Entire perimeter foundation wall; bituminous dampproofing. Insulation (see A1020.05) serves as protection course.

**Elevator Pits:** Elevator pits will be made watertight by application of negative-side cementitious waterproofing.

#### **A1020.05 Perimeter Insulation, Slab Insulation, and Vapor Retarder**

**Perimeter Insulation:** 2" thick foamed plastic insulation, continuous with the under-slab insulation, extending vertically along the outside face of foundation walls for a distance of 4'-0" below finish grade.

**Under-Slab Insulation:** 2" thick foamed plastic insulation, extending under the entire surface of the floor slab.

**Vapor Retarder:** Heavy-duty, unreinforced, 15 mils thick polyolefin sheet with Perm Rating of 0.03 perms or less, "Stego Wrap" by Stego Industries, LLC, or equal; continuous under the slab on grade on top of the insulation layer.

#### **A20 BASEMENT CONSTRUCTION**

Not applicable to this Project.

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**B SHELL****B10 SUPERSTRUCTURE****B1010 Floor Construction****B1010.01 Typical Elevated Floor Construction**

Typical elevated floors will be a 3-1/4" lightweight (115 pcf) concrete slabs on a 3", 20 gage galvanized metal deck (6-1/4" total thickness) supported on wide flange steel beams and girders. The slab will be reinforced with welded wire fabric and supplemental reinforcing bars over the girders and the composite deck will be anchored to the supporting steel framing with steel shear studs welded to the top flange of the beams and girders. (This floor system provides a 2 hour fire-rated floor slab without the need to spray fire-proof the deck.)

**B1010.02 Heavy-Duty Floor Construction**

**Exterior Stairs (Loading Dock):** Cast-in-place concrete slabs reinforced with reinforcing bars supported on reinforced concrete foundation walls and footings. Tread and landing surface will receive a broom finish.

**Interior Ramps:** 5-inches thick concrete slabs on grade reinforced with welded wire fabric.

**Interior Stairs:** See C20.

**B1010.03 Floor Construction Fireproofing**

The entire structural steel frame, including columns, beams and joists supporting floors, will be protected with sprayed-on fireproofing, 2-hour rated. Floor slab decks do not need fire proofing as their composite section provides for the rating.

**B1020 Roof Construction****B1020.01 Typical Roof Framing**

Typical roof framing will be 1-1/2-inches deep, 20 gage, Type B, galvanized metal deck supported on open-web bar joists and/or steel wide flange beams and girders. Roofs will be sloped to roof drains at 1/4 inch per foot.

The roof framing of Pod 2 will be framed as "floor structure" to enable a future third floor classroom addition. See B1010.01 for a detailed description.

**B1020.02 Auditorium Roofs Framing**

Auditorium roof framing will be 3-inches deep, 20 gage, Type NIA, galvanized, acoustic metal deck with field-installed acoustic batts, supported on steel wide flange beams spanning between deep steel trusses that clear-span the space. Roofs will be sloped to roof drains at 1/4 inch per foot.

**B1020.03 Cafeteria/Commons Roof Framing**

Cafeteria/Commons roof framing will be 6-inches deep, 18/20 gage (18 gage top deck, 20 gage bottom flat cover), Type HC6, galvanized, cellular acoustic metal deck, spanning between deep steel trusses that clear-span the space. Bridging between the trusses will occur at 1/4 points of the truss span and will consist of structural members that closely match the truss framing. Roof will be sloped at a 1.5-to-12 pitch; crickets and other local roof adjustments will be sloped at 1/4 inch per foot to roof drains.

**B1020.04 Gymnasium Roof Framing**

Gymnasium roof framing will be 1-1/2" deep, 20 gage, Type BCA, galvanized, cellular acoustic metal deck supported on long-span open-web bar joists that clear-span the space and steel wide flange girders. Roofs will be sloped to roof drains at 1/4 inch per foot.

**B1020.05 Roof Framing at Roof Top Mechanical Equipment**

Areas of the roof supporting large mechanical equipment will be a 5" normal weight concrete slabs on a 3", 20 gage galvanized metal deck (8" total thickness) supported on wide flange steel beams and girders. The slab will be reinforced with welded wire fabric and supplemental reinforcing bars over the girders and the composite deck will be anchored to the supporting steel framing with steel shear studs welded to the top flange of the beams and girders. Concrete slabs under roof top mechanical equipment will be level (i.e.: not sloped for drainage.)

**B1020.06 Entrance Canopies Framing**

The entrance canopies framing will be 1-1/2" deep, 20 gage, Type B, galvanized metal deck supported on steel wide flange beams and girders. Roofs will be sloped to roof drains at 1/4 inch per foot.

**B1020.07 Rooftop Equipment Screen Supports**

Rooftop equipment screens will be supported on tube steel posts (and channel girts if design requirements to curtail sagging of bar grate panels is necessary). Where possible, the posts will be welded to column caps below to create a moment connection and avoid kickers. Where this isn't possible, the posts will be braced back to the roof with angled kickers, which attach at the other end to round pipe stanchions extending 12" above the roof to allow for roof penetration flashing. All structural steel exposed above the roof will be hot-dipped galvanized and painted. Bar grate wall panels are edge-banded powder coat painted.

## **B1020.08 Roof Construction Fireproofing**

The entire structural steel frame, including columns, beams and joists supporting roofs, and roof deck, will be protected with sprayed-on fireproofing, 1-hour rated, except as follows:

- Gymnasium: The roof structural frame and deck are not fire proofed.
- Auditorium : The roof structural frame and deck are not fire proofed.
- Cafeteria/Commons : The roof structural trusses, cross braces, vertical framing (exposed above 20' above finish floor) and deck are not fire proofed.

## **B1030 Vertical Framing Elements**

### **B1030.01 Columns**

Columns will be steel wide flange or tube shapes.

### **B1030.02 Lateral Load-Resisting System**

Lateral Load-Resisting System: Lateral loads due to wind and seismic forces will be resisted by braced frames at each level, at selected locations, and will be incorporated within the interior and/or exterior wall systems.

### **B1030.03 Exterior Wall Support**

Exterior masonry veneer walls will be supported on suspended steel shelf angles at the window head of the third floor. Below that level, the veneer will bear on the perimeter foundation walls.

## **B20 EXTERIOR ENCLOSURE**

### **B2010 Exterior Walls**

#### **B2010.01 Exterior Wall Skin**

**Masonry Walls:** Brick and manufactured stone masonry facing (nominal 4-inch wythe) with precast concrete, anchored to stud framing with stainless steel ties. Loose steel lintels above window and door openings.

- CMU Back-Up: In limited areas (see B2010.02 for scope) face masonry will be anchored to reinforced concrete unit masonry back-up.
- Brick: Extruded brick, nominal 2-1/2 inches high by 12 inches long.

- **Manufactured Stone:** Arriscraft "Renaissance" calcium silicate masonry units, or equal. Utilized in single base course (12" tall) and top cap course (12" tall).
- **Precast Concrete:** Sills; color and finish to match the manufactured stone.
- **Through-Wall Flashing:** Self-adhering rubberized bitumen flashing lapped over formed zinc-tin-alloy-coated copper flashing. The zinc-tin alloy coated copper flashing will span the air space, providing support for the flexible flashing, and will extend forward of the face of the wall, terminating with a drip edge.

**Metal Panels:** Will be used at selected locations, including some walls, roof fascias and cornices, as well as soffits. As details are developed, these are likely composite metal panels with fire-rated core, installed with dry seal (gasketed) joints, such as Centria "Formabond" or "Alucobond," or less likely these may be insulated metal panels, such as Centria "Formawall." If the former are used, the air space behind will be insulated in the same way as the masonry walls.

#### **B2010.02 Exterior Wall Construction**

**Metal Stud Framing:** Curtainwall stud framing, 18 gauge or heavier steel studs with G90 galvanizing, covered with 1/2 inch thick glass-fiber-faced gypsum panel sheathing.

- Curtainwall stud framing will be designed to resist wind loads calculated for the Project, with deflection not to exceed 1/720 where framing carries masonry veneer; and not to exceed 1/360 where framing carries metal panels.
- Stud spacing as required to 16 inches on center maximum.

**Cavity Wall Construction:** In limited areas, such as the Student Activities Room, stair towers and perimeter splayed walls at the west end of the Cafeteria/Commons, cavity wall construction with masonry back-up may be used. In these locations, wall construction behind the brick facing or phenolic Trespa panel facing will be nominal 8-inch thick concrete unit masonry (CMU) reinforced with galvanized steel rebar and horizontal truss reinforcing to meet Code requirements for structural and seismic performance and, for egress stairs, 2-hour fireproof construction. Masonry lintels will be used in back-up wythe above doors, window, and louver openings.

#### **B2010.03 Exterior Wall Air Barrier, Vapor Retarders, and Through-Wall Flashing Insulation**

**Combination Air Barrier, Vapor Retarder, and Waterproofing:** Air barrier in stud-framed, masonry-clad or metal panel-clad wall assemblies will be provided by application of a self-adhering rubberized asphalt sheet over the sheathing. This material will also act as vapor retarder and as a waterproof surface which will prevent moisture that does get into the cavity from wetting the sheathing.

- **Product:** Monsey Bakor "Blueskin SA," W. R. Grace "Perm-a-Barrier," or Carlisle "CCW-705."

In limited areas, such as over concrete or concrete unit masonry back-up, a liquid-applied system such as Carlisle CCW-525; Monsey Bakor "Airbloc 06," Grace "Procor" may be used.

Through-Wall Flashing: Combination of flexible flashing and metal. Zinc-tin-alloy coated copper extending from face of wall to back-up, and forming a 2-inch deep metal pan. The air barrier system transition membrane, a 40 mils thick self-adhering rubberized asphalt, will lap over the metal pan, extending to face of wall.

#### **B2010.04 Exterior Wall Insulation**

**Insulation Above Grade:** 3" thick extruded polystyrene board insulation, installed in the air space behind the masonry, outboard of the air barrier.

In the unlikely event that insulated metal panels are used as cladding, insulation in the cavity may be reduced or eliminated.

3" thick extruded polystyrene board insulation behind spandrel glazing units.

**Insulation Below Grade:** See foundation insulation in Part A.

#### **B2010.05 Exterior Wall Interior Skin**

Typical: 5/8 inch thick gypsum board, with joints taped and finished.

At selected locations listed below, phenolic Trespa panels will be used as exterior skin (rain-screen application) and/or the interior finish. This veneer will be installed directly to wall studs with exposed metal fasteners.

- Academic wing stair enclosures: non-glass side walls (at landings) have painted masonry finish unless an Add-Alt of Trespa cladding is selected.
- Auditorium walls to have masonry cladding to 12' AFF. Trespa panels above.
- Gymnasium walls to just below the clerestory windows: concrete unit masonry veneer to the top of the bleachers and at least 20' AFF. Tectum on gypsum above, on steel studs.
- Splayed walls on western side of the Cafeteria/Commons, phenolic Trespa panels for full height on both sides (where exposed) and in portal jambs and heads/soffits. In these splayed walls there is a special base on the interior portions: below the Trespa panels at ground level, is a 15 5/8" wide (tall) steel grille/bar grating, McNichols GW75 or similar, standing on its side, creating both useable and blank HVAC diffusers. Other interior splayed walls are same construction.

Where the exterior wall construction is cavity wall with concrete unit masonry back-up, the interior face will be finished with 5/8 inch thick gypsum board applied over galvanized steel furring.

## **B2010.06 Exterior Louver**

Mechanical Room Louvers: Extruded aluminum fixed blade louvers with drainable blade profile; high performance painted finish, with bird screen, and with insulated blank-out panels to cover excess louver area not connected to duct.

## **B2010.07 Sun Control Devices**

Extruded aluminum grillework or louvered shading devices, supported on structural steel outrigger framing.

## **B2010.08 Exterior Soffits**

**Building Soffits, Except Cornice:** Exterior finish system applied directly over Portland cement sheathing ("Durock"); with a layer of building wrap behind the sheathing.

**Cornice Soffit:** The underside of the cornice overhang will be finished composite-metal panels over sheathing. The building thermal insulation and air barrier will extend over this soffit, to enclose the supporting structure and tie into the roofing system.

**Canopy Soffit:** Composite-metal panels over sheathing. Assume canopies are uninsulated, and that the building air barrier/vapor barrier does not extend onto canopies. The area under the canopy will be illuminated with recessed lights.

## **B2020 Exterior Windows**

### **B2020.01 Storefronts**

Extruded aluminum, stick-built storefront assembly; thermal break, equal to Kawneer "Trifab 451T" framing system or similar system by EFCO or Vistawall, with high-performance organic coating ("Kynar 500") in an architectural color. Field-glazed with insulated glass as described in B2020.04.

- Extent of storefront is indicated on drawings or any expanse of glazing that is not a "punched window" and conforms to dimensional limitations acceptable for storefront construction. Everything beyond these limitations will be curtain wall glazing. Note that vertical clerestory glazing system in roof monitors is to be storefront system.

### **B2020.02 Glazed Curtain Wall**

Extruded aluminum curtain wall system, employing Prevost 3400 HP, or EFCO Series 5600 Thermally-Improved Curtain Wall, or equivalent framing system by Kawneer or Vistawall. Mullions 2-1/2 inch face width, by depth required to resist wind loads. Framing will incorporate a thermal break consisting of a non-metallic structural strut between interior and exterior metal framing. Sloped glazing system of similar construction by same manufacturer at greenhouse roofs. U-value of 0.42 or lower when glazed.

- Extent of curtainwall is indicated on drawings. Assume any glazing system not identified as aluminum window or aluminum storefront is aluminum curtainwall.
- Note that exterior walls of greenhouses are to be curtainwall, and sloped roofs of greenhouses are to be a compatible, integrated sloped glazing system by same manufacturer. The system shall incorporate operable vents at top and bottom of wall.
- At selected locations, a special mullion cap in the shape of a 3-inch deep fin will be incorporated into the design.
- Field-glazed with insulated glass as described in B2020.04.

### **B2020.03 Aluminum Windows**

Aluminum-framed windows in "punched" openings (masonry surrounding the window). These will be windows of traditional design, with casement and/or projecting operable (vent) panels. High-performing window assemblies, providing U-value 0.35 or less when glazed will be specified. Window frame extrusions will incorporate a non-metallic thermal break to reduce heat loss, and the insulating glass units will include a low-emissivity coating. Insect screens will be provided.

Product: For preliminary design, assume one of the following:

- A & D Prevost, Inc.; Series 1860; 6-inch deep frame.
- Wausau Window and Wall Systems 3250 H, modified or furnished with frame extensions to provide a 6-inch deep frame.
- Kawneer; an Alcoa Company; 5525 Isoweb Series, modified or furnished with frame extensions that provide a 6-inch deep frame.

### **B2020.04 Exterior Glazing**

Vision Glass: Insulating glass units, 1" thick (1/4" glass + 1/2" air space + 1/4" glass), with high-performance low-E (low-emissivity) coating on the second surface. Air space filled with Argon. Glass performance U-value = 0.28 or less, (solar heat gain coefficient (SHGC) 0.27 or better. PPG Solarban 60 70XL or Viracon VE-1-2M or equal. Tempered glass where required by code (adjacent to doors, within 18" of floor. Heat-strengthened glass where thermal stresses may be induced by differential shading.

Spandrel Glass: Same as vision glass, with addition of opaque ceramic frit on the No. 4 (innermost) surface.

## **B2030 Exterior Doors**

### **B2030.01 Exterior Entrance Doors**

Aluminum Entrance Doors: Kawneer "500" doors with 5-inch wide stile, extra-heavy duty 0.125 inch thick extrusion, or equal by the curtainwall manufacturer, with custom arrangement of intermediate mullions. High performance fluoropolymer finish (made of 70% "Kynar 500" or "Hylar 5000" resin).

Frames: Adaptor as standard for the glazed aluminum curtainwall system into which the doors are installed.

Glass: Insulating glass units, 1" thick (1/4" glass + 1/2" air space + 1/4" glass), tempered safety glass, with high-performance low-E (low-emissivity) coating on the second surface.

Hardware: Full height continuous hinge; rim exit device; offset tubular pulls; surface-mounted overhead closers; stops; threshold; weatherstripping. Removable mullion at pairs of doors.

- One leaf at main entrance will also be activated by low-power power-assisted operating device, with push-plates located on both sides of the door.
- Locking will be coordinated with the security system for access control.

Security System: Entrance doors are monitored by the building's intrusion alarm system.

### **B2030.02 Exterior Service Doors**

Flush steel doors, SDI 100 Extra Heavy Duty (16 gauge steel face with steel stiffeners in core), in fully welded, 14 gauge steel frames, G60 galvanized, shop-primed and field painted. U-value to be provided (min 0.37).

- Hardware: Mortised lockset with lever handle; butt hinges; threshold.

Security System: Exterior service doors are monitored by the building's intrusion alarm system.

### **B2030.03 Overhead Coiling Doors**

Overhead coiling door, with curtain fabricated from insulated, flat-faced slats, with faces formed from 0.028 inch thick (22 gauge) galvanized steel. Shop-primed for field painting.

- 1 service door 8' wide x 10' high.
- Operation: Electrically operated with automatic-reversing bottom bar.
- Accessories: Jamb tracks, hood.

Security System: Service door is monitored by the building's intrusion alarm system.  
Insulated exterior doors to be R-4.75 min.

## **B30 ROOFING**

### **B3010 Roof Coverings**

#### **B3010.01 Low-Slope Roofs; Above Deck Roof Covering Components**

Fully-adhered single-ply roofing over insulated steel deck. Deck will be concrete-filled below mechanical system rooftop units.

- Underlayment: 1/2 - inch thick gypsum board mechanically fastened to steel deck.
- Air Barrier/Vapor Retarder: Self-adhering rubberized asphalt sheet.
- Insulation: Polyisocyanurate with glass felt facers; 5-inch (6" add alternate) minimum thickness (excluding tapered layer), applied in at least two layers, with first layer mechanically fastened and the other layers adhered to layer below. Where structural roof deck is flat, tapered insulation will provide slope to drain; 1/8 inch per foot.
- Insulation Overlayment: 1/2 - inch thick glass-faced gypsum panel.
- Membrane: 60 mils thick thermoplastic membrane with heat-welded seams; product still to be determined. Either fabric-reinforced polyvinyl chloride (Sarnafil PVC) membrane with heat-welded seams; or 60 mils thick thermoplastic polyolefin (TPO) with heat welded seams.
- Walkways: To provide access to rooftop equipment, PVC walkway pads will be laid over and adhered to the roofing membrane.
- Roof Edge Flashing and Fascias: Furnished by roofing manufacturer. 2-piece assembly consisting of extruded aluminum clip and snap-on aluminum fascia. Assume custom profiles for the fascia and high performance painted finish.

