

4.1.3

SCHEMATIC DESIGN PROJECT MANUAL

Northeast Metropolitan Regional Vocational High School Project

SCHEMATIC DESIGN SPECIFICATIONS (UNIFORMAT)

SCHEMATIC DESIGN SPECIFICATIONS ORGANIZATION

Introduction
Element A - Substructure
Element B - Shell
Element C - Interiors
Element D - Services
Element E - Equipment and Furnishings
Element F - Special Construction and Demolition
Element G - Sitework

INTRODUCTION

10 PROJECT DESCRIPTION

1010 Project Summary

- The project consists of the construction of a new four-story high school at the site of the existing Northeast Metropolitan Regional Vocational High School (NEMT) in Wakefield, MA. Site work includes but not limited to significant ledge removal operation, construction of the new access roads with traffic light and turn-off lanes at the new site entrance. The Work consists of a steel framed, concrete masonry and light gauge metal framing walls with CMU veneer, granite (stone) veneer, and high performance insulated rainscreen composite material panels at exterior envelope of the building. The exterior envelope also includes rain screen metal shingles and insulated metal panels. The roofing system includes but not limited to low slope single-ply membrane roofing over tapered and non-tapered insulation, roof pavers plazas, and vegetated roof areas.
- The Work includes the demolition and removal of the existing High School after completion of the new construction.
- The work also includes construction of several freestanding accessory structures.
- Phasing: The Project will be constructed in two major phases, also site enabling ledge removal phase is being considered. The existing building will be occupied during the first phase and demolished during Phase two.

1030 Project Criteria

1030.50 Sustainable Design Requirements

- LEED Version 4.1 for Schools – Silver rating.

1090 Funding

- Budget; Elemental Cost Estimate: Not yet determined.
- Assumptions and Qualifications: Not yet determined.

20 OWNER DEVELOPMENT

2080 Budget Project Contingencies

- Alternates: Not yet determined.
- Unit Prices: Not yet determined.
- Proprietary Products: Access Control and CCTV by Genetec Inc.

30 PROCUREMENT REQUIREMENTS

3010 Project Delivery

3010.10 Project Delivery Methods

- Construction Manager at Risk as Constructor, with prequalified Filed Sub-Bid subcontractors in accordance with the provisions of Massachusetts General Laws (Ter. Ed), including without limitation; MGL c30, § 39M as amended; MGL c149A, §§ 1 through 11 inclusive; and MGL c149, §§ 26 through 27D inclusive.

3010.30 Number of Construction Contracts

- Single Contract for General Construction with the Construction Manager at Risk (CMR), and Filed Sub-Bid (Trade) Contracts in accordance with MGL c149A Section 8 for the following Filed Sub-Bid (Trade) categories of work:

MASONRY
MISCELLANEOUS AND ORNAMENTAL IRON
WATERPROOFING, DAMPPROOFING AND CAULKING
ROOFING AND FLASHING
METAL WINDOWS
GLASS AND GLAZING
TERRAZZO
TILE
ACOUSTICAL TILE
RESILIENT FLOORS
PAINTING
ELEVATORS
FIRE PROTECTION
PLUMBING
HVAC
ELECTRICAL WORK

3020 Solicitation

- Qualification Requirements: Filed Sub-Bidders shall be pre-qualified according to Massachusetts Public Bid Laws and shall be DCAM certified for their category of work.
- Bid Requirements: Bidding procedures according to Massachusetts Public Bid Laws.
- Contracting Requirements: Contracting procedures according to Massachusetts Public Bid Laws.

40 CONTRACTING REQUIREMENTS

4010 Contracting Forms and Supplements

- Contracting Requirements: Contracting procedures according to Massachusetts Public Bid Laws, Ch.149A.

ELEMENT A SUBSTRUCTURE

A10 FOUNDATIONS

A1010 Standard Foundations

A1010.10 Wall Foundations

- Description: Cast-In-Place concrete foundations walls supporting exterior wall construction and interior bearing-wall structure.
- Based on the recommendations of the Geotechnical Engineer, the perimeter foundation walls would bear on continuous reinforced concrete strip footings extending at least 4 ft. – 0 in.

- below grade. The exterior foundation walls would be 14 to 16 in. thick, reinforced cast-in-place concrete walls, with brick shelf, on 12 in. thick by 36 in. wide continuous reinforced concrete strip footings around the perimeter of the building extending a minimum of 4 ft. – 0 in. below finished grade.
- Reinforced masonry shear wall be supported by 8 in or 12 in reinforced concrete foundation walls and 2'-6" wide by 12in. thick continuous reinforced concrete footings.
 - The retaining walls at the two-story Locker Room Building would be 2 ft. - 0 in. thick reinforced concrete walls supported on 9 ft. - 0 in. wide by 2 ft. – 0 in. thick continuous reinforced concrete footings. The retaining walls at portions of the building 20 to 25 feet below grade would be 2 ft.-6 in. thick reinforced concrete walls supported on 14 ft.-0 in. wide x 2 ft.-0 in. thick continuous reinforced concrete footings with 12 in. thick reinforced concrete full height buttress walls. The heel of the footing would be 10'-0" wide and located towards the existing buildings. The buttress walls will be a minimum 12 ft.–0 in. long and spaced approximately 20 ft.-0 in. on center. The buttress walls would be located either in the interior space or on the back side of the retaining wall depending on the location of the walls in the program spaces. Foundation drains will be installed around foundations of all structures below grade. Foundations will be founded on 12in. of compacted sand gravel fill or 6" of crushed stone placed above compacted structural granular fill in wet conditions.
 - Functional Requirements:
 1. Performance Requirements:
 - a. 4500 psi compressive strength concrete.
 - b. Bottom of exterior footing to be minimum 4 ft. – 0 in. below grade.
 2. Design Requirements:
 - a. Sustainability or LEED requirements:
 - (1) Recycled content shall not be less than 25% (flyash or slag).
 - (2) Regionally extracted and fabricated materials.
 - Components:
 3. Concrete:
 - a. Portland cement
 - b. Aggregates
 - (1) Normal Weight Fine Aggregate: Shall be washed, inert, natural sand conforming to ASTM C33.
 - (2) Normal Weight Coarse Aggregate: Shall be well-graded crushed stone or washed gravel conforming to ASTM C33.
 - (3) Light Weight Fine and Coarse Aggregate: Shall conform to ASTM C330.
 - c. Potable water.
 - d. Admixtures:
 - (1) Water reducing Agent: ASTM C494, Type A.
Water-reducing agent shall be by same manufacturer as air-entraining agent.
 - (2) Mid-Range Water Reducing Agent: ASTM C494, Type A
 - (3) High-Range Water Reducing Agent: ASTM C494, Type F or Type G.
 - (4) Air entraining agent: ASTM C260.
 2. Reinforcement:
 - a. Reinforcing Steel Bars: Shall be newly rolled billet steel conforming to ASTM A 615 (Grade 60 unless noted). Bars shall be bent cold as required. Reinforcing bars being welded shall conform to ASTM A 706, Grade 60.
 - b. Welded Wire Fabric ASTM A 185: All welded wire fabric shall be supplied in sheets and is to be used in slabs on grade and on deck as noted.

A1010.30 Column Foundations

- Description: Based on the recommendations of the Geotechnical Engineer, the columns of the proposed structure would bear on reinforced concrete spread footings. With the recommended bearing capacity of the soil of 5 tons/sf, a typical interior footing at the academic wing would be 11 ft. – 0 in. x 11 ft. - 0 in. x 24 in. deep and the typical exterior footings would be 10 ft. – 0 in. x 10 ft. – 0 in. x 24 in. deep in the four story areas. In the two story areas of the Administrative Department, Media Center and the Cafeteria, typical interior footings would be 9 ft. – 0 in. x 9 ft. – in. x 24 in. deep and typical exterior footings would be 8 ft. – 0 in. x 8 ft. - 0 in. x 24 in. deep. Typical interior and exterior footings at the Metal Fabrication Shop, Auto Body, Auto Tech / Gymnasium and Auditorium would be 11 ft. – 0 in. x 11 ft. – 0 in. x 24 in. deep. Typical interior and exterior footings for the single-story pre-engineered Maintenance Garage would be 5 ft. – 0 in. x 5 ft. – 0 in. x 24 in. deep. Typical interior and exterior footings of the two-story Locker Room Building would be 6 ft. – 0 in. x 6 ft. – 0 in. x 24 in. deep..
- Reinforced, Cast-in-Place concrete piers at column in perimeter walls would be 24 in. square, integral with foundation wall and projecting on the inside face.
- Functional Requirements:
 1. Performance Requirements:
 - a. 4500 psi compressive strength concrete.
 - b. Bottom of exterior footing to be minimum 4 ft. -0 in. below grade.
 2. Design Requirements:
 - a. Sustainability or LEED requirements:
 - (1) Recycled content shall not be less than 25% (flyash or slag).
 - (2) Regionally extracted and fabricated materials.
- Components:
 3. Concrete:
 - a. Portland cement
 - b. Aggregates
 - (1) Normal Weight Fine Aggregate: Shall be washed, inert, natural sand conforming to ASTM C33.
 - (2) Normal Weight Coarse Aggregate: Shall be well-graded crushed stone or washed gravel conforming to ASTM C33.
 - (3) Light Weight Fine and Coarse Aggregate: Shall conform to ASTM C330.
 - c. Potable water.
 - d. Admixtures:
 - (1) Water reducing Agent: ASTM C494, Type A.
Water-reducing agent shall be by same manufacturer as air-entraining agent.
 - (2) Mid-Range Water Reducing Agent: ASTM C494, Type A.
 - (3) High-Range Water Reducing Agent: ASTM C494, Type F or Type G.
 - (4) Air entraining agent: ASTM C260.
 3. Reinforcement:
 - a. Reinforcing Steel Bars: Shall be newly rolled billet steel conforming to ASTM A 615 (Grade 60 unless noted). Bars shall be bent cold as required. Reinforcing bars being welded shall conform to ASTM A 706, Grade 60.
 - b. Welded Wire Fabric ASTM A 185: All welded wire fabric

shall be supplied in sheets and is to be used in slabs on grade and on deck as noted.