Performance: Resist wind uplift calculated in accordance with the Massachusetts State Building Code for 100 mph design wind velocity, Exposure B.

Warranty: Total system warranty, 20 years with enhanced wind uplift warranty.

#### **B3010.02 Other Flashing and Sheet Metal**

**Coping:** 0.080 inch thick brake-formed aluminum, same finish as roof edge flashing.

**Counter-Flashing:** 0.050 inch thick aluminum, same finish as roof edge flashing.

#### **B3010.03 Vegetated Roof**

Approximately 10,000 square feet of roof above Pod 2 (and/or Maintenance roof adjacent to Library Deck) will be overlaid with an extensive vegetated roof system

consisting of low-growing sedum on 3 to 5 inches of planting medium. The planted area will be bordered by a strip of riverbed gravel ballast about 24-inches wide.

Related Work: Hose bibbs on roof; access to planted area from the third floor Pod 1 wing.

## **B3020 Roof Openings**

### **B3020.01 Skylights**

Metal-Framed Skylights: As fabricated by Kawneer, LinEl Signature, Naturalite Skylight Systems (Vistawall Group), Wasco Products, Inc..

- Assume eight skylights, 12' x 12' and three 8' x 12' for Greenhouse Pop-outs (see F Special Construction)
- Glass: Insulated glass unit, 1-1/16" thick, fabricated with exterior pane 1/4 inch thick heat-treated clear glass with high-performance Low-E coating, and interior pane 5-1/16-inch thick of laminated safety glass consisting of 2 sheets of 1/8-inch thick annealed glass and 0.060 inch thick plastic interlayer. (Include min U-value 0.31 or less)

Plastic Unit Skylights: As manufactured by Naturalite, O'Keefe's or Wasco. Double-glazed acrylic dome units on thermally-broken, insulated curb.

- Quantity: Assume six units, each approximately 36" x 36"

Skylight Light Tubes: "Solatube" or equal, 21" diameter tubes with lengths of 18' and 32' to reach the second and first floor ceiling heights, respectively, excluding any length added for above-roof curb needs. Assume six of each. Square 24" ceiling light-diffuser panels at the bottom of the tubes.

### **B3020.02 Ventilators**

Smoke Vents: Smoke vents will be provided at the top of the fly space above the stage in the auditorium; activated by fusible links. Five units will be required.

Elevator shaft ventilation is specified under Services, HVAC.

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**C INTERIORS****C10 INTERIOR CONSTRUCTION****C1010 Partitions****C1010.01 Masonry Partitions**

**Construction:** Normal-weight concrete masonry units, typically 8-inch width, ASTM C270 Type S mortar, reinforced with vertical rebar and with horizontal truss-type reinforcing in every other course. Partitions will run from the floor to the underside of steel floor or roof deck above, and will be restrained from lateral movement at the top.

- Locations: Stage, locker rooms and connecting corridors, kitchen, mechanical rooms, main electrical room, fire pump room, elevator shafts and elevator machine rooms, receiving area, and toilet cores.

**Fire-Rated Partitions:** Where a fire-rating is required, masonry partitions will be constructed to conform to a specific U.L. design. Specific locations will depend upon the final building design, but the following are probable locations:

- 2-hour rated construction around elevator shafts and elevator mechanical room, building mechanical room, main electrical and emergency electrical rooms, fire-pump room. Egress stairs where necessary.
- 1-hour rated partitions enclosing the kitchen and the receiving area.

**C1010.02 Gypsum Board Partitions**

**Typical Gypsum Board Partitions:** 5/8 inch thick gypsum board on 3-5/8" deep, 20 gauge steel studs spaced 16 inches on center. Screw gypsum board to studs. Partitions typically extend full height from floor to underside of deck above.

- Non-rated storage rooms, rooms other than teaching spaces

**Fire-Rated Gypsum Board Partitions:** As above, but conforming to a specific U.L. design, and constructed with Type X/Fire Core gypsum board. Specific locations will depend upon the final building design, but the following locations are probable:

- 2-hour rated construction around emergency electrical closets and utility shafts. Possibly the egress stairs if Trespa panel facing Add-Alternative is selected.

**Acoustical Partitions (Type 1):** Typical Gypsum Board partition with acoustical insulation inside the wall and acoustical caulking at top and bottom of the partition. STC of 49 or better.

- Locations: Administrative areas, typical classrooms, specialty classrooms, library, toilet rooms.

**Acoustical Partitions (Type 2):** Sound and vibration attenuating partitions; double stud with space between, gypsum board both sides, acoustical insulation inside the wall and acoustical caulking at top and bottom of the partition.

- Locations: Auditorium, music, ensemble, chorus and practice rooms. Also at the walls enclosing the Special Education Language Program classrooms where these rooms project into the Technology/Wood/Manufacturing/Scene Shop.

**Shaft Wall:** Galvanized steel C-H studs with 1-inch thick coreboard and 5/8-inch thick Type X gypsum on outside face.

- Locations: Elevator shaft; mechanical shafts.

**Indoor Air Quality (IAQ):** To the extent feasible, gypsum board and acoustical insulation products that have been tested and certified for low emissions of volatile organic compounds (VOCs) will be specified.

#### **C1010.03 Masonry Veneer Partitions**

Ground-face concrete unit masonry, tied back to the underlying stud framing.

- Locations: Gymnasium, Fitness Room, Multi-Purpose Rooms.

Alternate: Behind the splayed walls is a long angled wall (the face of the Server, and a long face of the Library above) that consists mostly of 2' thick piers (on both Floor 1 and Floor 2) and a few feet of horizontal wall above the piers. This wall would be faced in masonry veneer.

#### **C1010.04 Phenolic Panel Veneer Partitions**

Trespa units as the finish for walls within Cafeteria/Commons. The "splayed" walls in Cafeteria are 25' tall and are all phenolic Trespa veneer, including jambs and above portal openings. On the opposite side of the Cafeteria/Commons, the Auditorium wall, up to the wainscot level, is also Trespa panel clad or wood paneling. In all the splayed walls (both interior and perimeter), and large sections of the facade wall of the Auditorium, there is a special base: below the masonry units, is a 15 5/8" wide steel grille/bar grating, McNichols GW75 or similar, standing on its side, creating both useable and blank HVAC diffusers.

#### **C1010.05 Interior Guard Rails**

Guardrail at Commons bridge and Main Lobby Stair is glass assembly.

Guardrails around other Floor Openings: Painted steel railings, vertical picket design, with stainless steel top rail.

- Top of rail detail will allow for installation of glass panels between top of rail and ceiling in the future, should additional acoustical separation be desired.

## **C1010.06 Interior Windows**

**Hollow Metal Frames:** Hollow-metal construction, 16 gauge steel, 1½" width/profile with corners mitered and welded; shop-primed for field painting. Typical all locations except those listed below under "wood frames" heading.

**Aluminum Frames:** where noted, or substituted for Hollow Metal assemblies through any Add-Alternative selections.

**Wood Frames:** Solid hardwood assembly at Library Media Center, Student Activities, Staff Lunch and Administration entrances. FSC certified.

**Glass:** Clear glass, tempered at sidelights and where required by Code, annealed at other locations. Vision panels in fire-rated partitions (if any) will be fire-rated transparent ceramic material, such as "Fire-Lite."

## **C1010.07 Interior Storefront**

At primary entrances the interior vestibule wall will be constructed of the same material as the frame, sidelights and transom of the entrance door surround at the exterior walls. Glass will be clear, tempered safety glass.

## **C1010.08 Interior Partition Firestopping**

**Through-penetration firestopping:** Will be in accordance with a tested U.L. design, to attain an F-rating equal to the rating of the partitions, and a corresponding T-rating where required by code.

**Top-of-Partition Firestopping:** Will be in accordance with a tested U.L. Design. Occurs at rated partitions and smoke barriers

## **C1020 Interior Doors**

### **C1020.01 Interior Swinging Doors**

**Flush Wood Doors:** Window and Door Manufacturer's Association (WDMA) Premium Grade 5-ply construction, as manufactured by Algoma, Eggers, Marshfield, Mohawk or VT Industries, pre-fitted to steel frames.

Face Veneer: Select white maple veneer, plain sliced.

- Wood Finish: Factory finished with stain and conversion varnish.
- FSC certified wood veneer, non-urea formaldehyde composite sections, and VOC content compliant to MA CHPS.
- Glazing: Narrow vision panel 12-inches wide by 36-inches high, typical.

- Hold-open hardware on 90-minute doors in 2-hour assemblies at egress stairs, and possibly at corridor-secure locations (doorways to close off corridors from the common areas for after-hour use).
- Locations: Cross-corridor doors, classrooms and other teaching spaces, administrative offices, teacher break rooms, toilet rooms, egress stairs and for other doors in public areas.

**Flush Steel Doors:** ANSI 250.8 Level 2, "Heavy Duty" doors, with 18 gauge cold-rolled steel faces, seamless edges. Shop-primed and field painted.

- Locations: Mechanical equipment rooms, electrical equipment rooms, fire pump room, receiving area, and similar service locations.

**Stile and Rail Wood Doors:** One pair at the entrance to the Library; one pair at the entrance to the Administration area. Single doors at Student Activities (2) and Staff Lunchroom. Maple stiles and rails, factory finished. FSC certified wood veneer, non Urea formaldehyde composite sections and VOC content compliant with MA-CHPS.

**Steel Frames:** 16 gauge cold-rolled steel hollow-metal frames 1½" widths; corners mitered and welded. Furnish drywall and masonry profiles, as appropriate to construction in which doors will be set. Shop-primed and field painted.

- Frames for classroom doors typically include an 18-inch wide sidelight glazed with clear safety glass and 24" transom lite; or fire-rated ceramic glazing where required for fire-rating.

Alternative: Stick-built moveable wall systems with glass wall/door combination assembly built into gypsum board wall opening (Examples include Inscape, Heathrow "Reform", Steelcase "Privacy Wall", Hayworth "Enclose") with same dimensions as listed in Steel Frames above.

**Door Hardware:** Heavy-commercial quality; US 32D satin stainless finish. Provide key cabinet and key organizing system.

- Locksets: Mortised locksets and latch sets, with lever handles.
- Keying: Grand-Master and Masterkeying system to be coordinated with the Owner.

**Fire-Rated Openings:** Where openings are required to be fire-resistance rated, U.L. listed and labeled products, tested under positive pressure, will be specified. Hold-opens for doors in 2-hour walls at egress stairs.

**Path-of-Egress Doors:** Doors in the path of egress that can be locked, will automatically unlock upon activation of the building fire alarms system. If utilized, would include corridor-secure locations (doorways to close off corridors from the common areas for after-hour use).

## **C1020.02 Interior Entrance Doors**

At primary entrances, the interior vestibule doors will match the exterior entrance doors.

- Glazing: Single glazed with 1/4 inch thick clear tempered safety glass.
- Hardware: Full height continuous hinges; offset tubular pulls; tubular push bars full width of door; surface-mounted overhead closers.

## **C1020.03 Interior Coiling Grilles**

**Coiling Grilles:** Overhead coiling aluminum open link style grille with brushed aluminum finish. Electrically operated. Locations as listed below, with preliminary sizes.

- Servery: Two (2) 10' wide by 9' high.
- Main corridors: Three (3) 14' wide by 10' high. (May be eliminated if the design utilizes lockable swinging doors on hold-opens in these locations).

## **C1020.04 Other Interior Doors**

**Access Doors:** Furnish access doors to provide access to plumbing, mechanical, and electrical controls. Frame with 1-inch wide overlapping trim; stainless steel units in kitchen; painted steel units at other locations. Furnish fire-rated units for installation in fire-rated walls and fire-rated ceiling assemblies.

## **C1030 Specialties and Fittings**

### **C1030.01 Visual Display Boards**

**Markerboards, Fixed:** Wall-mounted porcelain on steel markerboards with extruded aluminum trim and chalk tray, and tack-strip along top of board. Claridge or Greensteel.

- Quantity: Three 4' x 8' per classroom, except science labs

**Markerboards, Sliding:** Wall-mounted porcelain on steel markerboards with two panels and extruded aluminum trim and chalk tray, and tack-strip along top of board. Claridge or Greensteel.

- Quantity: Two 4' x 8' per science lab

**Tackboards:** Wall-mounted vinyl-coated cork tackboards with extruded aluminum trim.

- Quantity: Two 4' x 8' per classroom, one @4' x 4' per office and additional tackboards may be installed in corridors and lounges, as the program requires

**Tackstrips:** 2 inch high vinyl-coated cork installed at ceiling/wall juncture on three walls in each classroom. Allow 40 linear feet for each classroom.

**Map Holders:** Wall mounted, to hold 8-1/2" x 11" paper, with long edge horizontal. One per room.

**Interactive Markerboards:** Refer to Part D

#### **C1030.02 Fabricated Compartments and Cubicles**

**Toilet Compartments:** Plastic partitions (high density polyethylene). Floor supported with headrail. Stainless steel hardware. Full height bracket

**Shower and Dressing Compartments:** Same as the toilet compartments.

**Cubicle Curtains:** In Nurse's suite, enclosing four cubicles. Vinyl curtains with mesh band at top. Hung from track.

#### **C1030.03 Wall and Corner Guards**

**Corner guards:** Stainless steel. Provided in kitchen areas and loading dock corridors.

#### **C1030.04 Interior Signage**

**Metal Plaque:** Cast aluminum plaque; one to be located in the lobby.

**Interior Panel Signs:** One per each door with raised letters and Braille. Includes back panel at all signs located on a glass sidelight.

**Dimensional Characters:** Size, quantity and location to be determined. Provide allowance.

**Egress Path Diagrams:** Framed "Path to Exit" signs, 8-1/2 by 11"; one per room.

**Miscellaneous Signs:** Other signs as required for wayfinding and life safety.

#### **C1030.05 Metal Lockers**

**Student Lockers:** Heavy duty corridor lockers. two-tier, 15" x 15" x 6-feet high, painted steel with louvers in the doors.

- Locking: combination locks built in.
- Mounting: Set on 4-inch high glazed masonry base.
- Accessories: Sloped tops.
- Quantity: 950 lockers

**Athletic Lockers:** Two-tier, 12" x 12" x 6-feet high, painted steel lockers with expanded metal doors and sides for ventilation.

- Locking: Padlock rings.

- Mounting: Set on masonry base.
- Accessories: Sloped tops; end panels as exposed ends.
- Quantity: 400 lockers (200 two-tier units)

**Team/Varsity Lockers:** Single-tier, 18" x 18" x 6-feet high, painted steel lockers with expanded metal doors and sides for ventilation.

- Locking: Padlock loops.
- Mounting: Set on 4-inch high glazed masonry base.
- Accessories: Sloped tops; end panels as exposed ends.
- Quantity: 120 lockers

**Locker room benches:** Laminated wood seats. Assume 8 per locker room.

**Kitchen Staff Lockers:** Wardrobe lockers, single-tier, 12" x 12" x 6-feet high, painted steel with louvers in the door.

- Locking: Padlock loops.
- Mounting: Set on 4-inch high glazed masonry base.
- Accessories: Hanger rod, sloped tops, end panels as exposed ends.
- Quantity: 12

#### **C1030.06 Postal Boxes**

For mail delivery to staff, private delivery, horizontal mailbox units, recessed in wall, with keyed locks will be provided. HHS Industries Model 1550-123 or equal. Quantity: 120

#### **C1030.07 Storage Shelving**

Metal storage shelving will be provided under a separate Furnishings, Fixtures and Equipment contract.

#### **C1030.08 Telephone Specialties**

**Telephone Enclosures:** One wall-mounted unit, installed in the Lobby. Telephone will be furnished and installed by the Owner's telephone company.

#### **C1030.09 Toilet and Shower Accessories**

**Toilet Room Accessories:** Stainless steel similar to Bobrick classic style (flat face).

- Combination paper towel dispenser and waste receptacle unit: Two per multi-user toilet room; one per single-user toilet room.
- Paper towel dispensers: One per each sink, except in toilet rooms
- Soap dispensers: One per each sink.
- Toilet paper dispensers, partition mounted: One per toilet in multi-user toilet rooms
- Toilet paper dispensers, wall mounted, recessed: One per single-user toilet room
- Sanitary napkin disposal units: One per toilet in multi-user toilet rooms
- Sanitary napkin dispensers: One in each multi-user women's toilet room.

- Grab Bars: Two at each wheelchair accessible water-closet.
- Mirrors in single-user toilet rooms : Stainless steel framed mirrors.
- Mirrors in multi-user toilet rooms : All-glass mirrors, not toilet accessories; see below.

#### **Shower Accessories**

- Fold-down seats: In one shower stall in each locker rooms and in one shower stall in each staff shower room.
- Grab bars.
- Shower curtains, hooks and rods: One set per shower compartment
- Robe hooks: One per shower compartment
- Soap dispenser: One per stall.

#### **Custodial Accessories**

- Mop holder with Shelf: One per janitor's closet.

#### **Miscellaneous Accessories**

In each room other than toilet rooms and kitchen where there is a sink, one wall-mounted paper towel dispensers and one soap dispenser will be provided at each sink. Locations include select classrooms with sinks, art room, drama room, teacher/staff dining rooms.

#### **C1030.10 Mirrors**

Wall-mounted, unframed, mirrors will be provided in each multi-user toilet room, above the lavatories.

Wall-mounted, unframed, laminated safety glass mirrors will be provided at the Multi-Purpose/Drama classroom, Choral room, and Band/Orchestra room.

### **C20 STAIRS**

#### **C2010 Stair Construction**

##### **C2010.01 Steel Stairs**

**Lobby Stair (in concrete, next section?):** Monumental, unenclosed stair connecting entrance lobby to second floor. Steel stairs conforming to NAAMM (National Association of Architectural Metal Manufacturers) "Architectural" Class, with tubular steel stringers and platform framing, precast-terrazzo treads and platforms, steel plate risers.

**Egress Stairs:** Steel stairs conforming to NAAMM (National Association of Architectural Metal Manufacturers) "Architectural" Class, with tubular or channel steel stringers,

concrete-filled steel pan treads and platforms, steel plate risers, open soffit, all welded construction.

#### **C2010.02 Concrete Stairs**

Aisle stairs at the steep (stadium seating) portion of the Auditorium, will be cast-in-place concrete.

**Lobby Amphitheatre/Stair:** Monumental, unenclosed stair connecting lobby to second floor. Where aligned to seating levels, connected to adjacent amphitheatre. Amphitheatre is concrete in pans on steel raker beams to create a solid concrete appearance. A set of eight (8) 14” risers in “L”-shaped plan layout to a height of 9’-4” where a small 250SF platform is formed and connects to Main Lobby Stair mid-landing. Platform is thin enough to allow head-height in a room below with clear height of 8’-6”. Underside of Lobby Stair and Amphitheatre risers is a low-height storage area.

#### **C2010.03 Wood Stairs**

Stairs from seating area to stage in the Auditorium will be wood framed, with maple treads and risers. FSC certified wood. VOC finishes compliant with MA CHPS

### **C2020 Stair Finishes**

#### **C2020.01 Tread, Riser and Landing Finishes**

**Monumental Stair at Lobby:** Precast terrazzo treads and landing if Commons floor is Fritz tile or polished concrete; or Slate if Commons floor is slate tiling. Steel structure painted with high-performance epoxy paint.

**Egress Stairs:** Rubber tread and risers covers; rubber tile on landings. Steel structure painted with high-performance epoxy paint.

**Aisle Stairs at Auditorium Stadium Seating:** Carpet on treads, risers and landings.

**Stair to Stage in Auditorium:** Exposed hardwood with transparent urethane finish.

#### **C2020.02 Stair Railings**

**Monumental Stair (Main Lobby):** Glass steel railing assembly.

**Egress Stairs:** Painted steel railings, vertical picket design, with stainless steel top rail and handrail. Wall-mounted handrails will be stainless steel pipe or tubing.

**Stairs in Auditorium:** To be determined.

**C30 INTERIOR FINISHES**

**C3000 Overview**

**C3000.01 Finishes Schedule**

<b>Room</b>	<b>Floor</b>	<b>Walls</b>	<b>Ceiling</b>
Entrance Vestibules	Entrance Mat (see Part E)	Glazed storefront system.	Acoustical panel
Entrance Lobby	12 x 18 Brazilian slate tile in running bond pattern.	Wood paneling; gypsum board painted.	Acoustical panel
Corridors in academic and public areas	Sheet Linoleum	Porcelain tile wainscot 5'-4" high; gypsum board painted above.	Acoustical panel
Corridors in service areas (locker rooms, receiving, mechanical room)	VCT	CMU filled and painted or painted gypsum board.	Acoustical panel
Classrooms, science labs, computer lab, and similar teaching spaces	VCT	Gypsum board, painted.	Acoustical panel
Library	Carpet	Wood paneling; gypsum board, painted.	Acoustical panel
Art Rooms	Sealed concrete	Gypsum board, painted.	Acoustical panel
Technology/Wood/Robotics/Manufacturing Shop	Sealed concrete	Gypsum board, painted.	Sound-attenuating gypsum board above acoustical panel ceiling.
Offices, Administration area.	Carpet	Gypsum board, painted.	Sound-attenuating gypsum board above acoustical panel ceiling.
Offices, other areas	Carpet	Gypsum board, painted.	Acoustical panel
Cafeteria Servery Arcade	Brazilian slate; possibly Deduct-Alt to Polished concrete, stained and sealed	6" Brazilian slate base in some locations, bar-grate diffuser in most, gypsum board, painted typical.	Acoustical roof deck, gypsum board in limited areas

<b>Room</b>	<b>Floor</b>	<b>Walls</b>	<b>Ceiling</b>
Cafeteria, face of Auditorium	-	Bolted-on banded plywood panels, stained; possibly Trespa panels, too.	-
Cafeteria, faces of splayed arcade walls	-	Phenolic Trespa panels with bar grate diffusers at base	-
Kitchen	Resinous flooring	FRP panels	Acoustical panel, mylar faced
Servery	Polished concrete, stained and sealed	Porcelain tile wainscot; gypsum board, painted.	Acoustical panel.
Band and Choral Rooms	VCT	Fabric-faced acoustical panels two walls; painted gypsum board.	Acoustical panel.
Auditorium	Painted concrete, with carpet in aisles.	Wood paneling on proscenium and side walls; and fabric-faced acoustical panels on rear wall.	Exposed structure, painted; wood sound reflecting panels (clouds).
Stage	Apron: Wood strip flooring Stage: Black masonite panels.	Painted CMU or gypsum board.	Exposed structure, painted black.
Gymnasium	Wood athletic flooring	Painted CMU veneer wall to top of bleachers ; wood fiber acoustical panels; glass block clerestory	Exposed structure, painted
Fitness/Weights Center	Rubber flooring	Painted CMU wainscot; wood fiber acoustical panels.	Exposed structure, painted
Multi-Purpose/Dance	Wood athletic flooring	Painted CMU wainscot; wood fiber acoustical panels.	Exposed structure, painted
Locker rooms and showers	Rubber flooring.	Glazed ceramic tile	Gypsum board, epoxy paint
Toilet Rooms	Ceramic mosaic tile.	4 x 4 ceramic tile full height	Gypsum board, epoxy painted
Mechanical rooms	Concrete, w/ sealer.	Painted CMU	Exposed structure.

<b>Room</b>	<b>Floor</b>	<b>Walls</b>	<b>Ceiling</b>
Storage rooms	VCT	Painted CMU	Exposed structure.
Loading dock area	Concrete w/ sealer	Painted CMU	Exposed structure.

### **C3000.02 Sustainable Design Requirements**

**Sustainable Materials:** Building materials will be selected to optimize the use of sustainable materials, as defined by MA-CHPS for Sustainable Materials Attributes. Sustainable materials include recycled content materials, bio-based materials (rapidly renewable), wood certified by the Forest Stewardship Council as sustainably harvested, and material salvaged from the existing high school.

**Indoor Air Quality (IAQ):** To the extent feasible, low-emitting materials will be specified in the following categories: Adhesives, sealants and concrete sealers; carpet and carpet adhesives; resilient flooring and associated adhesives; interior paints; acoustical ceiling panels; wood wall panels.

### **C3010 Wall Finishes**

#### **C3010.01 Wall Paneling**

**Wood Paneling:** Hardwood veneer paneling (FSC Certified); select white maple veneer, plain sliced, HPVA Grade A. Shop fabricated and shop-finished with AWI catalyzed urethane system. Manufactured to standard sizes.

#### **C3010.02 Gypsum Board Wall Finishes**

**Gypsum Board:** Joints taped and finished

**Gypsum Board Accessories:** Reveals to be determined

#### **C3010.03 Tile Wall Finishes**

**Porcelain Tile:** Field tile and trim including base and bullnose cap

**Ceramic Tile:** Field tile and trim including coved base

#### **C3010.04 Acoustical Wall Treatment**

**Fabric-Faced Fiberglass Panels:** 1 inch thick panels of molded fiberglass core with fabric facing and wrapped square edges.

**Fabric-Faced Acoustical Wood Fiber Wall Panels:** Tectum "Finale Fabri-Tough" Panels, or equal panel constructed of aspen wood fibers bonded with inorganic hydraulic cement; 2-inches thick.

### **C3010.05 Interior Wall Painting**

**Concrete Unit Masonry:** Acrylic block filler and two coats of acrylic paint.

**Gypsum Board, Latex Paint:** One primer coat and two top coats of low-VOC latex paint.

**Gypsum Board, Epoxy Paint:** One coat PVA primer and two top coats of water-based acrylic epoxy, equal to Tnemec "Tneme-Tufcoat" Series 113/114.

**Shop Primed Metal:** Two top coats of alkyd paint.

### **C3010.06 Other Wall Finishes**

**Fiberglass Reinforced Plastic Coated Panels (FRP):** Crane Composites "Glasboard" type panels with sealed finish.

## **C3020 Floor Finishes**

### **C3020.01 Slate**

Slate in tile form, 12" x 18" size typical, 3/8" thick. Wallace Falvey Associates Brazilian multi-color or equal. Delivered to site at \$3.50/tile. Medium bed mortar installation over concrete substrate.

### **C3020.02 Concrete Floor Finishes**

**Sealed Concrete:** Additional coat of clear sealer/dustproofer, specified as Concrete work.

**Polished and Densified Concrete:** Dry-ground to remove imperfections, densifier applied, dry polish with two passes of successively finer grit for a modest grinding (exposure of aggregate), low gloss, stain to reveal natural veining and seal.

### **C3020.03 Tile Floor Finishes**

**Porcelain Paver Tile:** Large size, unglazed, porcelain body tile, with matching base

**Ceramic Mosaic Tile:** Unglazed porcelain tile; 2" x 2"

**Terrazzo Tile:** Fritz tile, either 12" x 12" or 12" x 18".

### **C3020.04 Wood Flooring**

**Wood Strip Flooring:** Combination hardwood and softwood with tongue-and-groove edges nailed to plywood subfloor (FSC Certified). Field finished with transparent urethane varnish.

**Wood Athletic Flooring, Gymnasium:** Hard Maple strip flooring on plywood subfloor supported on neoprene pads; performance characteristics suitable for basketball and

volleyball. Field finished with game line paint and oil-modified urethane varnish. (FSC certified wood)

**Wood Athletic Flooring, Dance:** Hard Maple strip flooring on plywood subfloor supported on neoprene pads; performance characteristics suitable for dance and aerobics. Field finished with oil-modified urethane varnish. (FSC certified wood)

#### **C3020.05 Resilient Flooring**

**Resilient Tile Flooring:** Vinyl composition tile; 12" x 12" x 1/8" thick.

**Rubber Athletic Flooring, Fitness Center:** 3/8 inch thick interlocking rubber tiles.

**Rubber Locker Room Flooring:** 3/8 inch thick rubber sheet flooring.

**Resilient Play Surface:** 3/8 inch thick interlocking rubber tiles.

**Low VOC Adhesives compliant with MA CHPS**

#### **C3020.06 Carpet Flooring**

**Roll/Broadloom Carpet:** Auditorium; except under seats.

**Carpet Tile:** Offices, Library

**Low VOC Adhesives compliant with MA CHPS**

#### **C3020.07 Resinous Flooring**

**Kitchen:** Water-resistant, decorative resin flooring; skid-resistant texture. 1/4 inch thick system consisting of mortar coat, top coat with broadcast color chips, and clear sealer. Product and chemical type to be selected.

#### **C3030 Ceiling Finishes**

##### **C3030.01 Gypsum Board Ceiling Finishes**

**Gypsum Board:** Suspended gypsum board assembly with joints taped and finished.

**Sound Reflecting Panels:** Gypsum board panels suspended from the ceiling on steel channel framing used to provide reflective surfaces for sound control.

##### **C3030.02 Acoustical Ceilings**

**Acoustical Ceilings, Typical:** 2 x 2 mineral-fiber acoustical lay-in panels; supported by steel double-web grid with narrow face 9/16" wide aluminum face cap.

**Acoustical Ceilings, Sound and Vibration Attenuating:** The areas listed below will have, above the typical acoustical ceiling, a sub-ceiling made of a double layer of gypsum board fastened hung from the structure above on resilient studs.

- Administrative areas under the fitness room and the multi-purpose/dance.
- Special Education Language Program Classroom, if this program is added.

**High NRC Ceilings:** In the Library, ceiling panels will be large (4 x 4), high NRC (noise reduction coefficient) fiberglass base panels.

**Acoustical Ceiling, Food Prep Areas:** 2 x 4 mineral-fiber lay-in panels with scrubbable aluminum or mylar face; supported by steel double-web grid with standard 15/16" wide aluminum face cap.

### **C3030.03 Interior Ceiling Painting**

**Gypsum Board:** One coat PVA primer and two top coats of low-VOC latex paint.

**Exposed Structure:** Drywall paint

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**D SERVICES**

**D10 CONVEYING**

**D1010 Elevators and Lifts**

**D1010.01 Elevators**

Manufacturer: Kone, Otis, Schindler, Thyssen

Elevator, Hydraulic passenger elevator.

- Capacity: 5000 pounds.
- Travel: 3 landings; approximately 42'-0" rise.
- Car Inside Dimensions: To meet requirements of the Massachusetts Elevator Code, 17.40 and the Massachusetts Architectural Access Board (MAAB); nominal 6'-8" wide by 5'-5" deep.
- Speed: 100 fpm.
- Car and Hoistway Doors: Center opening.

**D1010.02 Lifts**

None

**D20 PLUMBING**

**D2000 Overview**

**D2000.01 Scope of Work**

Scope of work will include the installations of new systems to accommodate the new space configurations:

- Plumbing fixtures and trim.
- Domestic cold water and hot water distribution systems.
- Sanitary waste and vent systems.
- Kitchen waste and vent systems.
- Storm water drainage system.
- Natural gas system.
- Lab waste and vent piping system, including treatment for science classrooms.
- Protected cold water and hot water distribution systems for science classrooms.
- Tempered water system for emergency fixtures.

## **D2000.02 Codes and Standards**

Massachusetts Plumbing and Fuel Gas Code, 248 CMR  
Massachusetts State Building Code 780 CMR, Seventh Edition  
Massachusetts Fire Prevention Code 527 CMR

## **D2010 Plumbing Fixtures**

Plumbing fixtures will be mounted in accordance with the plumbing code and industry standards. Fixtures designated as "accessible" will be mounted in accordance with the regulations of the Massachusetts Architectural Access Board (MAAB) and the Americans with Disabilities Act Architectural Guidelines (ADA). As required by MAAB and ADA, a percentage of water closets, urinals, lavatories, sinks, drinking fountains and showers will be made accessible.

### **D2010.01 Water Closets**

Institutional grade white vitreous china, wall hung, 1.28 gpf and open front white plastic seat with self-sustaining check hinge. Toilet rooms for student boys and the public will be provided with battery-operated, electronic, automatic flush valves.

All fixtures to be mounted on commercial grade, floor supported chair carrier.

- Basis of Design: Toto Model #CT708E water closet with Model TET1LN32#CP, 1.28 gpf battery operated automatic flush valve. Toilet seat to be Toto Model #SC534.

Institutional grade white vitreous china, wall hung, dual flush and open front white plastic seat with self-sustaining check hinge. Toilet rooms for student girls, staff and kitchen staff to be provided with battery-operated, electronic, automatic flush valves.

- Basis of Design: Toto Model #CT708E water closet with Sloan Dual Flush flush valve Model #8111-1.6/1.1 gpf battery operated automatic flush valve. Toilet seat to be Toto Model #SC534.

### **D2010.02 Urinals**

Institutional grade, white vitreous china, wall hung, waterless or 0.1 GPF. Toilet rooms will be provided with battery-operated, electronic, automatic flush valves. Fixture to be mounted on commercial grade, floor supported chair carrier.

- Basis of Design:
  - 1) Waterless: Sloan Model #WES-1000.
  - 2) 0.1 GPF: Zurn Model #Ecovantage Z5798urinal with Zurn Model #ZEG6003EV, 0.1 gpf battery operated automatic flush valve.

### **D2010.03 Lavatories**

Institutional grade, white vitreous china, wall-hung type, with front overflow for individual staff and kitchen staff toilet rooms. Those fixtures designated as accessible will have the exposed water and waste piping below the fixture insulated with pre-molded type insulation.

- Basis of Design: Toto Model #LT307.4 lavatory with 4" faucet centers and Toto Model #TEL5GSC-10 faucet (10 second run time) with vandal resistant aerator and concealed thermostatic mixing valve with locked access panel.

Gang toilet rooms will be provided with multi-person, wall mounted, and solid surface modular counter system with integral lavatories. Fixture to be provided with chrome plated, temperature selecting and metering faucet, open grid drain, supplies with stops, and "P" trap.

- Basis of Design: SloanStone 2 or 3 station solid surface lavatory, Model #ELS-42000 series with combination Sloan Faucet and Electronic Soap Dispenser Model #ESD-28085.

### **D2010.04 Sinks**

Ceramics: Commercial grade, 18 gauge, Type 302 stainless steel, counter-mounted, with gooseneck faucet and wrist blades.

- Basis of Design: Elkay Model LRAD 2521, 3 hole, 6"deep with Chicago Faucet Model 201-GN2A-E3-317. Provide plaster trap for each sink, Jay R. Smith Model 8710 or 8730.

2D/3D Art Classrooms: Commercial grade, 18 gauge, Type 302 stainless steel, counter-mounted, with gooseneck faucet and wrist blades.

- Basis of Design: Elkay Model LRAD 2521, 3 hole, 6"deep with Chicago Faucet Model 201-GN2A-E3-317. Provide plaster trap for each sink, Jay R. Smith Model 8710 or 8730.

Jewelry: Commercial grade, 18 gauge, Type 302 stainless steel, counter-mounted, with gooseneck faucet and wrist blades.

- Basis of Design: Elkay Model LRAD 2521, 3 hole, 6"deep with Chicago Faucet Model 201-GN2A-E3-317. Provide plaster trap for each sink, Jay R. Smith Model 8710 or 8730.

Photography: A photo processing sink will be provided (by others) and include a silver recovery system integral with the sink. Waste will be conveyed to the acid waste piping system:

- Basis of Design: To be determined.

Choral: Commercial grade, 18 gauge, Type 302 stainless steel, counter-mounted, with gooseneck faucet and wrist blades.

- Basis of Design: Elkay Model LRAD 2521, 3 hole, 6”deep with Chicago Faucet Model 201-GN2A-E3-317.

Band: Commercial grade, 18 gauge, Type 302 stainless steel, counter-mounted, with gooseneck faucet and wrist blades.

- Basis of Design: Elkay Model LRAD 2521, 3 hole, 6”deep with Chicago Faucet Model 201-GN2A-E3-317.

Child Lab Classroom: Commercial grade, 18 gauge, Type 302 stainless steel, double-bowl, counter-mounted, with gooseneck faucet, spray hose and wrist blades.

- Basis of Design: Elkay Model LWR-3322, 4 hole, Chicago Faucet Model 200-GN2A-E3-317.

Food Lab: Commercial grade, 18 gauge, Type 302 stainless steel, double-bowl, counter-mounted, with gooseneck faucet, spray hose and wrist blades.

- Basis of Design: Elkay Model LWR-3322, 4 hole, Chicago Faucet Model 200-GN2A-E3-317.