A1010.90 Standard Foundation Supplementary Components

- Waterproofing
- Dampproofing
- Insulation

A40 SLABS-ON-GRADE

A4010 Standard Slabs-on-Grade

- Description:
- Based on the existing school construction and recommendations from the Geotechnical Engineer, the typical lowest level of the proposed structure would be a 4 in. thick concrete slab-on-grade reinforced with welded wire fabric over a vapor barrier on 2 in. thick rigid insulation on 12in. of compacted sand gravel structural fill. The slab on grade will be 6” thick in all the shop areas.
- Interior non-structural masonry walls will bear on continuous 14” thickened slabs.
- The typical slab at the single-story Maintenance Garage would be 6 in. thick concrete slab-on-grade reinforced with welded wire fabric over a vapor barrier on 2 in. thick rigid insulation on 12in. of compacted sand gravel structural fill.
- The typical slab at the two-story Locker Room Building would be 6 in. thick concrete slab-on-grade reinforced with welded wire fabric over a vapor barrier on 2 in. thick rigid insulation on 12in. of compacted sand gravel structural fill.
- The typical slab at the Concessions Building would be 6 in. thick concrete slab-on-grade reinforced with welded wire fabric over a vapor barrier on 2 in. thick rigid insulation on 12in. of compacted sand gravel structural fill.
- Functional Requirements:
 1. Performance Requirements:
 - a. 4000 psi compressive strength concrete.
 2. Design Requirements:
 - a. Sustainability or LEED requirements:
 - (1) Recycled content shall not be less than 25% (flyash or slag).
 - (2) Regionally extracted and fabricated materials.
- Components:
 1. Concrete:
 - a. Portland cement
 - b. Aggregates
 - (1) Normal Weight Fine Aggregate: Shall be washed, inert, natural sand conforming to ASTM C33.
 - (2) Normal Weight Coarse Aggregate: Shall be well-graded crushed stone or washed gravel conforming to ASTM C33.
 - (3) Light Weight Fine and Coarse Aggregate: Shall conform to ASTM C330.

- c. Potable water.
- d. Admixtures:
 - (1) Water reducing Agent: ASTM C494, Type A.
Water-reducing agent shall be by same manufacturer as air-entraining agent.
 - (2) Mid-Range Water Reducing Agent: ASTM C494, Type A
 - (3) High-Range Water Reducing Agent: ASTM C494, Type F or Type G.
 - (4) Air entraining agent: ASTM C260.
- 4. Reinforcement:
 - a. Reinforcing Steel Bars: Shall be newly rolled billet steel conforming to ASTM A 615 (Grade 60 unless noted). Bars shall be bent cold as required. Reinforcing bars being welded shall conform to ASTM A 706, Grade 60.
 - b. Welded Wire Fabric ASTM A 185: All welded wire fabric shall be supplied in sheets and is to be used in slabs on grade as noted.

A4090 Slab-On-Grade Supplementary Components

- A4090.10 Perimeter Insulation
 - Perimeter insulation: 2-inch-thick extruded polystyrene insulation
- A4090.20 Vapor Retarder
 - Vapor Retarder: Minimum 15-mil fiber reinforced polyethylene, sealed to the foundation walls.
- A4090.30 Waterproofing required at all foundation walls around below grade spaces as well as the elevator pits and other slab-on-grade recessed areas.
- A4090.40 Dampproofing required at all perimeter foundation frost walls that are not required to be waterproofed.
- A4090.60 Subbase Layer
 - Subbase: 8-inch compacted granular structural fill over a base course of 8-inch of compacted gravel. See under-slab drainage detail prepared by LGCI.

A60 WATER AND GAS MITIGATION

A6010 Building Sub drainage

A6010.10 Foundation Perimeter Drainage and Under-slab Drainage required within footprint of the buildings proposed for the Project.

Refer to the Detail provided by LGCI – see attached.

A90 SUBSTRUCTURE RELATED ACTIVITIES

A9010 Substructure Excavation

A9010.10 Ledge Removal – significant quantities of ledge require removal by blasting. See geotechnical report.

A9010.20 Backfill and Compaction

Geotechnical observations and recommendations:

1. LGCI completed thirteen (13) test pits (TP-101 to TP-111, TP-113, and TP-114). Test pit TP-112, originally slated to be excavated in the driveway, was skipped because of concerns related to wetlands.

2. The test pits extended to depths ranging between 1.8 and 5.5 feet beneath the ground surface. The test pits terminated on refusal on possible rock.
3. LGCI completed six (6) borings B-101 to B-106.
4. The borings extended to depths ranging between 11.5 and 36 feet beneath the ground surface. Rock was encountered in the borings at depths ranging between 0.7 and 3.5 feet beneath the ground surface.
5. LGCI installed two groundwater observation wells in borings B-101 and B-104.
6. Rock was generally hard to very hard. At boring B-103, it took up to 145 minutes to core one foot.
7. The proposed building will require perimeter drains and waterproofing. Unless the perimeter walls are poured against the rock surface, blind side waterproofing will not be needed.
8. The proposed building will require an under-slab drainage system beneath the entire building footprint. A detail of the under-slab drainage system is attached.
9. We plan on submitting our geotechnical report by the end of the month. Our specifications will follow the geotechnical report.

See attached Proposed SD Test Pit and Borings Location Plan – Rev.1 Prepared by LGCI
See attached Under-Slab Drainage Detail. Prepared by LGCI

A9020 Construction Dewatering

A9020.10 Dewatering required during construction. See geotechnical report.

ELEMENT B SHELL

B10 SUPERSTRUCTURE

B1010 Floor Construction

B1010.10 Floor Structural Frame

Description: Typical structural framing is composed of wide flange steel beams, spaced at about 8 ft. on center, spanning between steel girders and columns. The weight of the structural steel framing the floors is estimated to be 15 psf to 22 psf. Spray applied fireproofing and intumescent coating required as per code analysis.

- Beams: would be wide flange structural steel members.
- Columns: Columns would be hollow structural steel columns. Typical columns would be HSS 8 x 8; columns at the double story space at the Gymnasium would be HSS 12 x 12 or HSS 14 x 14.
- Lateral Load Resisting System: The typical lateral load resisting system for the other part of the school would be concentric steel braced frames comprised of hollow structural steel sections, and reinforced masonry shear walls.
- Design Requirements:
 - Sustainability or LEED requirements:
 - Recycled content shall not be less than 80%.
 - Regionally extracted and fabricated materials.
- Components:
 - All wide flange shapes shall be newly rolled steel conforming to ASTM A992, $F_y = 50$ k.s.i. unless noted otherwise on drawings.
 - All bars, plates, channels, and angles shall conform to ASTM A36 unless otherwise indicated on the drawings.
 - Structural tubing shall conform to ASTM A500, Grade B with

minimum yield strength $F_y = 46$ KSI.
Structural pipe shall conform to ASTM A53, Grade B.
Anchor bolts shall conform to ASTM F1554 Grade 36 as noted or otherwise shown on the drawings.
High strength bolts ASTM A325 or ASTM A490 with ASTM A563, Grade A Hex style nuts, and compatible washers. Bolts shall be cold forged with rolled threads. Bolts with torque control snap-off ends may be used.
Hot Dip Galvanizing shall conform to the latest ASTM specification as specified in Section 2.04 below.
Filler metal for welding shall conform to AISC Code, 2005 Edition, Section I.4.5.
Load-bearing and shear walls: 8 in. and 12 in. concrete masonry units, with steel bar reinforcement horizontally and vertically, grouted solid. Masonry units to ASTM C90; Type S high strength mortar; Coarse grout to ASTM C476, 3000 psi.

B1010.20 Floor Decks, Slabs, and Toppings

- Description: Typical floor slab is 5-1/4 in. total thickness light weight concrete on composite metal deck slab reinforced with welded wire fabric.
 - Performance Requirements: 4000 psi compressive strength concrete.
 - Sustainability or LEED requirements:
 - All deck is to consist of a minimum of 95 percent recycled steel with over 80 percent post-consumer and 15 percent pre-consumer recycled content.
 - For concrete, recycled content shall not be less than 25% (flyash or slag).
 - Regionally extracted and fabricated materials.
 - Components:
 - Floor deck shall be composite wide rib 2 in. deep sheet carbon, galvanized conforming to ASTM A611 or A653 with a minimum yield point of 33,000 p.s.i. Deck shall be formed with deformations to provide a mechanical lock between concrete and steel.
- Concrete:
- a. Portland cement
 - b. Aggregates
 - (1) Normal Weight Fine Aggregate: Shall be washed, inert, natural sand conforming to ASTM C33.
 - (2) Normal Weight Coarse Aggregate: Shall be well-graded crushed stone or washed gravel conforming to ASTM C33.
 - (3) Light Weight Fine and Coarse Aggregate: Shall conform to ASTM C330.
 - c. Potable water.
 - d. Admixtures:
 - (1) Water reducing Agent: ASTM C494, Type A.
Water-reducing agent shall be by same manufacturer as air-entraining agent.
 - (2) Mid-Range Water Reducing Agent: ASTM C494, Type A
 - (3) High-Range Water Reducing Agent: ASTM C494, Type F or Type G.
 - (4) Air entraining agent: ASTM C260.

Reinforcement:

- a. Reinforcing Steel Bars: Shall be newly rolled billet steel conforming to ASTM A 615 (Grade 60 unless noted). Bars shall be bent cold as required. Reinforcing bars being welded shall conform to ASTM A 706, Grade 60.
- b. Welded Wire Fabric ASTM A 185: All welded wire fabric shall be supplied in sheets and is to be used in slabs on deck as noted.