Teacher’s Workroom: Commercial grade, 18 gauge, Type 302 stainless steel, counter-mounted, with gooseneck faucet and wrist blades.

- Basis of Design: Elkay Model LRAD 2521, 3 hole, 6”deep with Chicago Faucet Model 201-GN2A-E3-317.

Science Labs: Sinks within the science classrooms and prep rooms will be integral with the counter. Lab sinks and faucets will be furnished by the Casework Contractor and installed by the Plumbing Contractor.

- Basis of Design: Refer to Casework section.

#### **D2010.05 Showers**

Showers are to be constructed in-place and be equipped with pressure balanced, single handle mixers. Shower heads to be institutional grade, adjustable type, 1.8 gpm flow. Accessible showers will be equipped with a standard shower head and a shower head mounted on a wall slide bar, with flexible supply hose.

- Basis of Design: Symmons Model 96-1 (non-accessible) and Model C-96-500-B30-V-X(accessible).

#### **D2010.06 Drinking Fountains/Coolers**

Institutional grade, wall hung, stainless steel finish, self-contained electric water cooler type, dual height to satisfy Massachusetts Architectural Access Board (MAAB) requirements.

- Basis of Design: Halsey Taylor Model OVL-II SER-Q.

#### **D2010.07 Mop sinks**

Floor mounted, mop service basins, molded plastic composition, with stainless steel grid drain, chrome plated mixing faucet, bumper guards on basin rim, and stainless steel wall splash guard.

- Basis of Design: Fiat MSB-2424 with E-77 Bumper guards, MSG2424 stainless steel wall guards and 832-AA hose and hose bracket. Faucet to be Chicago #445CR 20089.

#### **D2010.08 Emergency Plumbing Fixtures**

Mechanical Rooms and Lab Waste Room: Emergency shower and eyewash units will be free-standing, stanchion type in mechanical areas and recessed type in Science classrooms.

- Basis of Design: Guardian G1902P

Science Rooms: Emergency shower and eyewash units to be recessed type.

- Basis of Design: Guardian GBF2160

Science Prep Rooms: Eyewash unit will be sink or countertop mounted swing-down type.

- Basis of Design: Guardian G1805 with point of use mixing valve

Jewelry: Eyewash unit will be sink or countertop mounted swing-down type.

- Basis of Design: Guardian G1805 with point of use mixing valve.

Nurse's Suite: Eyewash unit to be wall mounted, recessed pull down cabinet.

- Basis of Design: Guardian G1805 with point of use mixing valve.

#### **D2010.09 Other Plumbing Fixtures**

Exterior wall hydrants will be strategically placed around the building and mounted approximately 18 inches above grade. Units will be non-freeze type with integral vacuum breaker.

- Basis of Design: Jay R. Smith Model 5560QT recessed box

Interior hose bibbs, with loose key and integral vacuum breakers, shall be provided at all Toilet rooms (except single person type), Mechanical rooms, and rooms with floor drains.

- Basis of Design: Chicago #952-1/2CP for toilet rooms and Chicago #998-RCF for mechanical rooms.

## **D2020 Domestic Water Distribution**

### **D2020.01 Cold Water**

Cold water supply system will be extended 10'-0" outside the building and connected to the underground yard main system. Service entrance will be equipped with a strainer, backflow preventer and water meter that meets the requirements of the local water department.

Separate backflow preventers will be provided as needed for equipment and systems such as HVAC make-up, ice machines, dishwashers, and protected hot and cold water systems.

A main branch from the domestic cold water supply; provided with a reduced pressure backflow preventer provided in close proximity to the science rooms; will be used for protected cold water requirements for the lab sinks.

### **D2020.02 Hot Water**

Domestic hot water will be provided by two ASME gas-fired condensing type water heaters in parallel. Each heater will be sized to provide 66% of the demand. Water will be delivered at 140 deg. F to the kitchen and 120 deg. F to all other fixtures throughout the school. Hand wash lavatories and showers will have integral temperature limit stops and/or point-of-use mixers to provide 110 deg. F. maximum temperature.

A main branch from the domestic hot water supply; provided with a reduced pressure backflow preventer provided in close proximity to the science rooms; will be used for protected hot water requirements for the lab sinks.

All domestic and protected hot water supply systems will be circulated using bronze circulating pumps controlled by immersion aquastats. The protected hot water circulation system will start downstream the backflow preventer and the temperature in the piping will be maintained by a local electric water heater.

Temperature maintenance cable for hot water will be provided on hot water supply piping shall be provided where needed as a supplement to or substitution for hot water recirculation to insure hot water delivery.

### **D2020.03 Piping Insulation**

Insulation will be applied to cold water, hot water, hot water return, Insulation will be continuous through supports and include a vapor retarding jacket. Insulation for cold

water piping 1" and smaller will be 1/2" thick. For cold water piping 1-1/4" and larger will be 1" thick. For hot water and hot water return piping, insulation shall be 1" thick. Insulation shields will be installed to protect insulation at all pipe hangers.

## **D2030 Sanitary Waste**

### **D2030.01 Waste and Vent Piping**

Piping will be designed to collect liquid wastes from all plumbing fixtures, equipment, and drains requiring waste connections. Horizontal collection of the vertical stacks will be primarily below the first floor slab, to minimize the potential for interference with work of other trades.

Several building drains will exit the building and connect by gravity to the site sanitary sewer system 10'-0" outside the building.

Kitchen waste will be piped separately by gravity to 10'-0" outside the building, to discharge into an exterior grease trap. Extension to exterior grease traps will be provided by the general contractor. A local grease interceptor shall be provided inside the building to serve the triple pot sink.

### **D2030.02 Waste Piping Specialties**

Floor drains will be cast iron body construction, heavy duty grade, PDI approved. Those for use in toilet rooms and other finished spaces shall have rough bronze exposed finishes. Those for use in mechanical rooms and other unfinished spaces will be all cast iron.

Point-of-use grease traps will be provided to receive waste discharge at the kitchen triple pot sink. The grease trap will be floor recessed. The unit will be PDI and ASSE approved, supplied with a flush floor access plate where applicable, and equipped with automatic draw-off hose. All other kitchen waste will be conveyed to an exterior grease trap.

Indirect waste piping receiving cold liquid waste and subject to condensation will be provided with 1/2" thick insulation.

## **D2040 Storm Water Drainage/Optional Rainwater Harvesting System**

The system will collect discharge of storm water from all roof drains. Where possible, the pipe routing will run directly from the roof drain locations, vertically down at building columns or chases and be collected below the first floor slab. Several building drains will extend by gravity to 10'-0" outside the building.

Rainwater harvesting system may be considered to flush the water closets and urinals in the building. If this option is selected by the owner, the building drain will be connected to the rainwater harvesting tank outside. The rainwater harvesting system will convey the collected storm water back into the building via a pump. The water will then be filtered,

treated by ultraviolet light and dyed. This non-potable water will then be piped throughout the school to flush the water closets and urinals in the toilet rooms. During times of low rainwater run-off from the roof, the rainwater harvesting system will be supplemented with domestic water from the municipal system.

Roof drains will be cast iron construction, heavy duty, with flashing clamp for membrane roofing, under deck clamping device, and aluminum domes.

Insulation will be applied to all horizontal storm water piping and roof drain bodies to prevent condensation. Insulation will be 1/2" thick and be continuous through supports and include a vapor retarding jacket. Insulation shields will be installed to protect insulation at pipe hangers.

A secondary overflow roof drainage system will not be required.

## **D2050 Natural Gas System**

The permanent natural gas service will be brought to the exterior of the building by the gas company and include a meter and primary pressure regulator as needed.

From the outlet of the meter/regulator set, natural gas piping will be extended throughout the building and serve all equipment requiring gas service. Gas pressure within the building will be low pressure, under 1/2 psig (14"wc).

The primary gas utilization equipment will be boilers, make-up air units, rooftop HVAC equipment, kitchen cooking appliances, science laboratory gas cocks, and central domestic water heating equipment.

Gas piping for each Science classroom will include an emergency master shut off valve in a wall-recessed box. Gas piping to cooking equipment will have an emergency gas shut-off valve that will automatically close upon operation of the kitchen exhaust hood fire suppression system.

## **D2060 Other Plumbing Systems**

### **D2060.01 Lab Waste System**

A lab waste and vent system will be installed to collect waste from all science classrooms and laboratories. The system will be centrally piped to a two-stage pH neutralization system.

The treatment system will consist of two 150 Gallon neutralization tanks in series, with mixers, acid and alkali tanks, automatic metering injection pumps, continuous pH monitoring and recording, local alarm, control panel and all control wiring. The pH neutralization system will be located in an interior, lighted and ventilated room with leak detection.

After treatment the discharge shall be piped independently to 10'-0" outside the building and connected to the site sanitary drainage system.

#### **D2060.02 Protected Water Systems**

Science classroom sinks will be supplied with isolated protected water systems to prevent contamination of the potable water systems. Protected cold, hot, and hot water recirculation systems will be provided and isolated from the domestic water systems by means of backflow preventers.

Insulation will be applied to protected cold water, protected hot water, protected hot water return piping. Insulation will be continuous through supports and include a vapor retarding jacket. Insulation for protected cold water 1" and smaller will be 1/2" thick. For protected cold water piping 1-1/4" and larger, insulation will be 1" thick. For all protected hot water and protected hot water return piping, insulation shall be 1" thick.

#### **D2060.03 Tempered Water**

A tempered water system will be fed from the domestic hot water system and created by installation of a fail-safe thermostatic mixing valve that will prevent hot water from being fed to emergency equipment. The mixing valve will be capable of delivering tempered water between 60 to 90 deg. F.

A central tempered water system will supply tepid water to emergency shower and eyewash units, where required. Emergency shower and eyewash units will be provided in science classrooms where chemical and/or gas services are accessible to students, in the lab waste neutralization room and in the boiler/maintenance areas where chemical treatment of systems is performed.

Tempered water will not be insulated or circulated. At the most remote end of the tempered water piping system, there will be an electric solenoid valve, operated by a time clock, that will periodically open to discharge water; so that fresh water will be introduced into the system.

There will not be floor drains at emergency equipment.

#### **D2060.04 Trap Primers**

Trap primer systems will provide make-up water to fixture and drain traps where necessary to maintain liquid trap seals. In general, trap primers will automatically operate based upon pressure fluctuation in the cold water system. Where multiple traps in one area require trap priming, an electric, time clock-operated automatic trap primer will be used.

Insulation will be applied to all trap primer piping above ground. Insulation will be continuous through supports and include a vapor retarding jacket. Insulation for trap primer piping will be 1/2" thick. Insulation shields will be installed to protect insulation at all pipe hangers.

## **D2060.05 Compressed Air**

A central compressed air piping system will be provided for the Wood Shop. The system shall include tank mounted duplex air compressors with automatic alternating control panel, filters and refrigerated air dryer as needed.

## **D2090 Plumbing System Materials**

### **D2090.01 Pipe and Fittings**

Buried exterior water systems: Class 52 cement-lined ductile iron pipe with restrained mechanical joints.

Buried interior water system; Type K copper with brazed copper joints.

Above ground water piping: Type L with 95/5 soldered copper joints.

Buried storm, sanitary waste and vent: Cast iron bell and spigot with neoprene gasket joints

Above ground storm, sanitary waste and vent: No-hub cast iron with Mass. approved stainless steel clamps. 2" and smaller may be type DWV copper with soldered copper drainage pattern fittings.

Natural gas: 2" and smaller shall be Schedule 40 black steel with malleable iron threaded fittings. 2-1/2" and larger shall be Schedule 40 black steel with welded joints.

Lab waste and vent: Single-wall acid resistant drainage pattern polypropylene with mechanical joints within lab benches and heat fusion joints elsewhere. PVDF piping to be provided in ceilings designated as a plenum.

Compressed air piping will be Type L copper with brazed joints.

### **D2090.02 Valves**

Water and Compressed Air: Shut off valves, 3" and smaller shall be full port ball valve, bronze body, chrome-plated bronze ball. Shut off larger than 3" shall be iron body, bronze mounted, inside screw, non-rising stem gate valve.

Balancing valves shall be approved circuit setters.

Water and Compressed Air: Check valves shall be bronze body, bronze swing disc.

Natural gas: 2" and smaller shall be Mass. approved threaded bronze ball valve. Larger than 2" shall be semi-steel, lubricated, wrench operated, plug valve.

## D30 HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

### D3000 Design Basis

The school building will be provided with a hot water heating system for heating and ventilation of the proposed spaces through the use of perimeter radiation or through hot water coils in rooftop air handling units. Air conditioned spaces will largely be served from chilled water generated by a split-type air cooled chiller with piped distribution to the air handling units serving those spaces being air conditioned. Some of the proposed air conditioned spaces (e.g., the classrooms) will be partially air conditioned to temper the ventilation air.

The proposed equipment as shown in the accompanying drawings is as follows:

<u>Unit Designation</u>	<u>Size</u>	<u>Service</u>
Air Handling Units:		
AHU-1	79 Tons	North classroom pod
AHU-2	10 Tons	Auditorium stage
AHU-3	87 Tons	South classroom pod
AHU-4	8 Tons	Art Rooms
AHU-5	6 Tons	Chorus/Band
AHU-6	54 Tons	Auditorium
AHU-7	17 tons	Admin Area
AHU-8	38 Tons	Dining Area
AHU-9	23 Tons	Library
AHU-10	3 Tons	Computer Room
Heating and Ventilation Units:		
HV-1	6,000 CFM	South pod storage
HV-2	30,000 CFM	Gym
HV-3	14,000 CFM	Lockers, bathrooms
HV-4	6,000 CFM	Mechanical room
Make-up Air Unit:		
MAU-1	8,000 CFM	Kitchen
Boilers:		
B-1	3,000 MBH	Condensing boiler
B-2	3,000 MBH	Condensing boiler
B-3	3,000 MBH	Condensing boiler
Chillers:		
CH-1	350 Tons	Split air cooled chiller

#### D3000.01 Reference Standards

The Massachusetts State Building Code, Seventh Edition.  
International Mechanical Code (IMC), 2006.  
International Energy Conservation Code (IECC), 2006.  
NFPA 101 - Life Safety Code.

Guide Books of The American Society of Heating, Refrigerating and Air Conditioning Engineers.

#### **D3000.02 Outdoor Design Conditions**

Summer: 87°F.D.B./74°F.W.B. (78°F.W.B. for chiller selection).  
Winter: 7°F.  
Source: The Massachusetts State Building Code, Seventh Edition.

#### **D3000.03 Indoor Design Conditions**

Summer Fully air-conditioned areas: 75°F dry bulb (db)/50% Relative Humidity.  
Partially air-conditioned areas: no absolute temperature control/60% RH  
Non-Cooled Spaces: 75°F db/no humidity control.  
Winter All spaces: 72°F db/no humidity control.

#### **D3000.04 Outdoor Air Ventilation**

Minimum outside air will be introduced as required by the greater of ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality," International Mechanical Code 2006, or the requirement to make up exhaust air.

### **D3010 Energy Supply**

#### **D3010.01 Gas Supply System**

The boilers and kitchen rooftop make-up air unit shall be gas-fired. See Section D20 for details of natural gas service to the building.

#### **D3010.02 Electric Supply Systems**

All fans, pumps refrigerant system compressors and other HVAC systems will be electrically powered.

### **D3020 Heat Generation/Heat Generating Systems**

#### **D3020.01 Water Boiler Plant**

The boiler plant will be comprised of gas-fired, condensing boilers sized for the full building heating load. Each boiler will have a constant-volume primary pump to directly serve its flow requirements as a primary loop configuration. The secondary loop will include three variable volume pumps (two as primary and one as standby) with VFDs to serve the building heating loads. The building loads will be controlled through the use of 2-way modulating valves for each terminal unit or heating coil. A modulating bypass valve will be located in the boiler room on the load-side of the pumps and sized to ensure minimum flow is maintained at low-load conditions, as defined by the minimum flow rate for a single pump.

The boilers as well as the gas-fired DHW heater will be direct-vent type and vented through the exterior of the building; assume separate flues for each condensing boiler.

Condensing Boilers: Provide three (3) 3,000 MBH input gas-fired condensing boilers with direct venting. Provide three (3) constant-volume, inline pumps, each 90 GPM and 25 ft. hd., each pump to be dedicated to a single boiler.

Secondary Pump Loop: Provide three base-mounted pumps, each with VFDs and each rated at 200 GPM and 80 ft. head (two as primary and one as standby). Provide a 3" modulating bypass valve to ensure minimum flow within the system at low-load conditions. New schedule-40 steel piping will provide distribution via the corridor ceilings throughout the school to terminal heating units. Equipment controls shall be provided separately through controls vendor, including valves and actuators.

Hydronic Specialties: Provide a 8" air separator, two medium-sized vertical expansion tanks (bladder type) and a makeup water connection.

### **D3020.02 Perimeter Heating**

Perimeter heating will be provided by hot water by a combination of the following:

- Radiant ceiling panels – in classroom spaces
- Finned tube radiation (similar to Runtal) – in gym, cafeteria, library
- Recessed cabinet unit heaters (wall or ceiling type) – in vestibules, corridors and other common areas
- Unit heaters – in back-of-house and utility spaces

### **D3030 Refrigeration**

#### **D3030.01 Variable Speed Air-Cooled Chiller**

A 350-Ton, variable speed, air-cooled chiller shall be provided to support the air conditioned spaces in the school. Distribution will be provided by three (3) 300 GPM, 80 ft. hd. (10 HP) primary-only pumps (two as primary, one as standby). There will be a 3" differential bypass control valve to maintain minimum flow to the chiller. Load temperature control will be provided through 2-way modulating valves through interface with the building management system (BMS).

New schedule-40 steel piping will provide distribution via the corridor ceilings throughout the school to terminal heating units. Controls to be provided separately through controls vendor, including valves and actuators.

Hydronic Specialties: Provide a 8" air separator piped in a side stream configuration, two medium-sized vertical expansion tanks (bladder type) and a makeup water connection.

**D3030.02 Other Refrigeration Systems**

Ductless split air conditioning systems will be complete with direct expansion cooling coil, supply fan, motors, and filter. Condensing units will be complete with compressors and condenser fans. The systems will be provided with equipment manufacturer's packaged controls including compressor anti-short cycle and low ambient start features. System operation will be monitored by the building management system through relay logic.

Provide ductless split air conditioners for each of the Tel/Data Closets. Allow for a quantity of three (3) 2-Ton units.