B1010.90 Floor Construction Supplementary Components

- Fireproofing (Floor Deck does not require fireproofing, required 2hr fire rating achieved by deck/concrete system)
- Firestopping
- Expansion Control

B1020 Roof Construction

B1020.10 Roof Structural Frame

- Description:
 1. Typical structural framing is composed of wide flange steel beams spaced at about 8 to 10 feet on center, spanning between steel girders and columns. The weight of the structural steel framing the roof is estimated to be 14 psf. The weight of the structural steel for the patio, the vegetated green roof and portions of roof supporting mechanical equipment is estimated to be 18 psf.
 2. The roof construction for the Gymnasium, Cafeteria/Student Commons, and Auditorium is composed of long span metal joists spaced at about 10 feet on center, supported on steel trusses and wide flange steel girders. The weight of the structural steel framing the gymnasium roof is estimated to be 13 psf.
 3. Beams: Wide flange structural steel members.
 4. Columns: Hollow structural steel columns. Typical columns would be HSS 8 x 8; columns at the double story space at the Gymnasium would be HSS 12 x 12.
 5. Lateral Load Resisting System: The typical lateral load resisting system for the school would be concentric steel braced frames comprised of hollow structural steel sections, and reinforced masonry shear walls.
- Functional Requirements:
 1. Design Requirements:
 - a. Sustainability or LEED requirements:
 - (1) All steel is to consist of a minimum of 95 percent recycled steel with over 80 percent post-consumer and 15 percent pre-consumer recycled content.
 - (2) Regionally extracted and fabricated materials.
- Components:
 1. All wide flange shapes shall be newly rolled steel conforming to ASTM A992, $F_y = 50$ k.s.i. unless noted otherwise on drawings.
 2. All bars, plates, channels, and angles shall conform to ASTM A36 unless otherwise indicated on the drawings.
 3. Structural tubing shall conform to ASTM A500, Grade B with minimum yield strength $F_y = 46$ KSI.
 4. Structural pipe shall conform to ASTM A53, Grade B.
 5. Anchor bolts shall conform to ASTM A307 or ASTM F1554 $F_y = 105$ k.s.i. as noted or otherwise shown on the drawings.

6. High strength bolts ASTM A325 or ASTM A490 with ASTM A563, Grade A Hex style nuts, and compatible washers. Bolts shall be cold forged with rolled threads. Bolts with torque control snap-off ends may be used.
7. Hot Dip Galvanizing shall conform to the latest ASTM specification as specified in Section 2.04 below.
8. Filler metal for welding shall conform to AISC Code, 2005 Edition, Section I.4.5.
9. Load-bearing and shear walls: 8 in. and 12 in. concrete masonry units, with steel bar reinforcement horizontally and vertically, grouted solid. Masonry units to ASTM C90; Type S high strength mortar; Coarse grout to ASTM C476, 3000 psi.

B1020.20 Roof Decks, Slabs, and Sheathing

- Description:
 1. The typical roof construction would be 3 in. deep Type N roof deck.
 2. Typical roof construction at the Gymnasium and Auditorium would be 3 in. deep Type NA acoustic roof deck.
 3. The typical roof construction at areas around rooftop units and at the green roof would be 7 in. concrete slab on composite deck as noted above for floor construction.
- Functional Requirements:
 1. Design Requirements:
 - a. Sustainability or LEED requirements:
 - (1) All deck is to consist of a minimum of 95 percent recycled steel with over 80 percent post-consumer and 15 percent pre-consumer recycled content.
 - (2) Regionally extracted and fabricated materials.
- Components
 1. Type N roof deck, 3 in. deep, from steel sheet in accordance with ASTM A653, with a minimum yield strength of 33 psi, hot-dipped galvanized G60
 2. Type NA acoustic roof deck, 3 in. deep, from steel sheet in accordance with ASTM A653, with a minimum yield strength of 33 psi, hot-dipped galvanized G60. Perforated webs with acoustic batts that fit into ribs. Minimum noise reduction coefficient of 0.70.

B1020.90 Roof Construction Supplementary Components

- Vapor Barrier
- Insulation
- Fireproofing, including underside of deck per UL P732
- Firestopping
- Expansion Control
 - Spray applied fireproofing

B1080 Stairs

B1080.10 Stair Construction

- Cast-In-Place Concrete; cast-in-place concrete stairs.
- Metal Stairs; concrete filled steel pans stairs.

B1080.30 Stair Soffits

- Gypsum Board.

B1080.50 Stair Railings

- Metal Railings; Interior metal pipe railings, shop-primed for field finishing; Exterior pipe railings, shop-finished, high performance coating.

- Decorative Metal and Glass Railings powder coated. (Prefabricated)
- ALL handrails shall be stainless steel
 - B1080.70 Metal Walkways
- Metal Catwalks; at the Auditorium.
- Metal Gratings; hot-dip galvanized.
 - B1080.80 Ladders
- Interior steel ladders shop primed.
- Exterior prefabricated aluminum ladders, shop finished, high performance coating.

B20 EXTERIOR VERTICAL ENCLOSURES

B2010 Exterior Walls

B2010.10 Exterior Wall Veneer

- Masonry Veneer; Oversized Ground and Split face CMU, with one base color and one accent color.
- Stone (Granite) veneer
- Metal Wall Panels; Flat Lock aged copper or zinc metal shingles (Rheinzink, VM Zinc, or equal).
- Insulated Wall Panels; concealed fasteners, flat and corrugated profiles (Centria, Kingspan or equal), 3" thick.
- Metal Wall Panels; ACM (Alucobond or equal) rainscreen system
- Composite material rainscreen system – TRESPA (TS210DC-285) METEON Panels.
- All Exterior Cladding systems shall meet NFPA 285

B2010.20 Exterior Wall Construction

- CMU veneer with CMU back-up in Gymnasium and Locker Rooms, Auditorium, High Bay Shops, Mechanical Spaces, Kitchen and Delivery Areas. Also, at freestanding Athletic Locker Rooms and Storage Building
- Structural Metal Stud Framing; Cold-formed metal framing (studs) with gypsum sheathing at typical locations.
- Thermal and Moisture Protection: Mineral-wool insulation (Roxul or equal) with thermally broken clips (Cascadia Clips or equal) over air/vapor retarder (NFPA 285 compliant) over sheathing, 2 inch air space, masonry veneer or metal wall panels where indicated; ALL assemblies to comply with NFPA 285.

B2010.40 Fabricated Exterior Wall Assemblies

- Aluminum and Glass Curtain Wall and Storefront Assemblies.

B2010.80 Exterior Wall Supplementary Components

- Grouting.
- Weather Barriers - NFPA 285 compliant
 - Vapor Retarder/
 - Air Barrier
- Insulation, mineral wool – 3" thick.

B2010.90 Exterior Wall Opening Supplementary Components

- Lintels
- Joint Sealants
- Flashing
- Sills

B2020 Exterior Windows

B2020.10 Exterior Operating Windows

- Aluminum-framed windows; fixed and project-out (awning) type, 3-coat fluoropolymer finish. Screens at the operable sash.
- High-Performance Glazing: Factory-glazed, sealed insulating glass units; Low-E suspended-film insulating units with argon (Heat Mirror by Southwall Technologies, Inc. or equal).

B2020.30 Exterior Window Wall

- Storefront: Aluminum and glass storefront system, field glazed with insulating glass; 3-coat fluoropolymer finish; spandrel and translucent glass at locations indicated.
- Curtain Wall: 7-inch and 10-inch deep aluminum framing, field glazed with insulating glass; 3-coat fluoropolymer finish; spandrel glass at locations indicated. Security Glass at Main Entrance, Customer Entrance and Events Entrance.
- High-Performance Glazing: Field-glazed, sealed insulating glass units; Low-E suspended-film insulating units with argon (Heat Mirror by Southwall Technologies, Inc. or equal).
- Insulated High-Performance Security Glass at Main Entrance exterior and Interior Vestibule
- Exterior walls at High Bay Shops: Insulated Translucent Wall Panels with operable vision sections glazed with insulated glass (Kallwal or equal).

B2050 Exterior Doors and Grilles

B2050.10 Exterior Entrance Doors

- Stile-and-rail aluminum and glass doors with thermally broken aluminum frames.
- Insulated Security glass at Main Entrance, Customer Entrance, and Events Entrance storefront doors.

B2050.20 Exterior Utility Doors

- Insulated steel doors and frames, galvanized, welded frames.

B2050.30 Exterior Oversize Doors

- Exterior sectional doors, insulated glass panels, electrically operated, 3-coat fluoropolymer finish. Engineered based on the code required wind load.
- Exterior coiling doors, insulated steel curtain, electrically operated, 3-coat fluoropolymer finish.

B2070 Exterior Louvers and Vents

B2070.10 Exterior Louvers

- Extruded aluminum architectural louvers, storm resistant, with 3-coat fluoropolymer finish.

B2080 Exterior Wall Appurtenances

B2080.30 Exterior Opening Protection Devices

- Aluminum sunscreen integrated with fenestration at Classrooms; 3-coat fluoropolymer finish.

B30 EXTERIOR HORIZONTAL ENCLOSURES

B3010 Roofing

B3010.50 Low-Slope Roofing

- Low-Slope Roofing Membrane: Fully adhered grey PVC roofing membrane, LEED compliant for high reflectivity.

B3010.90 Roofing Supplementary Components

- Deck Insulation
- Cover Board
- Vapor Retarder/Air Barrier
- Sheet Metal Flashing and Trim

- Flexible Flashing
- Copings
- Counterflashing Systems
- Gravel Stops and Fasciae
- Expansion Joints
- Concrete Paver system - see site specifications.
- Vegetated Roof System (Green roof) - see site specifications.

B3020 Roof Appurtenances

B3020.10 Roof Accessories

- Roof Ladders
- Roof Curbs
- Roof Walkways

B3020.70 Rainwater Management

- Internal drainage system part of Plumbing scope
- Metal Scuppers

B3060 Horizontal Openings

B3060.50 Vents and Hatches

- Roof Hatches.
- Heat and Smoke Vents (at the stage).

B3080 Overhead Exterior Enclosures

B3080.20 Exterior Soffits

- Soffit Panels: ACM panels factory finished.

VEGETATED ROOF and PAVERS – Warner Larson Please Provide Description

ELEMENT C INTERIORS

C10 INTERIOR CONSTRUCTION

C1010 Interior Partitions

C1010.10 Interior Fixed Partitions

- Unit Masonry: (CMU), where indicated, 8-inch or 12-inch thick, normal-weight.
- Gypsum Board 5/8-inch; regular and fire-resistant-rated gypsum board on 6-inch or 3-5/8-inch steel studs; impact resistant gypsum board in classrooms (non-tile locations); all gypsum board to be moisture and mold resistant; shaft wall assemblies; extra layers of gypsum board at acoustically rated partitions where indicated.

C1010.50 Interior Operable Partitions

- Folding Acoustical Panel Partition, 10 ft. high.

C1010.90 Interior Partition Supplementary Components

- Sound Isolation
- Acoustic Insulation – Mineral Wool
- Firestopping
- Acoustical Sealant at tops and bottoms of walls

C1020 Interior Windows

C1020.20 Interior Fixed Windows

- Fixed interior borrowed light frames.

C1020.50 Interior Special Function Windows

- Interior security transaction window at main entrance vestibule to administration.
- Interior Acoustically rated, sliding window at Auditorium Control Booth

C1020.60 Interior Fire Protection Rated Frames and Glazing

- Interior Listed and labeled by testing agency acceptable to authorities having jurisdiction, for fire protection ratings indicated (2 hours), based on testing according to NFPA 252 for door assemblies and NFPA 257 for window assemblies (Pilkington Pyrostop or equal)

C1020.90 Interior Window Supplementary Components

- Frames and Sills
- Fire Rated Frames (2 hour)
- Hardware
- Glazing: Fully tempered float glass in metal frames
- Laminated glass
- Spandrel glass
- Fire Rated glass
- Decorative glass
- Finishes

C1030 Interior Doors

C1030.10 Interior Swinging Doors

- Hollow metal doors and frames, where indicated.
- Flush-faced wood doors (5-ply), factory-finished, maple veneer stained, with vision lights where indicated.
- Fire Rated doors where indicated.
- Stainless steel Doors and Frames between Servery and Kitchen and Restaurant and Culinary Arts Kitchen.
- Sound rated acoustical doors for Auditorium and where indicated.
- Sound gasketed doors for ALL Educational spaces (including shops) and where indicated.

C1030.40 Interior Coiling Doors

- Coiling Counter Doors.
- Coiling Door at the Cafeteria Servery

C1030.70 Interior Special Function Doors

- Interior Sound Control Doors: Wood door assemblies with metal frames and hardware (Auditorium)
- Interior fire rated sliding door/wall assemblies (Won-Door)

C1030.80 Interior Access Doors and Panels

C1030.90 Interior Door Supplementary Components

- Hardware; Institutional grade hardware.
- Glazing: Fully-tempered float glass in metal frames; fire-resistance-rated glazing in fire-rated door assemblies.
- Louvers where indicated

C1070 Suspended Ceiling Construction

C1070.10 Acoustical Suspended Ceilings

- Acoustical lay-in panels

C1070.20 Suspended Gypsum Board Ceilings

C1070.50 Specialty Suspended Ceilings

- Suspended noise transmission reducing ceiling assemblies at the High Bay Vocational Shops – see details
- Suspended acoustical “clouds” at Auditorium
- Open Mesh Ceiling Panels systems at Auditorium (MCT)
- Suspended Perforated Linear Metal ceiling (LMC) where indicated.
 - Suspended extruded aluminum vertical blade system (EAVB), suspended from ACT grid above.

C1070.90 Ceiling Suspension Components

- Suspension Systems.
- Suspended Ceiling Sound Isolation.
- Vertical Edge Trim at “clouds” etc. – extruded aluminum

C1090 Interior Specialties

C1090.20 Information Specialties

- Markerboards.
- Tackboards.
- Visual Display Rails.
- Display Cases – Custom built finished wood framed with safety glass and pivot hardware
- Interior Signage:
 - Identification signage for rooms, classroom, utility/mechanical spaces, and offices
 - Egress signage related to stairs, elevators, and exit doors.
 - Wayfinding and directional signage including corridor directional elements, orientation maps, and directories.
- Regulatory signage.
- Dedication plaque.
- Specialty graphics, including large format wall murals and panels.
- Window Shades
- Roller Shades manual operation
- Roller shades electrically operated
- Vertical blinds manual operation
- Tension shade system at skylight electrically operated

C1090.25 Compartments and Cubicles

- Toilet Compartments; floor-mounted phenolic toilet partitions.
- Shower and Dressing Compartments.
- Cubicles; cubicle curtains at nurse’s area.

C1090.35 Wall and Door Protection

- Corner Guards

C1090.40 Toilet, Bath, and Laundry Accessories

C1090.70 Storage Specialties

- Lockers; metal lockers in corridors, metal lockers in shop areas
- Welded metal athletic lockers in the Locker Rooms
- Closet and utility shelving.

C1090.90 Other Interior Specialties

- Fire extinguishers and cabinets.
- Unframed glass mirrors.
- Automated External Defibrillators (AED) with Cabinets

C20 INTERIOR FINISHES

C2010 Wall Finishes

C2010.10 Tile Wall Finish

- Ceramic tile for toilet room: Full height at multi-stall toilets and 4'-0" high wainscot at single-stall toilets as indicated; 4 inch square glazed tile, thin-set.
- Large format thin porcelain wall tiles with vibrant and mottled colors, as indicated.

C2010.20 Wall Paneling

- Flush-faced phenolic paneling with metal trim systems where indicated.
- Decorative fabric metal panels with stainless steel woven mesh fabric and tensioned attachment system in Auditorium.
- Decorative wood paneling with vertical linear ridge pattern and geometric shapes similar to Plyboo Futura by Smith & Fong Company. Paneling system comes with metal trim systems where indicated.
- Painted perforated metal panels in Auditorium similar to Perforated Metal 3003-H14 by Mc Nichols.

C2010.70 Wall Painting and Coating

- Water-based latex paint system, typical; primer with two finish coats.
- High-performance painting system for stairways and railings, toilet rooms, steel frames and steel doors; epoxy primer with two polyurethane finish coats.
- Intumescent paint system at exposed to view Structural Steel components.

C2010.80 Acoustical Wall Treatment

- Acoustic wall fabric-wrapped panels in Auditorium, Cafeteria, Media Center, and where indicated; (2-inch panels).
- Sound-absorptive wood-fiber wall panels (Tectum) in Gymnasium.

C2030 Flooring

C2030.20 Tile Flooring

- Porcelain floor tile and base as indicated.
- Ceramic Mosaic floor tile as indicated.

C2030.50 Resilient Flooring

- Linoleum sheet flooring, typical in Classrooms.
- Rubber Tile, typical in corridors,
- Rubber Tile – Athletic Cleat Resistant, typical in locker room Corridors
- Sheet Vinyl flooring with integral base in Science Rooms
- Wall Base; rubber 4 inch high
- High Performance Adhesives capable to withstand up to 99% RH.

C2030.60 Thin-Set Poured Epoxy Terrazzo Flooring

- 3/8" thick epoxy terrazzo flooring system with crack bridging membrane and moisture control/mediation control system.
- Precast epoxy terrazzo base.

C2030.70 Fluid-Applied Flooring

- Resinous Flooring; epoxy flooring in Kitchen, Athletic Locker rooms, Toilet Room and as indicated

C2030.75 Carpeting

- Tile Carpeting: 6,6 Nylon, tufted loop pile and CRI Green Label Plus certified tile carpeting in offices, and Media Center (Learning Commons).
- Sheet Carpeting: 6,6 Nylon, tufted loop pile and CRI Green Label Plus certified sheet

carpeting in Auditorium as indicated.

- High Performance Adhesives capable to withstand up to 99% RH.

C2030.80 Athletic Flooring

- Wood athletic flooring; wood sports flooring system with vented rubber base in Gymnasium.

C2030.85 Entrance Flooring

- Entrance Floor Grilles; foot grille with alternating vinyl and carpet treads with a non-drained pit in the vestibule.
- Entrance Floor Gratings; metal grating with a piped drainage pit out-side the entrance doors.
- Entrance Tile; heavy ridged carpet tile in Lobby.

C2030.90 Exposed Concrete Floor Sealer

- Water-based epoxy paint system, typical; primer with two finish coats.
- Safety lines painted required at all High Bay Shops

C2040 Stair Finishes

C2040.50 Resilient Stair Finish

- Rubber treads and risers with matching rubber tiles at stair landings.

C2050 Ceiling Finishes

C2050.10 Gypsum Board Finish (Level 5 in high profile spaces, Level 4 everywhere else where exposed to view, level 3 at concealed from view locations)

C2050.70 Ceiling Painting and Coating

- Painted exposed steel structure.
- Painted gypsum board ceilings and soffits.

C2050.90 Ceiling Finish Supplementary Components

- Ceiling sound absorption
- Ceiling control and expansion joints

ELEMENT D SERVICES

D10 CONVEYING

D1010 Vertical Conveying Systems

D1010.10 Elevators

- Traction passenger elevator, Elevator 1 - 3500 pound capacity passenger and Elevator 2 - 5000 pounds capacity service.
Size to accommodate stretcher. One Oversized elevator with higher load capacity is requested by the Owner. KONE MONOSPACACE 500 or equal. Entrance height 9'.
- Connected to emergency power.

D20 PLUMBING

D2010 - Domestic Water Distribution

- Piping and Fittings: Potable and Non-Potable cold and hot water system water piping shall be Type 'L' hard tempered copper tubing with wrought copper fittings and silverbrite lead-free solder joints.
- Valves: Locate all valves so as to isolate all parts of the system. Shutoff

valves 3 inch and smaller shall be ball valves, solder end or screwed. Valves shall be by Apollo, Nibco, or Watts.

- Insulation: Insulation for all domestic and non-potable water piping and all storm piping, horizontal and vertical, whether concealed or exposed shall be 1 inch thick, heavy density, preformed snap-on insulation equal to Johns Manville, Owens Corning or Knauf. Insulation for cold water piping shall have a factory applied vapor barrier with ends and butts sealed with overlapping 4 inch sealing strips. Valves, fittings, and the underside of roof drain bodies shall be insulated with pre-formed fiberglass fitting insulation cut from dense fiberglass blanket and covered with pre-molded P.V.C. fitting covers. All insulation shall have self-sealing type, all service jacket (ASJ-SSL) factory applied. At exposed piping areas 10 feet from the floor and below, cover PVC jacket with continuous aluminum jacket.
- Wall Hydrant and Hose Bibb: Wall hydrants shall be Zurn, Woodford, or Smith 3/4 inch non-freeze wall hydrant with integral backflow preventer, 3/4 inch hose connections, polished nickel bronze face, loose key handle, and brass wall sleeve. Hose bib shall be T & S Brass or Chicago, chrome plated, 3/4 inch hose end, integral stop, vacuum breaker, modified with lock shield and loose tee handle.
- Domestic Water Sub-meter: Furnish and install Badger, Neptune, or equal water flow meter capable of providing BACnet output. All BACnet control wiring shall be by Section 230000.
- Domestic Water Heating: Furnish and install two gas-fired high efficiency storage water heaters to serve the kitchen the culinary area and all other fixtures on the west side of the Academic wing. Furnish and install two gas-fired high efficiency water heaters for the Locker and Shower area and the same is to be provided for the Satellite Athletic Building. Each water heating system will comply with all current ASHRAE 90.1 requirements for thermal efficiency and standby heat losses. All other remote areas and remote buildings are to be provided each with electric storage type heaters.