**D3040 HVAC Distribution**

**D3040.01 Air Distribution System**

Approximately 85% of the building will be air conditioned. The air conditioned spaces will be configured to be either fully air conditioned or partially air conditioned. The assignment of fully, partially or non-air-conditioned spaces is shown in the table below.

Space	Fully Air Conditioned	Partially Air Conditioned	Heating & Ventilation Only
Classrooms		X	
Large Group Instruction		X	
Art/Music		X	
Auditorium	X		
Media Center/Library	X		
Administration	X		
Media/TV Studio	X		
Custodial/Maintenance			X
Utility Spaces			X
Tel/Data Spaces	X		
Gymnasium			X
Locker Rooms			X
Weight & Dance Rooms			X
Cafeteria		X	
Kitchen			X

The fully and partially air conditioned spaces will be sized to maintain the respective design indoor temperatures listed in section D3000.03. The partially air conditioned spaces will be based on conditioning only the amount of air that is required for ventilation or to provide a minimum of four (4) air changes per hour. The fully air conditioned spaces will provide enough airflow to satisfy the full space conditioning requirements.

Rooftop air handling units will be of the following types according to the service and will be configured with sound attenuators to satisfy space acoustic requirements. Air delivery to the fully or partially conditioned spaces will be primarily through displacement

ventilation, with supply air delivered at or near floor level through drops from the overhead distribution. Carbon dioxide sensors will be installed in all air conditioned systems in order to maintain acceptable levels of indoor air quality due to the varying occupancies.

- **Heating & Ventilation:** Heated and ventilated spaces will be served by rooftop air handling units incorporating a sensible energy recovery wheel, MERV 7 and MERV 13 air filters, heating coil, supply fan with VFD, and an exhaust fan with VFD. Air distribution to the spaces will be through overhead, medium-pressure, ducted distribution through two-position VAV terminal boxes to control occupied and unoccupied modes.
- **Full Air Conditioning:** Fully air conditioned spaces will be served by rooftop air handling units incorporating an enthalpy recovery wheel, MERV 7 and MERV 13 air filters, heating coil, chilled water coil, a supply fan with VFD, and an exhaust fan with VFD. Distribution will be through medium-pressure ductwork to VAV terminal boxes as overhead distribution to wall-mounted, floor-level diffusers to perform as displacement ventilation.
- **Partial Air Conditioning:** Partially air conditioned spaces will be served by rooftop air handling units incorporating an enthalpy recovery wheel, MERV 7 and MERV 13 air filters, heating coil, chilled water coil, sensible energy wheel, a supply fan with VFD, and a return or exhaust fan with VFD. Distribution will be through medium-pressure ductwork to VAV terminal boxes as overhead distribution to wall-mounted, floor-level diffusers to perform as displacement ventilation.

A make-up air unit will be provided to serve the requirements of the kitchen exhaust hoods. The MAU will be a rooftop unit with MERV 7 prefilters, a hot water coils and a centrifugal fan with duct-mounted temperature sensor for control.

Except as outlined below, the air distribution systems will be constructed of galvanized steel and constructed to the appropriate pressure class. Sound attenuators and/or sound lining will be provided as required to control system noise.

- Showers (as applicable): Welded aluminum; pitched towards grilles for drainage
- Dishwasher (as applicable): Welded aluminum; pitched towards appliance for drainage
- Kitchen Hood: Welded stainless or carbon steel; or double wall pre-fabricated duct system listed for the application
- Fume Hoods: Welded stainless steel

#### **D3040.02 Special Exhaust Systems**

Dedicated exhaust systems will be provided for the following spaces and equipment due to their significant heat rejection and/or contaminated air streams. Spark proof construction and dedicated makeup air will be provided as required.

- Kitchen Hood: grease exhaust fan
- Kiln Room: high-heat rated fan
- Electrical Closets: in-line or roof exhaust type

- Mechanical Room: in-line or roof exhaust type
- Garbage disposal areas: roof exhaust type
- Dishwasher: aluminum wheel
- Fume Hoods: packaged lab exhaust fan(s) with integral bypass damper
- Toilet Rooms: standard roof exhaust fan
- Shower Exhaust: aluminum wheel, roof exhaust type
- Acid Neutralization Room

## **D3060 HVAC Instrumentation and Controls**

The facility will be provided with a microprocessor-based, direct digital control (DDC) building management system (BMS). The BMS will consist of equipment and building level controllers that communicate via a dedicated local area network (LAN) to an operator workstation. Each controller will be capable of full, stand-alone operation and have integral permanent memory to maintain control and set points in case of network or power failure.

User interface with the BMS will be through a combination of a local operator workstation, portable operator workstations and WEB access. A dedicated phone line and modem(s) will be provided to allow for communication with the remote devices. All operator workstations will be provided with easy to use, color, graphics-based software for communicating with equipment controllers and between workstations. The Local Operator Workstation (a personal computer) will be located on site. One Portable Operator Workstation(s) (laptop personal computer) will be provided for communication in the field with individual equipment controllers to facilitate troubleshooting and maintenance.

All set points, hours of operation, maintenance alarms, critical alarms, trend logs and some sequences of operation and safeties will be user adjustable through the operator workstations. Most equipment will be provided with occupied and unoccupied modes of operation for energy savings.

The DDC system will provide scheduled start/stop control and monitor the operational status of equipment. It will also incorporate control algorithms to optimize the efficiency and performance of the school's HVAC systems.

All mechanical equipment provided with manufacturers control shall have open protocol capabilities so manufacturers control will seamlessly communicate with BMS. It is planned that the controls contractor will provide all proposed controls for the rooftop air handling units (no manufacturer-provided controls).

## **D3070 Systems Testing, Adjusting and Balancing**

### **D3070.01 Piping Systems Testing, Adjusting and Balancing**

The piping systems testing, adjusting and balancing will be performed by an Air Balancing Contractor certified by either Associated Air Balance Council (AABC), or National Environmental Balancing Bureau (NEBB).

## **D3070.02 Air Systems Testing, Adjusting and Balancing**

The air systems testing, adjusting and balancing will be performed by an Air Balancing Contractor certified by either Associated Air Balance Council (AABC), or National Environmental Balancing Bureau (NEBB).

## **D40 FIRE-PROTECTION**

### **D4000 General Design Considerations**

#### **D4000.01 Codes and Standards**

Massachusetts State Building Code 780 CMR

Massachusetts Fire Prevention Code 527 CMR

NFPA codes and regulations

### **D4010 Wet-Pipe Sprinkler System**

#### **D4010.01 System Overview**

The building will be protected throughout with an automatic combination wet standpipe/sprinkler system. The system will be hydraulically calculated to provide a water application rate of 0.10 GPM per square foot over the most remote 1500 square feet for light hazard areas, 0.15 GPM per square foot over the most remote 1500 square feet for ordinary hazard group 1 areas and 0.20 GPM per square foot over the most remote 1500 square feet for ordinary hazard group 2.

Light Hazard areas will include: Office areas, general classrooms, auditorium, computer labs, commons, library and cafeteria seating.

Ordinary Hazard Group 1 areas will include: Storage areas, gymnasium, kitchen, culinary, science rooms.

Ordinary Hazard Group 2 areas will include: Mechanical rooms and wood working.

Sprinklers will be recessed type, white sprinkler and white escutcheon, at hung ceiling areas and concealed with white cover plate at all gypsum ceilings

Mechanical rooms and other unfinished areas will be provided with exposed brass finish sprinklers. Sprinkler guards will be provided at the Gym and Mechanical and Storage rooms.

Areas of the building that will not be provided with wet sprinkler protection are:

- Areas above suspended ceilings

- Main Electric Switchgear Room
- Elevator shafts and pits
- Elevator machine rooms
- Emergency electrical closets

The sprinkler system will be separated into multiple zones per floor for the purposes of monitoring water flow. The inspector's test valves for each zone will be located in the stairwells above the entry door soffit with a vertical access panel for testing and maintenance. Test drain piping to discharge outside the building to an appropriate location.

Fire department valves will be provided at each side of the Stage/Auditorium area and at the entry vestibules to the auditorium.

#### **D4020 Standpipes**

A combination wet standpipe/sprinkler system will be provided for the 4 story building and shall comply with NFPA 14. A floor control valve assembly, including associated inspector's test valve and drain piped to outside, will be provided at each egress floor.

All standpipes shall be provided with the shut-off valves at the base of each standpipe risers.

Standpipes with 2-1/2" Fire Department valves and 1-1/2" reducers will be provided at each main floor landing of each stairwell. A roof manifold will be provided off the standpipe system.

#### **D4030 Fire Protection Equipment**

A minimum of two Fire Department pumper truck connections (FDC) will be provided around the building, one at the main lobby entrance and one at the fire protection water service entrance. The FDC's will be 4"x4" Storz type to match the requirements of the Grafton Fire Department.

A vertical double check valve assembly will be provided on the fire service, in the mechanical room. This device will be ASSE listed and Massachusetts Code approved.

A free standing post indicator valve will be provided outside the building, on the fire main. An alternate would be a wall type post indicator valve.

All shut-off valves will be UL listed and FM approved type, and be equipped with supervisory tamper switches. These switches along with the flow switches will be monitored by the building fire alarm system.

## **D4040 Fire Protection Specialties**

### **D4040.01 Fire Extinguisher, Cabinets, and Accessories**

Fire Extinguishers: Multi-purpose dry type, 20A-60BC.

Fire Extinguisher Cabinets: Fully-recessed cabinet; painted steel trim and door with full-glass panel, DSA glass. Baked enamel primer finish; field painted.

Fire extinguishers and cabinets will be provided by the general contractor and located to meet the requirements of NFPA 10.

### **D4040.02 Wet Chemical Fire Extinguishing Systems**

Wet chemical fire extinguishing systems will be provided at kitchen exhaust hoods by the kitchen equipment contractor.

## **D4050 Materials**

### **D4050.01 Pipe and Fittings**

Sprinkler piping 2" and smaller to be Schedule 40, black steel with black cast iron screwed fittings.

Sprinkler piping 2-1/2" and larger to be Schedule 10 black steel pipe, roll grooved, with grooved end fittings.

### **D4050.02 Valves**

Gate valves 2-1/2" and larger to be iron body, bronze mounted, taper wedge, outside screw and yoke, rising stem and flanged ends. Indicating valves to be butterfly type, bronze type with grooved ends.

## **D50 ELECTRICAL**

### **D5001 Reference Standards**

Massachusetts Electrical Code, 527 CMR, 2008 edition.  
Life Safety Code NFPA 101  
National Fire Alarm Code, NFPA-72 2007  
Massachusetts Building Code, 780 CMR.  
International Energy Conservation Code (IECC), 2006

### **D5010 Electrical Service and Distribution**

#### **D5010.01 Overview**

New electrical service will originate from the existing National grid medium voltage overhead primary line on Providence Road, rising existing utility pole 140, and going underground to serve new building.

The service electrical transformer will be furnished, installed, owned and maintained by National Grid, and will be located adjacent to the building in close proximity to the building main electric room. The recommended distance from the transformer to the building is at least 10 ft. The transformer will be of the pad-mounted type with a primary voltage of 13.8 kV and a secondary voltage of 480Y/277 volts. The transformer will be sized by the utility company based on the load data provided by Symmes, Maini & McKee Associates.

Concrete pad and grounding grid for the pad-mounted transformer is provided by the Contractor per the National Grid standard.

Two 4 in. PVC conduits for the primary feeder installation from the existing pole 140 at Providence Road to the pad-mounted transformer will be provided by the Contractor. The conduits will be installed in the concrete encased duct bank. Pre-cast concrete manholes, 6ft. by 8ft., will be provided by the Contractor to facilitate the primary cables field installation.

Utility company will provide primary feeder cables from the existing utility pole via manhole(s) to the pad-mounted transformer, including terminations on the both ends.

Transformer secondary feeder of the copper conductors will be installed underground in the duct bank of (8) 4" PVC conduits from the pad-mounted transformer to the main electrical switchboard located in the electrical room. The secondary feeder and terminations at the switchboard side will be performed by the Contractor, and terminated at the transformer side by National Grid.

The new service will be metered at the primary voltage by National Grid.

### D5010.02 Building Electrical Design Load

Electrical load is based on the estimated preliminary design data for the new Grafton High School building:

Site Lighting:	20 kVA
Field Lighting	20 kVA
Irrigation Well	5 kVA
Chiller plant with Pumps	500 kVA
Boilers with Pumps	35 kVA
Ventilation, A/C Split Systems, Heat Pumps, Exhaust and Air Handling Unit Motors	250 kVA
Interior Lighting Load	185 kVA
Computer and Small Power	370 kVA
Kitchen (full service)	80 kVA
Miscellaneous Power	70 kVA
Elevators (2)	70 kVA
Auditorium Lighting	70 kVA
Total Connected Load	1,675 kVA

Total connected load is 1,595kVA or 2,016 Amps at 277/480 volt 3 phase 4 wire system.

### D5010.03 Main Electrical Switchboard

The main electrical switchboard will be fully metal enclosed, dead front, standard NEMA.1 indoor type construction. Switchboard will be front-connected, front-accessible, with fixed individually mounted main device, and panel mounted feeder devices. Switchboard sections will be rear aligned, designed for placement against a wall

The switchboard will be rated 2,500 Amperes at 480Y/277 volts, three phase, four wire.

Main protective device will be a power circuit breaker 100% rated, with a solid state trip unit capable of adjusting long time, short time, and ground fault protection characteristics. In general, feeder protective devices will be thermal-magnetic type molded case circuit breakers, but electronic type circuit breakers will be furnished for the devices 250 Amp and larger.

The switchboard will be furnished with a service entrance transient voltage surge suppression (TVSS) device rated for service entrance and digital metering unit to monitor voltage, current, power factor and demand kW.

If required, Utility metering compartment will be provided on the load side of the main protective device.

Main switchboard's short circuit rating shall be coordinated with National Grid, but estimated to be at 65 KAIC.

#### **D5010.04 Interior Electrical Power Distribution**

Building electrical power riser diagram is shown on the drawing E5.01

Electrical power distribution equipment will be installed in the main electrical room and in the electrical closets. Refer to the architectural floor plan for the main electrical room and closets location.

Electrical power distribution equipment in each electrical room or closet will support lighting, power, and HVAC loads in the associated areas.

A typical closet will house a 225 Amp 277/480 volt power panel as a power source for interior lighting and HVAC equipment (such as fan coil units, etc.) circuits, dry-type transformer sized from 45 to 75kVA and two 150 Amp or 250 Amp, 120/208 volt, 3 phase receptacle panelboards.

Roof-mounted HVAC equipment such as air handling units, energy recovery air handling units, make-up air units and exhaust fans will be power fed from the power panels of either normal or emergency (standby) power systems. The power panels will be located in the upper floor electrical closets.

Building DDC system panel, kitchen walk-in refrigerator/freezers, security and communication system, technology room cooling system, and boiler plant equipment including boilers with primary and secondary pumps will be power fed from the emergency (standby) power panel located in the mechanical room.

The building elevator controller will be power fed from the emergency (standby) power panel located in the mechanical room.

A dry-type 75 kVA transformer and 250 Amp, 120/208 volt, 3 phase panels will be provided for the Cafeteria and Kitchen loads.

The dedicated transformer and panel will be also provided for the Auditorium lighting dimming system.

Proposed manufacturers for the electrical power distribution equipment are: General Electric, Square D, Cutler-Hammer and Siemens.

#### **D5010.05 Interior Electrical Dry-type Transformers**

Interior electrical dry-type transformers will be provided to reduce 480 volt, three phase interior distribution voltage to 208Y/120 volts for small equipment power requirements, classroom power and convenience outlets. Transformers shall be of a general purpose dry type, air cooled, with indoor ventilated steel enclosure, energy efficient and shall comply with NEMA Standards ST 20 and TP-1. Where required to accommodate

computer equipment and other non-linear type loads, the transformers shall be K-13 factor rated with an electrostatic shielding.

#### **D5010.06 Electrical Branch Circuit Panelboards**

Electrical branch circuit panelboards will be dead-front type with thermal-magnetic molded case circuit breakers. Panelboards will be provided with tin-plated phase and neutral busses and copper equipment ground bus.

Panelboards will be rated 480Y/277 volts, three phase, four wire for power and lighting loads and 208Y/120 volts, three phase, four wire for small power and convenience outlets.

Neutral bus, 200% rated, and TVSS device will be specified for the 120/208 volt panelboards serving sensitive electronic equipment (computers, Equipment and Telecommunication Rooms, etc.) and where substantial non-linear type loads are present. These panels will be fed by k-factor rated transformers.

All panelboards will be Underwriters Laboratories (UL) listed and labeled, and comply with NEMA standard PB1 for the panelboards. All 208Y/120 volts panelboards with sensitive equipment loads will have built-in TVSS protection.

#### **D5010.07 Enclosed Safety Switches**

Individual heavy-duty type switches in NEMA 1 for indoor and NEMA 3R for outdoor applications will be provided where equipment disconnecting means are required in accordance with Massachusetts Electrical Code.

#### **D5010.08 Motor Controls**

Individually enclosed combination motor starter/disconnect switches will be provided for the control and overload protection of the three-phase motors unless the starters are furnished as integral part of the packaged equipment. Motor starters will be magnetic type and have overload relays in each phase for three phase motors, hand-off-automatic selector switch, and control power transformer. Motor starters will comply with ANSI and NEMA standards.

#### **D5010.09 Electrical Branch Wiring**

In general, wiring will be insulated conductors installed in steel conduit or metallic tubing run concealed in the finished areas or exposed in the unfinished areas such as a storage, gymnasium, mechanical and electrical rooms. Minimum conduit size will be 1/2 inch.

Metal clad MC type cable may be used for branch circuit wiring in the above suspended ceiling spaces and in the dry wall partitions where it is allowed by Massachusetts Electrical Code.

All conductors will be copper , type XHHW or THHN/THWN rated 600 volt and for 75 degree C insulation level . Minimum wire size for power and lighting circuits shall be # 12 AWG. Conductors # 8 AWG and larger shall be stranded. Control wiring conductors shall be # 14 AWG.

Multi-phase 120 volt branch circuits will be provided with a dedicated neutral conductor for each phase conductor.

Underground conduits and conduits installed under a concrete slab will be PVC Schedule 40. Conduits exposed to weather, and penetrating foundation and concrete slabs will be galvanized rigid steel.