D2010.60 - Plumbing Fixtures

Fixtures:

- Furnish and install all fixtures, including supports, connections, flush valves, fittings, trim, and incidentals to make a complete installation.
- Fixtures shall bear the manufacturer's guaranteed label trademark indicating first quality.
- Provide vitreous china and acid resisting enameled fixtures, including stops, supplies and traps. Fixtures shall be of one manufacturer Kohler, American Standard, or Toto. Supports shall be Zurn, Smith, or Josam. All fixtures shall be white. Solid surface lavatory units shall be provided in color selected by the Architect. Faucets shall be Toto, Speakman, Symmons, or Chicago.

Fixtures shall be as scheduled on drawings and as follows:

- Water Closet: High efficiency toilet, 1.28 gallon per flush, wall hung, vitreous china, siphon jet, sensor operated flush valve.
- Urinal: Complete HEU system with regenerating battery sensor flush valve for 0.13 gallon flush.
- Lavatory: Wall mounted vitreous china lavatory, single hole, punched for concealed armchair carrier. Regenerating battery powered, sensor faucet, 0.35 GPM rose spray, adjustable thermostatic mixing valve located under lavatory complete with in-line check stops.

- Mop Receptor: Terrazzo mop service basin with stainless steel rim guard on exposed sides, 3 inch caulk connection, stainless steel strainer. Include caulking and sealant to seal between unit and finished wall and floor. Furnish and install service sink fitting.
- Electric Water Cooler: Barrier Free Hi-Lo Electric Water Cooler with bottle filler, 8.0 GPH capacity, tandem mounting, #4 satin finish stainless steel bowls, flex-guard bubbler, push button actuator, ADA compliant bottle fill station. Furnish and install cane touch skirt.
- Stainless Steel Sinks: Single bowl, deep self-rimming countertop mounted, 18 gauge type 304 stainless steel sink with offset rear outlet; three hole punched faucet ledge and quick clip mounting system, sound deadening underside. Concealed deck faucet with 8 inch swing gooseneck spout, 4 inch wrist blade handles, 0.5 GPM aerator.

D2010.90 - Domestic Water Distribution Supplementary Components

- Workmanship and Installation Methods: All work shall be installed in a first-class manner consistent with the best current practices. All piping shall be installed true to line and grade, shall be grouped together and shall be parallel. Utilize gang hangers wherever feasible. Group all valves together where feasible.
- Cleaning and Protection: Protect all materials and equipment during shipment and installation, and properly handle and store at the job site so as to prevent damage, and upon completion of this work, clean all fixtures and equipment and replace damaged parts.
- Sleeves and Escutcheons: Furnish and install in all walls and floors, - provide galvanized steel.
- Testing: Test all work in the presence of the Architect or his representatives, the local plumbing inspector, and as required by local codes.
- Chlorination: Upon completion of the plumbing work, thoroughly chlorinate the entire domestic water system in accordance with code before putting same in service.
- The system is being planned to include a triplex booster pump system with a remote pressure tank.
- If required based on new water flow tests, the system will need to take suction from an underground water storage tank.
- Access Doors: Furnish access doors for access to all concealed parts of the plumbing system that require accessibility. Coordinate types and locations with the Architect.

D2020 - Sanitary Drainage

- Piping and Fitting: Soil, waste and vent, garage waste, kitchen waste and vent, and storm drainage piping to 10 feet outside shall be hub and spigot below slab and hubless cast iron above slab with heavy-duty pipe clamps for 2 inch and above. Install DWV copper with cast fittings for 1-1/2 inch and smaller.
- Drains: Drains shall be cast iron and caulked outlets, and nickel alloy strainers. Drains shall be Smith, Zurn, or Josam.
- Cleanouts: Cleanouts shall be full size up to 4 inches; threaded bronze plugs located as indicated on the drawings and/or where required in soil, waste and storm pipes.
- Acid waste and vent system components shall be Schedule 40, flame retardant polypropylene.
- Kitchen waste system shall include three 50 GPM passive, recessed grease traps.

D2020.90 - Sanitary Drainage Supplementary Components

- Sleeves and Escutcheons: Furnish and install in all walls and floors, provide galvanized steel.
- Testing: Test all work in the presence of the Architect and/or Engineer and as required by local codes.
- Access Doors: Furnish access doors for access to all concealed parts of the plumbing system that require accessibility. Coordinate types and locations with the Architect.

D2060 – Process Support Plumbing Systems

D2060.10 – Compressed-Air Systems

- Furnish and install an industrial grade compressed air system for each of the shop areas: One system to handle the shop areas of the academic wing and another system is to handle the Auto Shop areas.
- Furnish and install a medical grade compressed air system to handle the dentistry area.
- Each system shall be a duplex system with a separate receiver, air dryer, and all required pre and after filters.

D2060.20 – Vacuum Systems

- Furnish and install a medical grade system to handle the dentistry area.
- System shall be a duplex system with separate receiver.

D2060.30 - Gas Systems

- Fuel Gas System: Furnish and install a complete Natural Gas Supply System for building heating, domestic hot water, the emergency generator, kitchen equipment and Science Classroom bench top turrets. Include pipe, fittings, valves, connections to all gas fired equipment requiring gas, and all accessories and incidentals as indicated or specified. Installation shall be in accordance with State Fuel Gas Code requirements. Piping shall be installed with a sediment leg at the base of all risers. Gas piping shall be Schedule 40 black steel with threaded fittings for 2-1/2 inch and smaller, welded or flanged for larger sizes.
- Fuel gas valves shall be ball valves with tee handle, screwed end for 2-1/2 inch and smaller, and lubricated iron body plug cocks for 3 inch and larger. Valves shall be by Apollo, Nibco, Watts or Rockwell.
- Natural Gas Sub-Meter: Furnish and install Elster, or equal, turbine meters, capable of providing BACnet output. All BACnet control wiring shall be by Section 230000.

D30 HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)

D3020 - Heating Systems

D3020.10 - Heat Generating Systems

Boilers:

- Factory assembled, high efficiency, gas-fired condensing hot water boilers. The boiler plant shall consist of three boilers each one sized to carry 40% of the building load on a design day thereby allowing for a boiler to be inoperative (for whatever reason) without loss of service to the majority of the building. Boilers shall be sized at three - 2000 MBH input each.
- Manufacturer: Subject to compliance with the above, provide stainless steel condensing boilers by one of the following: Viessmann, Riello, Lochinvar, or equal.

Auxiliary Equipment:

- Venting and combustion Air Control: Double-walled AL29-4C alloy vent piping shall be used from the direct vent connection of the individual boilers. Combustion air shall also be ducted directly from outdoor using stainless steel, single wall ductwork.

D3020.90 - Other Heat Generating Systems

Variable Refrigerant Flow (Split System) Air Cooled Heating and Cooling (Heat Pump) System:

- Multiple heat pump type VRF-Condensing units will provide heat to rooftop HVAC units and heat recovery type will provide heat to VRF fan coil units. Provide units with low ambient control.
- Manufacturer: Subject to compliance with the above provide air cooled VRF heat recovery style heat pump systems by one of the following: Daikin, LG, Mitsubishi, or approved equal.

D3020.70 – Decentralized Heating Equipment

Fan Coil Units - (VRF)

- Multiple VRF-FCU will be connected to central air condensing units (CU). Units shall be heat recovery configuration allowing simultaneous heating and cooling of various spaces connected to same ACCU.
- Units shall be horizontal ducted type with multi fan speed design with matching outdoor unit capacity. Units shall be designed for above ceiling installation with factory provided overflow alarms and DDC interface gateway controllers. Units shall be equipped with fan, motor, filter, low ambient control.
 - Available Manufacturers: Subject to compliance with requirements, provide fan coil units of one of the following: Mitsubishi, LG and Daikin

D3030 - Cooling Systems

D3030.10 – Central Cooling

Variable Refrigerant Flow (Split System) Air Cooled Heating and Cooling (Heat Pump) System:

- Multiple heat pump type VRF-Condensing units will provide cooling to rooftop HVAC units and heat recovery type will provide cooling to VRF fan coil units. Provide units with low ambient control.
- Manufacturer: Subject to compliance with the above provide air cooled VRF heat recovery style heat pump systems by one of the following: Daikin, LG, Mitsubishi, or approved equal.

D3030.70 – Decentralized Cooling

Fan Coil Units - (VRF)

- Multiple VRF-FCU will be connected to central air condensing units (CU). Units shall be heat recovery configuration allowing simultaneous heating and cooling of various spaces connected to same ACCU.
- Units shall be horizontal ducted type with multi fan speed design with matching outdoor unit capacity. Units shall be designed for above ceiling installation with factory provided overflow alarms and DDC interface gateway controllers. Units shall be equipped with fan, motor, filter, low ambient control.
 - Available Manufacturers: Subject to compliance with requirements, provide fan coil units of one of the following: Mitsubishi, LG and Daikin

D3050 - Facility HVAC Distribution Systems

D3050.10 – Facility Hydronic Distribution

Pumps

- Hot Water Pumps: Vertical in-line bronze fitted with high efficiency VFD compatible electric motor. Hot water distribution shall be variable primary flow from heater evaporators to building hot water heating distribution. Flow rate is based on a 20°F delta-T with design maximum temperature set at 140°F.
- Manufacturers: Subject to compliance with the contract documents provide pumps of the following manufacturer: Bell & Gossett, Taco, Armstrong, or equal.

Piping and Fittings

- Hydronic piping shall be Schedule 40 ASTM A-53, black steel pipe with butt welded ends and fittings on 2-1/2 inch and above and threaded ends and fittings on 2 inch and smaller. At the contractor option type "L" copper may be used on all 2-1/2 inch and smaller.
- Condensate piping shall be type "L" copper.
- Refrigerant piping shall be type L ACR copper piping with brazed joints.

Valves

- All valves shall be bronze, brass, or cast iron as system design requires. Locate all valves so as to isolate all parts of the system and as required for normal system operation.
- Manufacturers: Subject to compliance with the requirements of the contract documents provide valves of the following manufacturer: Milwaukee, Stockham, Nibco, or equal

System Identification

- Provide markers on all piping and equipment. Tag all valves in system with corresponding valve lists.