**D5010.10 Wiring Devices**

Duplex receptacles will be heavy duty, specification grade, grounding type, rated 20 Amp at 120 volt, UL listed. Duplex receptacles will be GFI and WR types where required by the Code.

Toggle switches will be 20 Amp at 120/277 volt, specification grade, UL listed.

**D5020 Lighting**

**D5020.01 Interior Lighting**

Complete interior lighting system with the illumination levels per IES recommended value for applicable activity type and in compliance with the IECC energy allowances and control requirements .

ILLUMINATION LEVELS

Location	Average Illumination Level
Common areas	35-40 FC
Offices, conference rooms, Library:	40-50 FC
Classrooms/Labs	45-50 FC
Utility and Storage rooms	20 FC
Corridors/Toilets/ Stairways	20 FC
Cafeteria	30-40 FC

In general, interior lighting fixtures will utilize fluorescent low-mercury, energy- efficient T5, T5HO or Super T8 lamps, compact fluorescent lamps and the electronic ballasts. The ballasts shall be .95 power factor or higher, sound rating Class A, and input harmonic distortion of 20% or less. All fluorescent lamps should contain low mercury level.

Classroom Lighting: Direct/Indirect pendant mounted fluorescent fixtures. Ambient light sensors will be also provided to control the light fixtures located along the exterior windows. Integrated Classroom Lighting System will give teachers the ability to switch between different lighting modes (general mode and audio/visual mode) in order to achieve appropriate lighting for different work task.

Lighting in the administration areas, corridors, staff and nurse's offices, teacher support areas, culinary arts labs, photography lab and in the similar areas will be fluorescent recessed 2ft. by 2 ft. and 2ft. by 4ft. of the direct/indirect type.

Lighting in the kitchen, locker rooms, preparation rooms, storage rooms, and in the similar areas will be fluorescent recessed 2ft. by 2 ft. and 2ft. by 4ft. with prismatic lens.

Multi-level lighting control will be an energy-efficient and cost-effective method to provide multiple illumination levels as required for the different working tasks and time of the day. Local switches and occupancy sensors will be provided for lighting control in the private offices and conference rooms

Ambient light sensors will be installed in the areas where daylight harvesting is available. These sensors in conjunction with the fluorescent dimming type ballasts will result in the substantial energy savings.

Low-voltage programmable lighting control system will be furnished to facilitate automatic lighting shutoff on a scheduled basis with an occupant override in compliance with the Energy Code.

Exit signs and egress lighting will be connected to the emergency power distribution system to provide illumination level required by the Code for emergency egress in a case of normal power failure.

#### **D5020.02 Exterior Building and Site Lighting**

Exterior building lighting will be provided at the building exits to comply with the Massachusetts Building Code.

Walkway and parking lot lighting fixtures will be pole mounted, with energy-saving LED lamps. Minimum maintained lighting level will be .5 FC at grade. The light standards will be capable to withstand a maximum wind load of 100 mph. Cast aluminum fixtures with glass lens. Prewired, 4" diam. Seamless cast aluminum pole, 20' height.

Atheletic lighting will be cast aluminum fixture with clear glass lens. 120 Light Emitting Diodes=175-watts. Prewired for 277 volts. 5" dia. seamless tapered steel pole, 25' height with anchor bolts

All exterior fixtures will be vandal resistant, enclosed, listed for wet locations and with full cut-off light distribution, with 0% lamp lumens above 90 degree plane.

Exterior building and parking lot lighting will be photocell and/or time switch controlled.

Lighting system will comply with energy use limitations of Massachusetts Building Code.

## **D5030 Communication and Security**

### **D5030.01 Fire Alarm System**

Addressable, non-coded, Class A supervised type fire detection and alarm system will be provided to meet the requirements of the Massachusetts Building Code, NFPA-72, Americans with Disabilities Act (ADA) and local fire department requirements. Fire alarm system will consist of a fire alarm control panel, remote annunciator, automatic smoke and heat detectors, manual pull stations, audible and visible alarm signals, connections to automatic fire suppression systems and a city master box for transmitting alarm signals to the local fire department.

FACP will provide an alarm and annunciation capability in case of activation of any manual fire alarm station, smoke detector, heat detector, duct smoke detector, sprinkler water flow switch or fire suppression system. The fire alarm control panel will be located in an area, as required, by the Fire Department.

Audible horns and visual high intensity strobes alarm devices will be installed per NFPA-72. In addition audible/visual alarm devices will be provided in all classrooms. A voice evacuation system is not required by the local Fire Department in any space in the building( this direction should be confirmed).

System type smoke detectors will be installed in the main electrical room, electrical closets, data/telephone rooms, school corridors, elevator machine room, elevator lobbies and at the top of the stairways. Addressable type duct smoke detectors will be installed in supply and return air ducts as required by NFPA-90A.

The system will be as manufactured by Siemens, Notifier or approved equal.

### **D5030.02 Security Access and Surveillance**

A hard wired building security system will be provided to protect the building from unauthorized entry. This security system will consist of a main control panel, intrusion detection sensors, building access control using proximity readers, video intercom devices and CCTV surveillance. The security system design will include all power and routing devices necessary to the support the system.

The intrusion detection system will consist of door contact switches and dual technology motion detectors. When an intrusion event is detected, the system will programmed to transmit an alarm signal to the main office during school hours and to the local police department (or security company)during off-hours. System coverage will include motion detection in all first floor rooms with exterior windows or doors, in the first floor corridors, in rooms on upper levels that may be accessed from low roofs or adjacent building structures and in the rooms with high value equipment (i.e. computer labs) or where sensitive documents may be stored. Door contacts will be provided on all exterior doors to detect unauthorized entry or exit. The intrusion detection system will interface with the fire alarm system.

Access control will be managed using proximity card readers installed at main entries and at specified locations where high value equipment or sensitive documents may be stored. In addition video intercom devices will be provided at the main entries, equipped with electrified lock control to allow remote the door release from a desk mounted console.

Exterior mounted CCTV cameras will be provided at the entry to the parking lot including up to three wide angle views of the parking lots, areas where students will congregate (i.e. bus drop-off, garden area) and overlooking the dumpster area. Interior CCTV cameras will be located in corridors and as designated pending further discussions with the Owner. Video surveillance footage will be recorded to a network video recorder (NVR) and be visible over the network to selected individuals who have been granted access and a password code. The local Police may also be given password access to live and recorded surveillance content over the wide area network.

### **D5030.03 Voice and Data Systems**

The School will be equipped with a voice and data distribution system providing connectivity from the work area voice/data outlets to the nearest patch panel in the Equipment Room (ER) or Telecommunications Room (TR). A fiber optic data and multi-pair copper voice backbone will provide connectivity from the each TR to the ER. All wiring, outlets and terminations will be installed to comply with EIA/TIA 568 standards. The ER and TRs will be strategically located so as not to exceed the maximum 300 ft. length of the horizontal distribution cabling to the workstation outlets. These rooms will be designed to provide efficient cable runs, easy access and flexibility for future growth. Power, lighting and mechanical systems will be specified in the MDF and IDFs to provide and maintain adequate ambient conditions for immediate and future users and systems.

The system design shall include specification of recommended support equipment, jacks, faceplates, installation methods and wiring requirements.

The voice and data distribution system shall consist of structured, Category 6, unshielded twisted pair (UTP) cabling systems and outlets for local area network (LAN) and voice communications. Outlets will be provided in the offices, classrooms, workrooms, library, computer labs, cafeteria, gymnasium, and utility rooms. The typical LAN/Voice outlet quantities in various spaces will be approximately:

- Classroom – Eight LAN outlets and one voice outlet.
- Computer – Thirty LAN outlets and one voice outlet.
- Science Lab – Sixteen LAN and one voice outlet.
- Office – Two LAN and one voice outlet.

An infrastructure to support wireless data network access will be provided.

Refer to section G4030.01 for a description of outside plant communications cable distribution plans.

#### **D5030.04 Public Address and Program System**

The School will be equipped with a public address, music and intercommunication system consisting of an main console, microphones, amplifiers, AM/FM tuner, CD player, speakers, wiring, telephone paging adapter, clock/program system interface, room call switches, and classroom telephone handsets. The system shall allow broadcasting of program tone signals for classroom changes, radio and CD deck program material, and microphone originated announcements to all areas throughout the building by individual area or on an all-call basis. Private two way communications can be established between any classroom and the office, utilizing individual classroom telephone handsets. All electronic equipment will comply with applicable Electronics Industries Association (EIA) Standards.

A clock and program system will be generate and distribute time and time correction signals, and will initiating audible program signals. System will consist of a master control unit and indicating clocks. The master control unit will transmit time and time correction signals to clocks throughout the building and generate program tone signals for broadcasting over loudspeakers on the public address system.

#### **D5030.05 Cable Television System**

Each educational space or group space will be cabled for video system connectivity. The video system is to be bi-directional and will support the distribution of cable TV programming. System will consist of a head end rack mounted equipment, outlets, splitters, trunk and branch cabling. All wiring, outlets and terminations will be installed to comply with local CATV company standards.

A TV production studio will be provided that will support multi-camera recording, audio recording, video switching and editing. Selected locations, including the cafeteria, gymnasium and auditorium, will be equipped to transmit audio and video signals to the TV studio for multi-camera productions.

The cable television system head end will be connected to TV studio to allow programming to be distributed throughout the school and on to the community access channel. Remote connection for multiple cameras, audio and intercom from the TV studio to the auditorium, gymnasium and library will be provided.

Select public sites including Cafeteria, Media Center, Administrative Conference Room, Main lobby and primary circulation areas will be wired for flat screen television monitors. The television monitors will be furnished and installed under the Technology contract.

#### **D5030.06 Audio Visual Systems**

Local sound systems will be provided for the Auditorium, Gymnasium, Large Group Instruction Room, Band Room, Chorus Room, Ensemble Room, Fitness Center, Dance

Room and Cafeteria. Systems will provide high quality sound reproduction for use during meetings, lectures, theatrical productions and public functions. In addition, high quality audio recording capabilities will be provided in Auditorium and TV studio. A professional grade audio recording system will be provided in the ensemble room.

The auditorium, cafeteria, gymnasium, fitness center, wrestling, dance room, performing arts studios and all academic classrooms will be wired for LCD projectors. Projectors will be furnished under the Technology contract; and will be sized to accommodate the conditions of each location.

All classrooms will be prepared for smart boards by installation of conduit. Smart boards, including installation and wiring, will be provided under the Technology contract.

## **D5090 Other Electrical Systems**

### **D5090.01 Packaged Engine Generator System**

A packaged engine-generator system will be provided to supply power to building life safety and standby loads upon loss of the normal electric utility power source. The generator unit shall start automatically on loss of normal power and transfer to the emergency power system within 10 seconds.

#### **Generator-set power loads:**

- Life-safety emergency power loads
  - 1) Emergency exit and egress lighting (interior and exterior)
  - 2) Fire alarm system
  - 3) Fire pump (if any)
  
- Standby power loads
  - 1) Heating system boilers with associated pumps
  - 2) Boiler control panel and DDC panels
  - 3) Kitchen walk-in refrigerator/freezer
  - 4) Elevators controller
  - 5) Nurse/medical areas lighting and power
  - 6) Security system equipment
  - 7) Communication systems (telephone and public address systems)
  - 8) Technology Rooms cooling system

The generator power system design will include:

- Outdoor soundproof type diesel-generator set 350 kW (estimated, exact size will be determined at subsequent design phase) with a skid-based fuel tank for at least 24 hours of the generator operation without re-fueling. Fuel tank shall be of double-wall construction and shall be furnished with leak detection system.

- Two automatic transfer switches (ATS) and the associated power distribution panels
- Lighting panels, dry-type transformers and branch panelboards to serve the emergency life safety loads. Emergency (life safety) power distribution equipment including ATS, panelboards and feeders shall be installed in 2-hour fire-rated closets and shafts in compliance with the requirements of the Massachusetts Electrical Code.
- Power panels, dry-type transformers and branch panelboards to serve the standby loads.

#### **D5090.02 Grounding**

All exposed, non-current carrying metallic parts of electrical equipment, the raceway system, and the neutral conductor of the wiring system will be grounded in accordance with the Electrical Code.

A ground bus will be provided in the main electrical room. It shall terminate electric service grounding conductor to the main switchboard ground bus, grounding electrode conductors to the water service pipe and building structural steel, and a conductor to the ground bus in the communication closet.

Separate copper equipment grounding conductor will be installed with all feeder and branch circuits.

Grounding cable connections to structural steel, grounding rods and other grounding cables will be of the thermal fusion type. Grounding rods will be copper clad steel, 5/8-inch diameter.

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**E            EQUIPMENT AND FURNISHINGS**

**E10        EQUIPMENT**

**E1010     Commercial Equipment**

**E1010.01 Commercial Laundry and Dry Cleaning Equipment**

Commercial washer and dryer for the athletic department; stainless steel cabinets and drums. For estimating, assume the following:

- Washer: 70 pound capacity, front loading, soft-mount; Wascomat Model EX670.
- Dryer: 100 pound capacity, front loading; Wascomat Model TD 100.

**E1020     Institutional Equipment**

**E1020.01 Library Equipment**

Library Equipment will be provided under a separate Furnishings, Fixtures and Equipment contract.

**E1020.02 Gymnasium Equipment**

**Scoreboards:** Electronic scoreboard for interior installation; multi-purpose type that can display scores for basketball and volleyball. Quantity: 2

**Basketball Equipment:** Overhead mounted folding backstops, with glass backboards for main court and for practice courts. Electronic shot timer mounted on each main court backstop. Quantity: 8

**Gymnasium Divider Curtains:** Electrically operated, vertical lift. Quantity: 2

**Mat Storage(Wrestling Mats):** Electrically operated mat lifters, 2-mat capacity. Quantity: 1.

**Batting Cages:** Electrically operated mesh batting cages. Quantity: 2.

**Wall Mats:** Wall protection mats on all gym walls except at bleachers.

**Volleyball Equipment:** Floor sleeves for volleyball net posts. Quantity: 4 sets.

**E1020.03 Laboratory Equipment**

**Fume Hoods:** One two-sided fume hood in each science classroom.

Flammables Storage Cabinets: Full-height metal storage cabinets for storage of flammable chemicals; one each for Chemistry and Biology departments.

Acid Storage Cabinets: Full-height metal storage cabinets for storage of corrosive chemicals; one each for Chemistry and Biology departments.

Goggles Storage Cabinet: One per Science Classroom.

First Aid Kit: One per each Science Classroom and Science Prep Room.

Projecting window greenhouse unit for each of eight science classrooms.

#### **E1020.04 Theater and Stage Equipment**

Manufacturer: A company specializing in theatrical rigging; JR Clancy, Inc., Tiffin Scenic Studios; Texas Scenic Studios, or equal.

Type: Manual rigging; appropriate to a stage with fly loft. Include the following components:

- Fire Curtain
- House Curtain Rigging
- House Curtain Draperies
- Counterweight Rigging.
- Stage Draperies
- Miscellaneous Rigging and Equipment

#### **E1020.05 TV Studio Equipment**

Curtains: Three-track curtain assembly with three curtains. Curtains include one Chromakey blue; colors of the other two to be determined.

Equipment Grid: 4-foot by 4-foot threaded rod assembly, hung from overhead structure.

#### **E1020.06 Audiovisual Equipment**

Projection Screens, Electrically Operated: Large size screens, matte white fabric face; motor in roller.

- Locations: Auditorium, Cafeteria, Gymnasium and Library.

Projection Screens, Manually Operated: Manufacturer's standard spring-roller-operated units designed and fabricated for wall or ceiling installation and consisting of case, screen, mounting accessories, and other components necessary for a complete installation.

- Locations: One per teaching space, including general education classrooms, art classroom, science classrooms, and health classrooms.

Projectors: Refer to Part D

**E1020.07 Art Classroom Equipment**

**Pottery Kilns:** Two electric kilns, to be installed in the kiln room in the art suite.

**E1030 Vehicular Equipment**

**E1030.01 Loading Dock Equipment**

**Dock Bumpers:** Heavy molded-rubber bumpers at loading dock area.

**E1040 Food Service Equipment**

**Kitchen and Servery:** A fully equipped kitchen and servery will be provided with the capacity to serve 1100 students daily in three seatings. A full description of the Food Service program, an equipment schedule and a preliminary cost budget is included within Appendix B.

**E1090 Other Equipment**

**E1090.01 Residential Appliances**

**Electric Ranges:** Family and Consumer Science Classroom – Energy Star rated.

**Electric Cooktop:** Family and Consumer Science and Life Skills Classrooms; for the wheelchair accessible cooking station. Energy Star rated

**Electric Wall Oven:** Family and Consumer Science and Life Skills Classrooms; for the wheelchair accessible cooking station. Energy Star rated

**Microwave Ovens: Energy Star rated**

- Over-the-range type with externally vented exhaust fan will be provided for the Family and Consumer Science Classroom.
- Under-cabinet type will be provided for the Family and Consumer Science Classroom, Teacher Dining Room, and Administration Kitchenette, Life Skills classroom.

**Refrigerators:**

- Frost-free, bottom freezer; with automatic ice-maker: Two for the Family and Consumer Science Classroom; one in the Life Skills classroom; two in the Teacher Dining Room, one in the Administration Kitchenette and one in the Nurse's Suite.
- Frost-free, bottom freezer, no ice maker: One in each Science Prep Room.

**Freezers:** Frost-free, upright; for the Family and Consumer Science Classroom

**Dishwashers/Glass Washers:** Residential type dishwashers for the Family and Consumer Science Classroom and Life Skills classroom. Three glass washers for the Science Prep Rooms.

**Clothes Washer and Dryer:** One washer and one dryer for each of the Family and Consumer Science Classroom and Life Skills classroom. One Stacked washer and dryer unit for the custodial staff and a second one for the kitchen/ food service area. All washers and dryers listed above shall be Energy Star rated

**E1090.02 Ice Making Machines Energy star rated**

Athletic Trainer's Office: Capable of producing 300 lbs of flaked ice or cubes per day.

Science Prep Room: Capable of producing 60 lbs of cubes per day. Three units.

**E1090.04 Portable Riser Systems**

Portable riser systems for the Choral and Band rooms are not in this Contract. They will be purchased under the FF&E (furniture, fixtures and equipment) contract.

**E20 FURNISHINGS**

**E2010 Fixed Furnishings**

**E2010.01 Fixed Casework**

**Modular Casework:** Hardwood cases and interiors with plastic-laminate clad doors and drawer fronts; AWI (American Woodwork Institute) Premium Grade, full-flush overlay design.