Insulation

- All piping shall be insulated with snap-on fiberglass insulation with all service jacket. Fittings shall be insulated with snap on pre-molded covers with loose fill fiberglass insulation.
- All HVAC supply and return ductwork shall be insulated with 1.5 inch thick high density fiberglass blanket (min. R-6 insulation) with a foil vapor barrier. All outside air intake ductwork shall be insulated with 2 inch (min. R-12 insulation) rigid fiberglass with foil vapor barrier.

D3050.50 - HVAC Air Distribution

Dedicated Outdoor Air Handling Unit (100% OA)

- All units shall be of the draw-through 100% outdoor air design and shall be provided with DX cooling coil, hot water coil, energy recovery wheel with VFD, MERV-8 and MERV-13 filters, recirculation dampers, and plenum supply and return/exhaust air fan sections with high efficiency motors and variable frequency drives.
- Available Manufacturers: Subject to compliance with the requirements of the contract documents provide rooftop air handling units by the following manufacturer: BTI, Haakon, Annexair, or equal

Rooftop Air Handling Units (HVAC Recirculation)

- All units shall be of the draw-through type provided with DX coil, hot water coil, MERV-8 and MERV-13 filters, economizer dampers, energy recover wheel, and plenum supply and return air fan with high efficiency motors and variable frequency drives.
- Manufacturers: Subject to compliance with the requirements of the contract documents provide rooftop air handling units of the following manufacturer: BTI, Haakon, Annexair, or equal.

Interior Heating, Ventilating Units

- All units shall be of the draw thru type and shall be provided with hot water heating section, MERV-8 and MERV-13 filters, economizer dampers, energy recovery wheel, and plenum supply and return air fan with high efficiency motor and variable frequency drives.
- Manufacturers: Subject to compliance with the requirements of the contract documents provide heating and ventilating units of the following manufacturer: BTI, Haakon, Annexair, or equal.

Energy Recovery Ventilators (ERV)

- All units shall be of the draw-through 100% outdoor air design and shall be provided with hot water coil, energy recovery wheel with VFD, MERV-8 and MERV-13 filters, recirculation dampers, and centrifugal supply and return/exhaust air fan sections with high efficiency motors and variable frequency drives.
- Manufacturers: Subject to compliance with requirements of the contract documents provide energy recovery ventilators of one of the following: JCI, Greenheck, Renewaire, or equal.

Variable Air Volume Terminal Units

- Supply air VAV terminal units and return/exhaust air VAV terminal units shall be single duct style without hot water heating coil.
- VAV boxes will be connected to space occupancy and carbon dioxide sensors to control and modulate ventilation air based on space demand.
- Available Manufacturers: Subject to compliance with the requirements of the contract documents provide rooftop air handling units of the following manufacturer: Price, Titus, Enviro-Tec, Nailor, or equal.

Radiant Heating Panels

- Radiant panel shall be manufactured utilizing extruded aluminum strips of approximately 0.115 overall thickness. The strips shall have a minimum 0.495 I.D. copper tube firmly attached to aluminum extrusion under all operating temperature conditions. Ends of tubes shall be swaged to 0.569 I.D. for proper soldering fit of 1/2 inch Type "L" soft copper tubing.
- Manufacturers: Subject to compliance with the requirements of the contract documents provide fin-tube radiation of the following manufacturer: Rittling, Sterling, Sun-El, or equal

Unit Heaters

- Horizontal or cabinet type with exact locations to be determined. All units shall be provided with fan and aquastat control.
- Available Manufacturers: Subject to compliance with the requirements of the contract documents provide unit heaters of the following manufacturer: Rittling, Sterling, Trane, or equal

Panel Radiation

- Commercial flat panel radiation with steel tube and steel fin. Assembly shall be 14 gauge with baked enamel factory finish. All units shall be provided with finned element backing, welded grille, end covers, and splice pieces for a complete installation.
- Available Manufacturers: Subject to compliance with the requirements of the contract documents provide fin-tube radiation of the following manufacturer: Runtal, American Panel Radiation, Rittling, or equal

Ductwork

- Ductwork shall be galvanized steel with all seams sealed. Entire ductwork system shall be fabricated and installed per SMACNA Duct Construction Standards.
- All high velocity ductwork, between air handling unit and VAV box (where

applicable), shall be medium pressure 4 to 6 inch pressure class.

- Kitchen hood exhaust ductwork shall be welded black iron or stainless steel.
- Welding fume and science hood exhaust ductwork shall be 304 stainless steel.
- Woodshop, paint finishing, and auto exhaust ductwork shall be 10 inch pressure class.
- Sound attenuators shall be provided for all fan systems.
- All air handling unit supply and return ductwork from unit connection to sound attenuator shall be double-wall/insulated type.

Diffusers, Registers, and Grilles

- All devices shall be steel or aluminum construction with baked enamel finish and color selected by the Architect.
- Manufacturers: Subject to compliance with the requirements of the contract documents provide displacement diffusers of the following manufacturer: Price, Titus, Krueger or equal

Exhaust Fans

- Exhaust fans shall be galvanized steel construction with centrifugal fan and direct drive motor with speed control or variable frequency drive. Each roof unit shall be provided with 18 inch high pre-fab curb with motor operated damper in curb.
- Welding booth, kitchen hood, and paint booth fans shall be rated for their intended use.
- Fume hood fans shall be high plume laboratory exhaust fans.
- Manufacturers: Subject to compliance with the requirements of the contract documents provide exhaust fans of the following manufacturer: Greenheck, Cook, Twin City, or equal

Dust Collector

- Provide an industrial grade re-circulating outdoor dust collector for the Carpentry Shop and two indoor re-circulating duct collectors for the Sheetmetal Shop.
- Manufacturers: Subject to compliance with the requirements of the contract documents provide dust collectors of the following manufacturer: Donaldson Torit, AQC, UAS or equal.

Vehicle Carbon Monoxide Removal System

- Provide a complete carbon monoxide removal system including fans, air duct, and floor fixtures with flexible stainless steel tubing and stainless steel tailpipe adapters.
- Manufacturers: Subject to compliance with the requirements of the contract documents provide carbon monoxide removal system of the following manufacturer: Car-Mon Products Inc., Reumelin or equal.

D3050.90 - Facility Distribution Systems Supplementary Components

Automatic Temperature Controls

- System shall be an open protocol (BACnet based) direct digital control and building energy management system with Tridium Niagara front end to provide complete automatic temperature control and monitoring of newly installed HVAC system.
- Available Manufacturers: Subject to compliance with the requirements of the contract documents provide automatic temperature controls of the following manufacturer: Johnson Controls MetsSys, Siemens, FMC or equal

Electrical and BTU Metering

- Electrical metering shall be provided for collection of historical and real-

time performance data. Separate meter groups shall be provided for the upper school areas and lower school areas consisting of meters for the measurement of lighting and plug loads for each classroom group by wing, floor or classroom type.

- Individual metering of lighting and plug loads shall be provided for the Kitchen, Media Center, Auditorium/Stage, Gymnasium, and Administration areas.
- Electrical metering shall be provided for each air handling system, central system pumps (by each group type), and each chiller-heater.
- Provide BTU metering of chilled water, hot water, and domestic hot water system.

Testing, Adjusting, Commissioning, and Balancing

- Requirements include measurement and establishment of the quantities of the mechanical systems as required to meet specifications, and recording and reporting the results. Test, adjust and balance the following mechanical systems:
 - Supply air systems.
 - Return air systems.
 - Exhaust air systems.
 - Outside air systems.
 - Hydronic heating and cooling systems.
 - Verify temperature control system operation.
- Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders.
- An independent testing, adjusting, and balancing agency certified by the AABC or NEBB as a Test and Balance Engineer in those testing and balancing disciplines required for this project.

Workmanship and Installation Methods

- All work shall be installed in a first-class manner consistent with the best current practices.
- All piping shall be installed with slope for proper drainage shall be grouped together, and be parallel to each other. Utilize gang hangers wherever feasible. Group all valves together where feasible.

Cleaning and Protection

- Protect all materials and equipment during shipment and installation, and properly handle and store at the job site so as to prevent damage, and upon completion of this work, clean all fixtures and equipment and replace damaged parts.

Sleeves and Escutcheons

- Furnish and install in masonry walls and floors, galvanized steel sleeves as required. Provide escutcheons where sleeves and pipe penetrations are exposed to view.

Fire-safing

- At all sleeved walls and floors provide firesafe caulking, packing, blanket, for a completely tight system to prevent the passage of smoke and fire.

Operation Manuals and Maintenance Manuals:

- Refer to the contract's specifications for a complete outline of all requirements of operations and maintenance data.

Record Drawings and Control Documents

- Refer to the contract's specifications project record documents for a complete description of all requirements of recording as built record documents.

D40 FIRE PROTECTION

D4010 - Fire Suppression

General: All materials and equipment furnished under this Subcontract shall be new, unused, first quality of a manufacturer of established reputation. Each valve, fitting, section of pipe, piece of equipment shall have cast or indelibly stamped thereon the manufacturer's name, pressure rating where applicable. Drains and test connections shall be provided in the systems.

D4010.10 - Water-Based Fire Suppression

Sprinkler Piping

- Schedule 40 black steel pipe for 2 inch and smaller and Schedule 10 for 2-1/2 inch and larger. Piping for the dry system shall be galvanized.

Sprinkler Fittings

- Fittings on fire service piping, 2-1/2 inch and larger, shall be Victaulic Fire Lock Ductile Iron Fittings conforming to ASTM A-536 with integral grooved shoulder and back stop lugs and grooved ends for use with Style 009-EZ or Style 005 couplings. Branch line fittings shall be welded or shall be Victaulic 920/920N Mechanical Tees. Schedule 10 pipe shall be roll grooved. Schedule 40 pipe, where used with mechanical couplings, shall be roll grooved and shall be threaded where used with screwed fittings. Fittings for threaded piping shall be malleable iron screwed sprinkler fittings.

Sprinkler Joints

- Threaded pipe joints shall have an approved thread compound applied on male threads only. Teflon tape shall be used for threads on sprinkler heads. Joints on piping, 2-1/2 inch and larger, shall be made up with Victaulic, or equal, Fire Lock Style 005, rigid coupling of ductile iron and pressure responsive gasket system for wet sprinkler system as recommended by manufacturer.