Typical classrooms will have three (3) full-height wardrobe and storage cabinets along the corridor partition, faced with marker board to act as another teaching wall, but may have open front cabinets. Interior shelves in cabinets will be adjustable. All doors will have key-operated cam locks.

A few atypical classrooms will have a continuous counter, open below, wall mounted top cabinets, and full-height wardrobe and storage cabinets along the corridor partition, and may have open front cabinets. Interior shelves in wall and tall cabinets will be adjustable. All doors will have key-operated cam locks.

Science Labs will have base, wall mounted top cabinets, full height wardrobe and storage cabinets, and peninsula tables. In Chemistry Labs, the peninsulas will have base cabinets. Base cabinet drawers will be on heavy-duty slides. Interior shelves in wall and tall cabinets will be adjustable. All doors will have key-operated cam locks.

Counters, Countertops and Table Tops: Fabricated from the following materials; 4-inch high backsplash where tops meet a vertical wall or cabinet surface.

- General Classrooms, Physics Classrooms, Shops, Drama Classroom: Plastic-laminate-clad tops with solid wood front edge.
- Chemistry and Biology Classrooms: Chemical-resistant cast epoxy tops with integral resin sinks. Plumbing fittings which are to be installed in epoxy tops are furnished by the casework fabricator for installation by the plumber.
- Graphic Arts and Photography Wing: Epoxy tops.

**Custom-Fabricated Casework:** Wood cases, interiors, door and drawer fronts with solid wood trim, fabricated to AWI (American Woodwork Institute) Premium Grade standards. Base-cabinet and table tops will be of solid surfacing material.

- Includes: Main office reception desks, library circulation desk, built-in library shelves

**Corridor Display Cases:** Custom-fabricated wood display cases. Deep, wood-framed units, back surface inside case covered with tackboard material, tempered glass shelves supported on metal standards and brackets. Sliding tempered glass doors, with locks. Fabricated to AWI (American Woodwork Institute) Premium Grade standards. Approximate dimensions and quantities of display cases are listed below.

- Full height units, 24-inches deep by 72-inches wide by 44-inches high; 4 cases.
- Full height units, 12-inches deep by 72-inches wide by 80-inches high; 12 cases.
- Half height units, 12-inches deep by 72-inches wide by 44-inches high; 8 cases.

**Window Stools:** Solid surfacing material.

**Adjustable Shelving:** Provide utility shelving for storage rooms, copy rooms, and similar locations: Wood shelves with solid-wood edge banding, supported on extra-heavy duty double slot extruded aluminum stanchions and brackets; 12" deep shelving.

**Musical Instrument Storage Cabinets:** Not in this Contract. Manufactured cases with welded wire doors will be purchased under the FF&E (furniture, fixtures and equipment) contract.

**Indoor Air Quality (IAQ):** To the extent feasible, casework specifications will require the use of panel materials that have been tested and certified for low emissions of volatile organic compounds (VOCs) and that are made with no additional formaldehyde.

## **E2010.02 Window Treatments**

**Shades:** Dual roller shade assemblies with a room darkening shade band on one roller and a solar control (sheer) fabric on the other roller.

- Manually-operated dual shade-band roller shades will be provided at exterior windows in all teaching spaces.

- Electrically-operated dual shade-band roller shades will be provided in the Library and cafeteria.

**Horizontal Blinds:** Horizontal blinds with 2-inch wide slats will be provided at exterior windows in the administration area and other offices. Manually operated.

**Vertical Blinds:** Vertical blinds with 2-inch vanes will be provided at interior windows ("borrowed lights") in the administration area and other offices, and in the Library Media Center.

#### **E2010.03 Entrance Grille and Mats**

Two-part walk-off mat system will be provided at the main entrance.

- **Entrance Grille:** Drop-through extruded aluminum grille, recessed in the floor.
- **Walk-Off Mat:** Carpet type mat or carpet tiles, surface mounted.

#### **E2010.04 Fixed Multiple Seating**

**Fixed Audience Seating:** In the Auditorium, chairs with upholstered fold-up seats and upholstered back. Seating layout will include areas for wheelchairs to comply with the Americans with Disabilities Act and with the Regulations of the Massachusetts Architectural Access Board. Aisle seats will incorporate aisle lighting.

- Quantity: 660.

**Telescoping Stands:** In the Gymnasium, electrically-operated telescoping bleachers. Bleacher layout will include areas for wheelchairs to comply with the Americans with Disabilities Act and with Massachusetts Architectural Access Board (MAAB) rules.

- Capacity: 1000 seats.

#### **E2020 Movable Furnishings**

Movable Furnishings will be provided under a separate Furnishings, Fixtures and Equipment contract.

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## **F SPECIAL CONSTRUCTION AND DEMOLITION**

### **F10 SPECIAL CONSTRUCTION**

#### **F10.1 Light Shelves**

In classrooms, offices and other small rooms with orientation to South, East or West exposures where there is a band of *clerestory* glass below the ceiling, Light Shelves will be installed on the interior at the height of the sill of the clerestory band. These units will be continuous for the length of the sill and made of roll-formed/shaped aluminum. The profile of the aluminum will be a gentle “U” shaped curve, 24” at its width, 8” deep at the middle (bottom of the curve) and have a rolled-over lip at both length-edges to add rigidity, provide an airplane cable attachment thickness, and to conceal the cut edge from being easily touched. At the short sides, the aluminum will be rolled over or otherwise protecting people who clean the units or touch these edges. The cables will be attached to the wall-edge and the open-edge, every 6’ on center, for the length of the shelf and at each end of the shelf. The shelves will be hung from the gypsum board soffit ceiling, hung ceiling or other ceiling assembly, typically (but not always) 18” above the shelf. The aluminum will be anodized finish.

#### **F10.2 Greenhouse “Pop-outs”**

Three of the four second story Science Classrooms have a room projection that is 12’ wide and cantilevered off the side of the building 4’. Inside the room the Greenhouse will occupy another 4’ for a total depth of 8’. The rooms will rise the entire floor height (14’) and will be capped with an 8’ x 12’ skylight unit. Glass walls will make up the bottom 9’ of the walls, with skim-coat finished blueboard comprising the upper 5’. The doors will have a weather seal to contain the greenhouse heat and humidity. There will be a programmable heat sensor-activated vent on the exterior wall to release excessive temperatures. There will be a floor drain and a hand sink within the unit. 15” deep, modular, configurable shelving units will make up the perimeter walls with enough shelves to accommodate shelves at 24” height increments.

### **F20 BUILDING DEMOLITION**

#### **F2010 Building Demolition**

As part of the site development for the new building, demolish the school administration and Pre-kindergarten building, including foundations. Prior to demolition, abate hazardous materials as described in F2020, below. The Owner may identify elements to be salvaged before the building is demolished.

## **F2020 Hazardous Components Abatement**

**Asbestos:** With respects to the School Administration/ Pre-Kindergarten building which is proposed to be demolished, the most recent AHERA report indicates that ACM was found or assumed to be present in the types of materials listed below, throughout areas of the building which were constructed before 1970. These materials will have to be removed prior to the demolition work.

- pipe insulation and mudded fittings
- boiler tank and breeching insulation.
- water tank insulation
- floor tile and associated mastic; some of this flooring is under carpeting.
- linoleum and associated mastic; some of it is under carpeting.
- residual mastic under carpeting
- floor leveling material under floor tile and linoleum (assumed)
- wood block mastic
- ceiling tiles, in the glue daubs
- transite wall panels
- chalk board glue daubs (assumed)
- transite board (blackboard) and glue, at various locations.
- bulk roofing tar and paper
- window and unit vent caulking and glazing compounds.

**Lead Based Paint:** Elevated levels of lead-based paint (lead content greater than 1.0 mg/cm<sup>2</sup>) may be present on the windows and on various surfaces throughout the building. Lead paint does not have to be removed, but components that are covered by lead based paint may require special handling and disposal, personnel exposure monitoring, and other precautions and protection in compliance with OSHA.

**PCBs:** PCBs (polychlorinated biphenyls) are present in fluorescent lamps. Fluorescent lamps will have to be handled and disposed of as universal waste.

**Mercury:** Present in fluorescent light ballasts and in thermostats. These items will have to be handled and disposed of these items as universal waste.

**Other Hazardous Materials:** Other hazardous materials which may be encountered during demolition include banned refrigerants in air conditioning units, emergency lighting, batteries, and stored paints and chemicals. These materials will have to be handled and disposed of in accordance with federal, state and local regulations.

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**G BUILDING SITEWORK**

**G10 SITE PREPARATION**

**G1010 Site Clearing**

Site Clearing and Erosion and Sediment Control, in compliance with the NPDES General Permit from the EPA. Comply with the Order of Conditions from the Grafton Conservation Commission which will be obtained at the completion of design and permitting.

Maintain temporary protective barriers through the course of construction.

Maintain safe access for emergency vehicles.

Maintain temporary protective barriers, including construction fence, through the course of construction. Provide temporary signage to guide school and construction traffic.

Maintain safe access to the existing school building which will be operational throughout construction. Construction vehicles must remain segregated from the school operations.

**G1020 Site Demolition and Relocations**

**G1020.01 Building Demolition**

See Section F.

**G1020.02 Site Elements Demolition**

The existing track and associated field improvements will be removed as part of the project.

Remove, salvage & protect the existing Track & Field lighting for reinstallation around the new Track & Field.

**G1030 Site Earthwork**

Excavation for building foundations, utilities, pedestrian and parking areas including bracing and support as required.

Preparation of subgrade and bearing surfaces including proof rolling and dewatering.

Placement and compaction of fills from onsite and offsite sources. Compact fill layers below building and pavement with granular fill to 95% Maximum Dry Density, per

ASTM 1557. Fill in landscape areas will meet the specifications for common fill and requires compaction to 90% Maximum Dry Density.

Preparation of subbase and base courses for building and pavement.

Preparation of landscaping areas including placement of topsoil.

#### **G1040 Hazardous Waste Remediation**

Preliminary testing indicates the presence of arsenic within the existing on-site soils. The presence of the arsenic may be naturally occurring as evidenced in other areas within Worcester County. The reuse of soils containing arsenic will be limited to reuse in areas with similar arsenic concentrations. The reuse of the soils must be managed and monitored throughout construction. Removal of soils with arsenic from the site must comply with all state and federal regulations.

### **G20 SITE IMPROVEMENTS**

#### **G2010 Roadways**

Bituminous flexible pavement: 2-inch binder course, 2 inch wearing course. Materials in compliance with Paragraph 460 of the Massachusetts Highway Department Standard Specifications.

Porous Bituminous flexible pavement: 4-inch porous asphalt; single lift, with 6" PVC underdrain. Provide porous bituminous pavement at emergency access drive around building.

#### **G2020 Parking Lots**

##### **G2020.01 Parking Lot Program**

397 parking spaces will be provided to serve staff, students and visitors, including 8 handicap accessible spaces (1 van and 7 automobile). Parking area will be striped and landscaped. Parking lot lighting will be provided.

##### **G2020.02 Parking Lot Paving**

Bituminous concrete flexible pavement with a 2 inch binder course and a 1-1/2 inch wearing course. Materials in compliance with paragraph 460 of the Massachusetts Highway Department Standard Specifications.

##### **G2020.03 Parking Lot Curbs and Gutters**

Entry drive: VA4 vertical granite.

Front entry plaza and drop-off areas: VA4 vertical granite.

Parking lot curbing: Sloped granite edging and VA4 vertical granite curbs.

Service drive to loading dock: Modular, precast-concrete vertical curb.

Municipal building parking lot: Modular, precast-concrete vertical curb.

## **G2020.06 Parking Lot Appurtenances**

Parking lots will be provided with traffic barriers, parking lot signs and pavement markings. Raised crosswalks (6" high) will be constructed of concrete; provided at 8 crossings within the parking area.

## **G2030 Pedestrian Paving**

### **G2030.01 Sidewalks**

Pedestrian sidewalks will be poured in place Portland cement concrete minimum 6' width and 5" depth. Sidewalks are proposed between each parking lot and drop-off area to the school entrances and between existing sidewalks along existing roads and school entrances as shown on the site plans.

### **G2030.02 Decorative Pavements**

Provide architectural concrete pavers complying with ASTM C939 over an asphalt base with tack coat setting bed.

### **G2030.03 Exterior Steps and Ramps**

Steps: Cast-in-place concrete; standard cements and aggregates; broomed finish. Galvanized steel pipe rail, painted with polyurethane paint system.

Ramps: Cast-in-place concrete; standard cements and aggregates; broomed finish. Widths and slopes conforming to ADAAG and MAAB. Galvanized steel pipe rail, painted with polyurethane paint system.

### **G2030.04 Cast-in-Place Detectable-Tactile Warning Surfaces**

All curb ramps, as defined by ADAAG and MAAB shall be constructed with minimum 24" x 48" detectable warning surface with raised dome tactile surface.

## **G2040 Site Development**

### **G2040.01 Fences, Backstops and Gates**

Chain Link Fences and Gates: Provide a 10 foot high black vinyl clad chain link fence with locking gates at the proposed tennis courts. Provide a 6 foot high black vinyl clad chain link fence with locking gates around the track and field. Provide a 4 foot black vinyl clad chain link fence without gates at the basketball courts and along the parent drop-off corridor.

Chain Link Backstop: Provide a 19' x 34' black vinyl clad chain link hooded backstop with at the baseball field. Provide a 19' x 34' black vinyl clad chain link hooded backstop at the softball field.

Ornamental Fence and Gates: Provide ornamental steel fence with 3-rail system, extended picket design, and fully fusion welded steel construction. Provide pedestrian gates of exact style/construction with lockable latch/hardware.

#### **G2040.02 Athletic and Recreational Surfaces**

Baseball and Softball: Provide skinned areas of the baseball and softball field including the infield, coaches' boxes, pitchers' mound, on-deck circles and players' bench areas.

Tennis and Basketball Court: Provide bituminous tennis court with an acrylic color playing surface and line markings. The surface should be sealed with a clear acrylic sealer.

Track: Provide track surfacing consisting of a blend of recycled EPDM and polyurethane rubber surface with line markings over an asphalt base. Provide a 6" wide cement concrete flush curb as an edge restraint.

Multi-Purpose Artificial Turf Field: Provide multi-purpose field surfacing with synthetic turf system with polyethylene fibers and 100% rubber infill over an aggregate base with sub-surface drainage. Provide a 6" wide cement concrete flush curb as an edge restraint.

#### **G2040.03 Athletic and Recreational Equipment**

Tennis equipment will be tennis court posts and nets. Basketball equipment will be goal posts, backboards, nets, and player benches. Baseball and softball equipment will be bases, home plates, pitchers' rubbers with ground anchors, and player benches. Football equipment will be goal posts and goal line pylons. Track equipment will be pole vault box, shot throw ring and toe board, discus throw ring, discus/hammer cage, long/triple jump take-off board and sand pit. Soccer equipment will be semi-permanent goals and nets.

Bleachers will be permanent aluminum grandstand seating installed on a cast-in-place concrete pad.

#### **G2040.04 Site and Street Furnishes**

Site furniture will include benches, trash receptacles, bicycle racks, drinking fountains and bollards. Bicycle racks will accommodate bike parking for at least five percent of the building's occupants. Acceptable products for benches, trash receptacles and bicycle racks will come from the same manufacturer and will be packaged together as a collection.

**G2040.05 Flagpoles**

One ground-set 40' high extruded aluminum or fiberglass pole, with flag.

**G2040.06 Site Walls**

Mechanical equipment and generator enclosures consisting of a precast concrete wall with brick facing to match the building exterior brick.

**G2040.06 Retaining Walls**

Cast-in-Place: Provide 4' deep foundation. Provide integral guard railing or chain-link fence as shown on plans. Provide 4" pvc underdrain connected to nearest drainage structure or daylight.

Mechanically Stabilized Earth (MSE): Contractor to provide stamped and certified design by Massachusetts registered professional engineer. Include guard railings and/or chain-link fence as shown on plans.

**G2050 Landscaping**

**G2050.01 Soil Preparation**

Provide eighteen inches of topsoil in plant bed areas and eight inches of topsoil in new lawn areas and 4 inches of topsoil in restoring disturbed areas per specified topsoil preparation and amendment additives. Assume that all topsoil will be imported from off-site sources.

**G2050.02 Lawns and Grasses**

Lawn areas shall be provided to compliment the general plantings and the site. Seed mixes will be appropriate to use.

**G2050.03 Trees, Plants and Ground Covers**

Trees, shrubs, groundcover, and perennials will be provided to compliment the site and public areas. Planting areas will include three inch deep mulch.

**G2050.04 Plant Maintenance and Guarantee**

Contractor shall provide maintenance to plantings and lawn areas for a specified time and guarantee plantings for one year to ensure the health and establishment of all plantings.

## **G30 SITE CIVIL/MECHANICAL UTILITIES**

### **G3010 Water Supply**

#### **G3010.01 Site Domestic Water Distribution**

The domestic water service will be an 10-inch Class 52 ductile iron line connected to the existing water main in Brigham Hill Road. The water main will be looped around the new building and connected into the existing 6-inch water main on the project site.

#### **G3010.02 Site Fire Protection Water Distribution**

The fire protection service will be an 8-inch Class 52 ductile iron line connected to the new water main on the project site.

Hydrants will be provided within 300 feet of each building corner and as required by the Grafton Fire Department.

### **G3020 Sanitary Sewer**

Gravity sewer lines will be PVC (SDR-35). Manholes shall include metal frame and cover with precast concrete structures with concrete channels. Connection will be at the existing sewer line located in Providence Road.

Kitchen wastes will discharge to a precast concrete grease trap.

Laboratory wastes will be treated within the building and will connect to the sanitary sewer service outside the building.

### **G3030 Storm Sewer**

Storm drain pipe will be corrugated polyethylene, smooth interior. Manholes and catch basins shall include metal frame and grates or covers with precast concrete structures. All structures must meet H-20 loading requirements.

Runoff from the loading/service area will discharge to a precast concrete oil-water separator.

Stormwater treatment devices will be incorporated into the storm drain system with hydro-dynamic separators similar to Stormceptor.

Runoff from the building rooftop will discharged to infiltration structures consisting of 36" diameter perforated corrugated polyethylene pipe surrounded by crushed stone.

Surface detention/infiltration systems Consist of 36" diameter perforated corrugated polyethylene pipe surrounded by crushed stone.