Sprinklers

- Upright sprinkler heads in areas with no ceilings shall be Quick Response, upright natural bronze finish with cage guards.
- Sidewall heads shall be Quick Response with chrome plated head and escutcheon.
- Pendent wet sprinkler heads shall be Quick Response recessed adjustable escutcheon, bright chrome plated.
- Concealed heads shall be Quick Response concealed type, 1-1/2 inch adjustment white cover plate. In special areas, as may be noted on the Drawings, provide alternate cover plate finishes as selected by the Architect.

Double Check Valve Assembly

- Double check valve assembly shall be State approved, U.L./F.M. approved, with iron body bronze mounted construction complete with supervised OS & Y gate valves and test cocks. Double check valve assembly shall be Watts, Wilkins, Conbraco, or approved equal.

Fire Department Inlet

- 4 inch Storz type as required by the Local Fire Department.

Fire Pump System

- Furnish and install a complete UL listed and FM approved 1000 GPM fire pump system to satisfy the requirements of the main building standpipe system.

Based on new water flow tests conducted on 6/24/2021 the system will need

to take suction from water supply system. Workmanship and Installation Methods

- All work shall be installed in a first-class manner consistent with the best current practices.
- All piping shall be installed true to line and grade, shall be grouped together and shall be parallel to each other. Utilize gang hangers wherever feasible. Group all valves together where feasible.

Cleaning and Protection

- Protect all materials and equipment during shipment and installation, and properly handle and store at the job site so as to prevent damage, and upon completion of this work, clean all fixtures and equipment and replace damaged parts.

Testing

- Provide all NFPA required tests and certificates at project completion.

D50 ELECTRICAL

D5010 - Facility Power Generation

D5010.10 - Packaged Generator Assemblies

- An exterior, ground mounted, self-contained sound attenuated diesel emergency generator, as manufactured by Caterpillar, Cummins, or Kohler, rated at 1200kw 480/277V, 3 phase 4 wire will power the following:
 - Emergency/Life Safety: egress lighting and exit lighting in corridors, assembly areas, toilets, and stairwells.
 - Standby: Miscellaneous systems will include kitchen walk-in coolers and freezers, selected kitchen equipment, kitchen ventilation system, telephone system, security system, IT head-end, fire alarm system, one boiler, and associated circulator pump and controls.
- Fire Pump
- Domestic Water Booster.
- Fieldhouse, Kitchen and new Café HVAC, additional lighting, and receptacles.
- Separate automatic transfer switches will be provided for emergency and non-emergency standby loads. Automatic transfer switches shall be ASCO 7000 series, Russelectric RMTD series.
- Circuit breakers for emergency services shall be installed in barriered compartments on generator.
- Emergency feeders run outside two-hour electric rooms and shafts, and not under floor slab, will utilize MI Cables.
- A fully rated load bank breaker shall be provided to test the generator at full load.

Generator Control Panel

- Complete control operation of engine generator set. Panel to have automatic start control, AC voltmeter, AC ammeter, pointer type frequency meter, volt meter, ammeter and selector switch.

Automatic Transfer Switch

- Provide automatic transfer switches for operation on 277/480 volts, 3 phase, 4 wire operation. Unit to be housed in a NEMA 1 enclosure. Transfer switches shall be rated for minimum 65,000 amps. Entire switch shall be listed under UL 1008. Acceptable Manufacturers: Russ Electric RMTD (4 Pole), ASCO 7000 Series (with overlapping neutral contacts).

Remote Annunciator Panel

- Flush mounted panel shall include both audible and visual signals. Annunciator shall meet NFPA 110 Standards.
- Natural gas emergency generator will power emergency egress lighting and exit lighting in corridors, exterior egress entries, assembly areas, and stairwells. Additional equipment on standby will include Kitchen walk-in coolers and freezers, telephone system, security system, IT head-end, fire alarm system, heating equipment, and associated circulator pump and controls, building management system.
- In addition to the equipment and systems listed above, the following equipment and systems will be fed from the generator.
 - Additional lighting in kitchen and associated toilets and corridors.
 - HVAC ventilation and air conditioning equipment associated with the areas noted above.
 - Selected equipment.
- Emergency panels will be located in two-hour rated electric closet.
- Non-emergency (standby) loads will be located in separate closets via separate automatic transfer switch and panelboards.
- Emergency feeders run outside two-hour electric rooms and shafts will utilize MI cables.
- Provide a portable generator or hook-up connection to meet National Electric Code Article 700 requirements to have a portable generator available while servicing the building generator.

Photovoltaic System

- Distributed generation will be provided for a 249KW roof mounted photovoltaic (PV) installation on the roof area of building. The PV system shall include all system components to include panel clamp roof mounting system with ballasting, PV array, DC wiring, inverters, connections, AC wiring and conduits, net metering from the utility, 200A circuit breaker in main switchboard and energy monitoring hardware and software for a complete system.
- PV Provisions – Include provisions for PV breakers in switchboards and/or distribution equipment, space provisions for PV inverters, respective PV/utility metering and conduits from Main Electric Room to all PV roof locations including provisions for future PV locations on the roof.

D5020 - Electrical Service and Distribution

D5020.10 - Electrical Service

- Coordinate and cooperate with local Utility Company with respect to providing new primary and secondary service and metering. See allowances section for back charges by utility company with respect to permanent service.
- Provide all primary system raceways, elbows, pull wires and all pad grounding. Utility company will provide pad mounted transformer and primary conductors including making up of all terminations and connections.
- Provide secondary service complete including all conductors, raceways and connectors.
- Metering: All usage will be on one secondary meter. Utility Company will furnish current transformers and potential transformers to be installed in transformer.

Transformers

- Dry-type transformers shall be 480 volt, 3 phase, delta connected primary and 120/208 volt, 3 phase, 4 wire wye connected secondary with

grounded neutral. Transformers 75KVA and larger shall have minimum impedance of 4-1/2 percent. Transformers feeding panels with surge protection devices shall be K-13 rated.

- Provide grounding of separately derived systems in accordance with Code Article 250.
- Transformers shall be of same manufacturer as switchboard.

Switchboards

- Two Main building switchboards shall be constructed in accordance with UL 891 and ANSI standards and of the required number of vertical sections bolted together to form one metal enclosed rigid structure. The front shall be accessible. Buses shall be 100% rated copper.
 - Switchboard shall be arranged for operation as follows:
 - Voltage: 480Y/277 volts.
 - Frequency: 60 cycles.
 - Service: 3 phase, 4 wire, ampere capacity as indicated on drawings.
 - Neutral - full capacity
 - Available short circuit current at line terminals - 65,000 RMS amperes symmetrical.
 - Integrated equipment rating - 65,000 AIC.
 - Copper ground bus, full length.
 - UL service entrance label.
 - Surge protection.
 - Ground fault for feeder breakers.
 - Kirk key interlink
 - Fire pump tap of main circuit breaker

Arc Flash Maintenance System

- Each circuit breaker, 1,200-amp frame and above, shall include as part of the trip unit, Arc Flash Reduction Maintenance Technology, which shall reduce the trip system instantaneous pickup value when activated. The Arc Flash Maintenance System shall allow the operator to enable a maintenance mode which enables a preset accelerated instantaneous override trip to reduce arc flash energy. A blue LED on the trip unit shall indicate the trip unit is in the maintenance mode. The device must not compromise phase protection or defeat its functionality, even when enabled. Once disabled, the recalibration of phase protection must not be required.
- Activation and deactivation of reduced maintenance trip setting must be accomplished without opening the circuit breaker door and exposing operator to energized parts.
- Arc Flash Reduction System will also include a switchboard-mounted blue indicating light for visual indication that the Arc Flash Reduction System is activated. The light control voltage shall be an independent 9V DC or 120V AC source. A battery shall be included as backup.
- Arc Flash Reduction System switch will be located on the switchboard and include a lockable cover to avoid tampering. The switch must be rated and tested for milli-volt signals in harsh environments. The switch shall include an extra NO/NC contact for remote indication.
- Reduced maintenance trip setting must be adjustable with a minimum of five settings ranging from 2.5X to 10X of sensor tap value. The switch shall be maintained in the "Normal" and "Maintenance" positions.

Panelboards

- Panelboards shall be dead-front, door in door safety type equipped with single or multi-pole circuit breakers suitable for 120/208 volt or 277/480

volt, 3 phase, 4 wire operation.

- Buses shall be copper. Panelboards shall have a circuit directory card mounted in a frame with plastic cover on inside of door. Panelboards to have a copper ground bus with terminals for each circuit. Panelboards serving isolated ground receptacles shall have a separate ground bus for terminations of the isolated grounds. Isolated ground bus shall be mounted to the panel tub via non-conducting means with a separate grounding conductor run to the normal panel ground bus.
- Panelboards and distribution panels shall be of same manufacturer as switchboard.

Protection Devices

- Provide surge protection devices with ratings of 300,000 amperes on the secondary side of the main service overcurrent device and 120,000 amperes for 208/120V panelboards.

Existing Electric Service and Distribution

- Maintain existing electric service to existing building switchgear to maintain existing electrical system consisting of panelboards feeders, mechanical equipment feeds and branch circuits and all low voltage systems as required during construction and demolition.
- Coordinate with Eversource for relocation of any overhead poles and lines in conflict with new construction and scheduled demolition of the existing school building. Provide temporary relocated services to existing school during construction.
- All existing services shall be maintained for the complete operation of existing school building to be maintained until the scheduled date of demolition of the existing building. Upon substantial completion, coordinate with Eversource and include all work required for the removal of all existing utility services including all overhead and/or underground power, telephone, cable TV, and fire alarm services.
- Include the removal of all existing roadway, parking, and walkway lighting structures. At the scheduled time of final demolition of the existing building include disconnecting all services and making safe the existing structure for complete demolition.
- Include new feeders from existing sources to maintain existing equipment to remain under respective phases.
- Include relocation and extension of existing feeders to maintain existing equipment to remain under respective phases.
- Include removal of existing equipment, feeders, and branch circuitry to be demolished remain under respective phases.
- Protect existing equipment to be reused or to remain under respective phases.
- Any interruptions to all services, including low voltage systems, shall be scheduled with construction manager to avoid any impact to school operations.
- All additional circuit breakers, connections and pull boxes shall be provided from existing sources to maintain existing equipment to remain under respective phases.