**G40 SITE ELECTRICAL UTILITIES**

**G4010 Site Electrical Distribution**

**G4010.01 Electrical Substations**

**Utility Company Transformers:** Utility company transformers are of the pad mount type furnished, installed and connected by National Grid. Contractor will provide concrete pad and grounding according to National Grid standards.

**G4010.02 Electrical Power Distribution Lines**

Existing electrical overhead services will be removed. New underground service will be provided as described in section D50 .

**G4020 Site Lighting**

Refer to Section D50, Electrical Work

**G4030 Site Communications, Fire Alarm, and Security**

**G4030.01 Communications**

Telecommunication services will originate from the existing Verizon and Charter Communications overhead lines on Providence Road. A telecommunications utility riser pole will be designated on Providence Road. Four, 4-inch riser conduits will be provided by the contractor and will pass from this pole under Providence Road on to the School property.

The four 4-inch underground PVC conduits will extend across the school property into the service entrance inside the school. The conduits will be installed in a concrete encased duct bank per the utility standard. A pre-cast concrete manhole 6ft. by 8ft. will be provided by the Contractor to facilitate cable field installation. Four 4-inch conduits will extend from the manhole to the front of the existing High School to provide future connectivity. Hand holes will be provided where required. The estimated length of this conduit duct bank is approximately 900 feet

# **Appendix A**

## **Code Summary**

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## Grafton High School Schematic Design Building Code Review

December 17, 2009

Massachusetts State Building Code, 780 CMR, Seventh Edition  
Architectural Access Board Regulations, 521 CMR

### A. Use Group Classifications:

Education, Group E (Section 305) is the primary use of the building  
Other Uses:  
Cafeteria – Assembly, Group A2r, 1<sup>st</sup> floor  
Gymnasium – Assembly, Group A4, 1<sup>st</sup> floor  
Library – Assembly, Group A3, 1<sup>st</sup> floor

### B. Occupancy Separations

None  
(MSBC 313)

### C. Proposed Construction Types – New construction is Type 1B (Table 503)

Allowable for New Construction (Type 1):  
Unlimited area

### D. Fire Separations: (Table 601)

	Type 1B
Structural Frame, including columns, girders, trusses	2 hour
Bearing Walls	2 hour
Nonbearing walls and partitions – exterior	see Table 602
Nonbearing walls and partitions – interior	0 hour
Floor construction including supporting beams and joist	2 hour
Roof construction including supporting beams and joist construction is over 20' above finished floor level.)	1 hour (typical, 0 hour if roof

### E. Exterior fire resistance rating requirements (Table 602) Groups A & E

Fire separation distance < 5 feet	1 hour
Fire separation distance < 10 feet	1 hour
Fire separation distance > or = 10	1 hour
Fire separation distance < 30	1 hour
Fire separation distance > or = 30	0 hour

**F. Egress Requirements:**

Occupancy Calculations:

3<sup>rd</sup> Floor anticipated occupancy 190 persons

2<sup>nd</sup> Floor anticipated occupancy 349 persons

1<sup>st</sup> Floor anticipated occupancy 2,488 persons includes gym at 858; auditorium at 700, cafeteria at 563

Size stairs to largest upper story load = 2<sup>nd</sup> floor at  $349 \times 0.2 = 69.8$ " of stair req. < 180 proposed

Size doors to exterior at largest load = 1<sup>st</sup> floor at  $2,488 \times .15 = 373$ " of door req. < 792" proposed

Gymnasium - assume 3 exits required

Auditorium – assume 3 exits required

Cafeteria – assume 3 exits required

**G. Accessibility:** Facility to conform with Architectural Access Board Regulations, 521 CMR

**Appendix B**  
**Food Service Program Narrative**

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Grafton High School Food Service Program  
December 15, 2009



## **INTRODUCTION**

A new high school is being designed by Symmes Maini & McKee Associates (SMMA) for Grafton, Massachusetts. On November 18, 2009 Hopkins Foodservice Specialists (HOPKINS) interviewed Jackie Dickman, the Grafton High School food service director to assist the design team in developing criteria required for completing the design of the food service spaces for the new building. The State standard for the space is 2,800 net square feet and the current layout provides for 3,000 nsf. (The State standard may be for a conventional straight line operation.)

The School Building Authority (SBA) has requested a modular, scatter system. This will require a very efficient layout. Although some departmental functions may change in size or be relocated to other floors to accommodate an increase in space for food service the overall building square footage may not be increased.

To promote energy savings, on 11-24-09, the SBA requested the facility provide the capability to move from disposable service ware to china service.

SMMA and HOPKINS request Client review of this program and notification of any exceptions to our understanding of the following information.

## **FOOD SERVICE MANAGEMENT**

Staff and management of the food service operation will be by State employees and will not be contracted out. Local staff will prepare food from scratch but most of the food served will be partially processed convenience heat/cook and serve products.

The contact for food service design criteria (SMMA to confirm):

Jackie Dickman  
Foodservice Director

Grafton High School Food Service Program  
December 15, 2009

508-839-5425 x306  
508-839-0496 Fax  
email: dickmanj@graffton.k12.ma.us

## **SCHOOL PROFILE**

The school will be designed to serve a projected population of 900 students with core spaces designed to accommodate 1100 students and 80 faculty. Currently, the existing High School serves 700 students.. Lunch participation is estimated to be 50%, and is an increase on the current experience. There is not competitive supply so the food service program has a captive audience.

## **MEAL SERVICE**

### **Seatings**

Three seatings for lunch are proposed. To accommodate the projected population the cafeteria's will require a minimum of 183 seats during each period, and based on a code requirement of 15 square feet per seat, the dining room will require a minimum of 2,745 square feet. To provide for the empty seat factor, it is recommended that 200 seats be provided (3,000 nsf).

Teachers and administrators and staff will be served in the student servery, and may dine in the adjacent faculty dining room or in their classrooms. A coffee brewer is proposed for staff use in servery, however, this may best be relocated to the faculty dining room.

### **Meal served**

All cooking will be done on site. Both a breakfast meal and a lunch meal will be served, five days a week. Currently 50 breakfast meals are served. The dining room will be open to the students and used for multiple purposes or even catered events. The kitchen will not, however, be accessible to the general public. The Grafton High School will not be designed for use as an emergency shelter.

### **Sequence of Service**

Students arriving at the cafeteria will enter the arcade area and queue up at the "in" service line. A roll down gate will be provided at the entrance. The first station is a single position Deli Station and will provide wall space for students

Grafton High School Food Service Program  
December 15, 2009

to line up and queue for attendant preparation of custom made sandwiches. A decorative pylon is located next to each station for menu posting and interior design purposes. Its height and width can be adjusted in the next design phase to integrate refrigeration, hand sink, storage etc. Pass through refrigerators from the kitchen will be provided on the back line.

The second station will be a Specialty Counter. This will serve rotating menu items and provide quick self-service, as well as space for students to queue for the Hot Food Station. This may also be the location for the soup if re-stocking of soup on the island Salad bar is deemed a concern.

The third station is the Hot Food Station. This will be an attendant served counter. Four hot wells were requested. Pass through warmers from the kitchen will be provided on the back line.

An aisle space is provided for staff access from the kitchen to the servery.

The fourth station is the Pizza Station. This will be a self-service station. Pre-sliced pies will be placed on hot shelves with overhead heat lamps. It is located last to provide additional queue space for students which are expected to heavily participate at this station.

The fifth station is the island Salad/Soup Bar. It will provide salad ingredients, dressings, and a soup and bread bar. Service ware can be located on the counter, in mobile carriers or under the tray slide at each menu item. (Please let us know of any preference.)

The fifth station is the Beverage/Dessert Station. An open front air screen will display milk, waters, teas, and fruit drinks. An upright glass door merchandising freezer will store frozen novelties. A beverage counter with utility sink will provide for coffee brewing and a slush machine.

A servery door is located into the future dishroom.

The students will move to the cashier stations. Three mobile cashier positions are provided. Until the future population of 1100 students is reached, the twin cashier station may be sufficient. The cashier stations will have floor power and data outlets with covers to permit the units to be rolled into the servery after service hours. A roll down gate will be provided at the exit.

Students will move out into the dining area. When they are finished with their trays, students will carry their trays to a corner of the dining room and dump their trash into a container under supervision of an aide, and then return to their

Grafton High School Food Service Program  
December 15, 2009

classrooms. Custodial staff will maintain the dining room, empty the trash cans and remove the plate waste outside of the building. If the future decision is made by the SBA to go to china service, students will return to the future tray return area and drop off their trays for washing in the future dish room.

### **Service ware**

All service ware will be disposable. Disposable foam service trays and plastic utensils used by students will be set out on a mobile tray shelf on the serving line. Multi-compartment dish/tray will be used in lieu of trays. Utensils will be picked up at the cashier. To support the decision in the future to provide china service, rough-ins in the base building will be provided for a dish room area to enable installation of a tray return window, soiled dish table, upright dishwasher, clean dish table, hand sink, hose reel and janitor sink. Any catered events will be served on disposable ware.

### **Method of Payment**

Students will pay for their meals on the serving line. A student ID card will be swiped at a card scanner or card pad at the end of the serving line that will identify the student. (SBA to confirm if cash will be collected or students and staff will use a debit card). Staff will pay cash for meals at the student serving line cashier for their meals.

### **Menu Profile**

The Student / Staff menu ingredients will consist of frozen entrees, canned vegetables and some frozen vegetables, and prepared desserts. Some US commodity foods will be used as the supply and or storage space becomes available.

### **Office**

One office with two desk positions will be provided with access to the kitchen. The office will over-look the serving line. Provisions will be made for the room to hold a safe and time clock.

### **Kitchen Restrooms & Lockers**

Restrooms and lockers are located off the service corridor above the kitchen. The restroom facility will be designed by SMMA.

## **Receiving**

Food deliveries will arrive at the kitchen through the building grade loading dock and will be brought into the kitchen by the vendors via a service corridor. There will not be a raised dock as vendor and inter-school trucks have lift gates.

## **Food Service Trash for Recycling**

Currently there is a recycling program. Space will be provided in the dining area and on the loading dock for the recycling program collecting:

- Aluminum beverage cans
- Office paper (paper recycling as a part of building program)
- Cardboard (cardboard recycling as a part of building program)
- Glass
- Metal cans (#10)

## **Waste Handling Process**

Kitchen staff will bag the trash, separate the recyclable materials, and transport both to the exterior trash holding area. The general building will provide containers and space for recycling and trash containers. The trash will be taken to the street daily by the building custodial staff for pick up by the city services.

## **Pot Washing**

Because "ware washing" will be limited exclusively to washing utensils, the function will be designated "pot washing." A three-compartment sink shall be provided with a pre-rinse faucet. If space and budget permits, a turbo-wash style unit will be provided. In lieu of a conventional garbage disposer, which face increasing pressure to be removed from food service operations in some jurisdictions, a food scrap collector will be provided. Non-soluble materials (lettuce leaves, corn etc.) will be dumped into a waste bin and disposed. Accommodations should be made in design for future composting capability.

## **Janitor Closet**

The mop basin will have a can washer provision. An area drain and hose bibb will be provided in the JC area in the kitchen.

## **BUILDING SYSTEMS**

### **Finishes**

- The kitchen floor shall be quarry tile with epoxy grout. Safety coating can be applied by third party vendors in the work aisles to avoid slip and fall accidents.
- The Servery floor shall be (\_\_\_\_SMMA to confirm).

### **Structural**

- A 4" depressed pad will be provided for the walk-in cooler/freezer.
- Seismic restraints will not be required for kitchen equipment in this zone.

### **Mechanical**

- Pot washing will not require exhaust.
- The kitchen hood will be a Type 1 exhaust hood with removable cartridge filters which can be washed in the three compartment sink. No make-up air will be provided; the replacement air for the exhaust air will be provided by exchange air from the dining area (SMMA to confirm). A rated shaft and fire suppression system will be required.
- Refrigeration compressors will be mounted outdoors to conserve energy.
- Hot water heating tank location is proposed to be outside kitchen space.
- 140 degree water required for three compartment sink and janitor mop sink, cart wash hose and faucet with hose bibb.
- Natural gas is available for cooking.
- No CFCs will be used in refrigerants.
- An area drain will be provided in the pot washing area.
- Floor troughs can be provided on the exterior of the walk-in cooler (if desired by SBA).
- The loading dock area is recommended to have a trough drain (by DIV 15) and access to a freeze proof hot water hose-bib and trough drain for sanitation that can be accessed for area maintenance of the trash area and delivery areas.

### **Electrical**

- A panel location inside of kitchen will be provided (SMMA to confirm).
- Estimated electrical load is 70 kW.
- The walk-in cooler/freezer will be connected to the emergency generator (SMMA to confirm).

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**Architectural**

The height of tray slide for student service shall be adjustable from 34 inches and integrated into the modular counter design.

**EQUIPMENT**

**Kitchen Equipment**

Energy Star equipment will be selected where available. High efficiency ventilation, refrigeration and cooking equipment will be selected where budget permits. Mobile equipment is desired where possible. The walk-in ratio will be 66-33 split if space and layout optimize this efficiency. This equates to a maximum of 117 lineal feet of freezer space five-tier 24" deep shelving units and a maximum of 72 lineal feet of coolers space of five-tier 24" deep shelving units. Food storage for one week supply is desired. Most deliveries are once per week. The current plan provides for 126 sf of non-food storage space, 182 sf of dry food storage and 135 sf of additional storage in the future dish room. A fryer is not desired. The estimated foodservice equipment is \$450,000 for kitchen equipment set in place- hook-ups will be by other trades.

Equipment will be separated into three categories:

- Owner Furnished Contractor Installed (OFCI)
- Contractor Furnished Contractor Installed (CFCI)
- Owner Furnished Owner Installed (OFOI), plus Vendor furnished equipment

For planning confirmation, a recommended equipment list is provided:

QTY.	DESCRIPTION	REMARKS	SOURCE
1	20 QT. MIXER		CFCI
1	ADA HAND SINK		CFCI
1	AIR POT BREWER		OFCI
1	BEVERAGE COUNTER W/ UTILITY SINK		CFCI
1	BOTTLED BEVERAGE AIR SCREEN		CFCI
1	CAN WASH/MOP SINK		CFCI
3	CASH REGISTER		OFOI
1	CLEAN DISH TABLE	FUTURE- NOT SHOWN	CFCI
1	COMBI OVEN		CFCI
1	COOK'S TABLE WITH SINK	BY FABRICATOR	CFCI
LOT	CORNER GUARD	BY FABRICATOR	CFCI
1	DOUBLE DECK CONVECTION OVEN		CFCI
1	DOUBLE DOOR PASS THROUGH HEATED CABINET		CFCI

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1	DOUBLE DOOR PASS-THROUGH REFRIGERATOR		CFCI
LOT	DUNNAGE RACKS		CFCI
1	EVAPORATOR, -10°F FOR ITEM 57	FOR WALK-IN COOLER/FREEZER	CFCI
1	EVAPORATOR, 35°F	FOR WALK-IN COOLER/FREEZER	CFCI
1	EXHAUST HOOD (LIGHTS & EXHAUST CFM)		CFCI
1	FIRE PROTECTION		CFCI
1	FLOOR TROUGH		CFCI
1	FLOOR TROUGH		CFCI
1	FOOD COLLECTOR	FUTURE- NOT SHOWN	CFCI
1	FOOD PROCESSOR		CFCI
LOT	HAND SINK W/SIGN (KITCHEN LAVORATORY)		CFCI
1	HOSE REEL	FUTURE- NOT SHOWN	CFCI
1	IONIZER FOR COMBI OVEN		CFCI
1	JANITOR SINK	FUTURE- NOT SHOWN	CFCI
1	MOBILE COLD FOOD COUNTER W/ FOOD GUARD & SOUP WELLS		CFCI
LOT	MOBILE DRY STORAGE SHELVING		CFCI
1	MOBILE HOT FOOD CABINET		CFCI
1	MOBILE HOT FOOD COUNTER W/ ATTENDANT FOOD GUARD		CFCI
1	MOBILE MIXER STAND		CFCI
LOT	MOBILE PAN RACK		CFCI
1	MOBILE PIZZA COUNTER W/ HEAT LAMPS & SELF-SERVE FOOD GUARD		CFCI
2	MOBILE POT RACK		CFCI
1	MOBILE SANDWICH STATION		CFCI
1	MOBILE SINGLE CASHIER COUNTER- ONE REGISTER		CFCI
1	MOBILE SLICER TABLE		CFCI
1	MOBILE TANDEM CASHIER COUNTER- TWO REGISTERS		CFCI
1	MOP RACK		CFCI
1	OFFICE FURNITURE (80 SF)	BY ARCHITECT	CFCI
1	PORTABLE STEAM CLEANER		CFCI
1	POT FILLER		CFCI
1	POT SINK TABLE & FOOD COLLECTOR- (POWER SOAK)		CFCI
1	PREPARATION TABLE WITH SINK & OVERSHELF	BY FABRICATOR	CFCI
1	RECEIVING SCALE		CFCI
1	RECEIVING TABLE	BY FABRICATOR	CFCI
1	REMOTE CONDENSER-COOLER	FOR WALK-IN COOLER/FREEZER	CFCI
1	REMOTE CONDENSER-FREEZER	FOR WALK-IN COOLER/FREEZER	CFCI
1	SLICER		CFCI
1	SLUSH MACHINE		CFCI
1	SOILED DISH TABLE	FUTURE- NOT SHOWN	CFCI
1	SPECIALTY COUNTER		CFCI

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LOT	STAFF UNIFORM LOCKER		CFCI
3	STOOLS		CFCI
1	TILTING BRAISING PAN		CFCI
1	TIMECLOCK & CARD RACK		OFCI
1	TRAY RETURN	FUTURE- NOT SHOWN	CFCI
1	TWO OPEN BURNER RANGE		CFCI
1	UPRIGHT DISHWASHER & BOOSTER HEATER	FUTURE- NOT SHOWN	CFCI
1	UPRIGHT SINGLE DOOR RETAIL FREEZER DISPLAY		CFCI
1	UTENSIL RACK		CFCI
1	WALK IN REFRIGERATOR / FREEZER		CFCI
LOT	WALK-IN SHELVING		CFCI
1	WALL SHELF	BY FABRICATOR	CFCI
1	WORK TABLE	BY FABRICATOR	CFCI
2	WORK TABLE WITH OVERSHELF	BY FABRICATOR	CFCI

End.