Transient Voltage Surge Protective Device (TVSS/SPD)

- Provide UL listed Surge Protection Device (SPD) equipment, formerly referred to as Transient Voltage Surge Suppression (TVSS), having electrical characteristics, ratings, and modifications as specified herein and as shown on Drawings.
- SPD applications include distribution and branch locations, bus plugs, and switchboard assemblies. Branch panel located SPD shall be tested

and demonstrate they are suitable for ANSI/IEEE C62.41 Category C1 environments. Minimum total surge current 8 x 20 microsecond waveform that device is capable of withstanding shall be shown in following table:

<u>Application</u>	<u>Minimum Surge Current Per Mode *</u>
Service Entrance (Switchboards)	125 kA
Distribution Panelboards	80 kA
High Exposure Roof Top Locations	80 kA
Branch Locations (Panelboards, MCC's, Busway)	60 kA
* L-L, L-G, L-N and N-G (WYE system)	

Switchboard Requirements

- Service entrance SPD shall be tested and suitable for ANSI/IEEE C62.41 Category C environments.
- Service entrance suppression shall be installed within switchboards by switchboard manufacturer.

Short Circuit Protection and Coordination Study and Arc Flash Analysis

- Provide overcurrent device time-current coordination analysis to determine appropriate ampere ratings and settings for overcurrent protective devices to effect time and current coordination among devices, for maximum system protection and electrical service continuity.
- Short circuit study shall include:
 - Power company's system characteristics.
 - Base quantities selected.
 - Impedance source data.
 - Calculation method and tabulations.
 - One line diagrams and impedance diagram.
 - Conclusion and recommendations.
- Arc Flash Hazard Analysis shall be performed according to IEEE 1584 equations that are presented in NFPA 70E-2004, Annex D. Include labeling of all equipment and presentation/training of Owner's representative.
- Flash protection boundary and incident energy shall be calculated at all significant locations in electrical distribution system (switchboards, distribution panels, panelboards, disconnects, MCC's, VFD's, and UPS) where work could be performed on energized parts.
- Arc Flash Hazard Analysis shall include all significant locations in 208V systems fed from transformers equal to or greater than 112.5kVA where work could be performed on energized parts.
- Electrical vehicle service equipment (EVSE) will be provided consisting of exterior 75kva transformers and panel boards mounted in NEMA3R enclosures serving 2 dual-charger charging stations each in a total of 5 locations. shall be located at Provide 2 EVSE locations at Athletics Building and 3 EVSE locations School Building.

D5030 - General Purpose Electrical Power

D5030.10 - Branch Wiring System

Raceways and Enclosures

- No raceway shall be used smaller than 3/4 inch diameter and shall have no more than four 90° bends in any one run, and where necessary, pull boxes shall be provided. Only rigid metal conduit or intermediate metal conduit is allowed for in-slab work. Cable systems, if allowed to be used by other sections of this specification, shall not be used exposed or in slabs, whether listed by "UL" for such use or not.

- Rigid metal conduit may be used for service work, exterior work, slab work, and below grade level slab, wet locations, and in penthouse for drops down to equipment from elevations above eight feet and also where raceway may be subject to mechanical damage.
- Electrical Metallic Tubing (EMT), may be used in masonry block walls, stud partitions, above furred ceilings, where exposed but not subject to mechanical damage, and shall be used for fire alarm work.
- Surface metal raceways shall be used where raceways cannot be run concealed. There shall be no surface mounted raceways without the acceptance of the Architect.
- Flexible metal conduit shall be used for final connections to recessed lighting fixtures from above ceiling junction boxes and for final flexible connections to motors and other rotating or vibrating equipment. Liquid tight flexible metal conduit shall be used for the above connections which are located in moist locations. All flexible connections shall include an insulated grounding conductor.
- Rigid non-metallic conduit may be used for underground electric and telephone services outside the foundation wall and shall be polyvinyl chloride (PVC) schedule 40, 90°C.
- PVC Schedule 40 may also be used for below slab circuits within building confines and site lighting branch circuits. Below slab rigid non-metallic conduits do not require concrete encasement. Rigid non-metallic conduits shall not be used for exterior feeders, in slabs, nor for elbows which penetrate slabs. Raceways and fittings shall be produced by same manufacturer.
 - Acceptable manufacturers: Pittsburgh Standard Conduit Company, Republic Steel and Tube, Youngstown Sheet and Tube Company, Carlon, or equal.

Outlets, Pull and Junction Boxes

- Outlets: Each outlet in wiring or raceway systems shall be provided with an outlet box to suit conditions encountered. Boxes installed in normally wet locations or surface mounted shall be of the cast-metal type having hubs. Concealed boxes shall be cadmium plated or zinc coated sheet metal type. Old work boxes with Madison clamps not allowed in new construction. Through-the-wall boxes are not permitted.
 - Acceptable manufacturers: Appleton, Crouse Hinds, Steel City, RACO, or equal

Pull and Junction Boxes

- Provide where necessary to terminate, tap off, or redirect multiple raceway runs or to facilitate conductor installation, provide appropriately designed boxes. Boxes shall be fabricated from code gauge steel assembled with corrosion resistant machine screws. Box size shall be as required by Code.
 - Acceptable Manufacturers: Brasch, Hoffman, Keystone, Lee Products Co., McKinsty Inc., Eldon Inc., or equal.

Floor Outlets (Flush Type)

- All flush floor outlets shall be Steel City 640 or 840 series cast iron, watertight type. The 640 series shall be used generally, and the 840 series used where shallow depth is required.
- Whenever floor outlets for different services are indicated in the same location, they shall be ganged together.
- Covers shall be brass series P64. Duplex receptacle covers shall be lift lid type P64DS. Low tension covers shall be series P64-3/4-2 with 3/4" diameter and 2" diameter plugs. Flush floor outlets located in carpeted

areas shall be provided with P64-CP carpet plates of the number of gangs required.

Wiring Devices

- Receptacles: Receptacles shall be flush mounted. All standard 20 ampere devices to be of same manufacturer.
- Acceptable Manufacturers:
 - Arrow Hart, Hubbell, or Leviton.
- Composition material of wiring devices to be nylon.
- Cover plates: Nylon.
- Provide gaskets on all wiring device plates where devices are on walls separating conditioned and non-conditioned spaces.

Dimmer Controls

- All devices shall be UL listed specifically for the required loads (i.e., LED).

Conductors

- All conductors shall be a minimum size of #12 AWG except for control wiring and fire alarm wiring where #14 AWG may be used. Exit sign circuits, emergency circuits, exterior lighting circuits, and where distance from panel board to first outlet exceeds 80' feet for 120 volts and 150 feet for 277 volts, #10 AWG shall be minimum size wire allowed. All feeder and branch circuit conductor shall be color coded as follows:
 - 208Y/120V Phase A Black
 - 208Y/120V Phase B Red
 - 208Y/120V Phase C Blue
 - 480Y/277V Phase A Brown
 - 480Y/277V Phase B Orange
 - 480Y/277V Phase C Yellow
 - Grounded Conductor
 - 120/208 White
 - 277/480 Grey
 - Equipment Ground
 - 120/208 Green
 - 277/480 Green with Yellow Trace
- All conductors not installed in accordance with color scheme shall be replaced. All conductors larger than #6 AWG must be identified with colored tape.
- Connections throughout the entire job shall be made with solderless type devices. For #10 AWG and smaller: spring type. For #8 AWG and larger: circumferential compression type.
- Acceptable manufacturers: 3M "Scotchlock", IDEAL "Wingnut", BURNDY, MAC, or equal.
- Any splices made up in ground mounted pull boxes shall be resin cast waterproof type or waterproof pressure type, as manufactured by King Technology, St. Louis, MO.
- Conductors shall be copper, soft drawn, and annealed of 98% conductivity. Conductors larger than #10 AWG shall be stranded; #10 AWG and smaller shall be solid. Conductors shall be insulated for 600 volts and be of following types:
- All conductors shall have heat/moisture resistant thermoplastic insulation type THWN-1 (75°C) except as follows:
 - In sizes #1 AWG and larger: Crosslinked polyethylene insulation type XHHW (75°C - 90°C) may be used.
 - Fire alarm system conductors shall be #14 AWG, type THHN, solid. Color coding of fire alarm conductors shall be in

accordance with fire codes.

- Fixture whips #16AWG type "SF".
- Stranded conductors for all wiring systems except fire alarm will be allowed if installed and terminated as specified under Execution Section.
- Mineral-Insulated Metal-Sheathed Fire-Resistive Cables (Type MI) - Cables shall consist of a factory assembly of one or more solid copper conductors insulated with highly-compressed magnesium oxide and enclosed in a seamless, liquid-and-gas-tight continuous copper sheath. Cables shall be rated for 600 volts and less. Cables shall comply with Article 330 of the National Electrical Code. Cables shall be classified by Underwriters Laboratories, Inc. as having a 2-hour fire resistive rating. Cable terminations shall be made with UL listed mineral-insulated cable fittings. Approved Manufacturer - Pyrotenax USA, Inc., or equal.
- Type MC cable may be used for concealed branch circuits and fire alarm in hollow spaces where allowed by code if installed and terminated as specified under Execution Section. Armor to be galvanized steel and shall be UL listed for two-hour through-wall fire penetration.
- Acceptable manufacturers: AFC Cable Systems, American Wire & Cable, Cerro, Cornish, Crescent, General Cable, or Okonite.

D5030.90 - General Purpose Electrical Power Supplementary Components
Motors

- Each motor shall have disconnect switch and starter provided under this section. Starters which are a part of "factory assembled" control panel will be provided under section supplying equipment to be controlled but connected under this section. Provide motor terminal boxes for each motor not furnished with same.

Disconnect Switches

- Disconnect (safety) switches shall conform to industrial standards of NEMA, be UL listed and shall be heavy duty type, quick-make, quick-break type with interlocking cover mechanism and provisions for padlocking switch handle in "OFF" position. Three pole toggle switches are not acceptable as substitute for disconnect switches.
- Acceptable Manufacturers: General Electric, Westinghouse, Square D/Groupe Schneider, Siemens, or Allen Bradley.

Fuses

- Provide a complete set of fuses for each item of fusible type equipment. Fusible equipment furnished by other contractors will be complete with fuses, unless noted otherwise on electrical drawings.
- Acceptable Manufacturers: Bussmann, Division of McGraw, Gould/Shawmut, or GEC-ALSTHOM.

Dual Technology Ceiling Occupancy Sensors

- Dual technology occupancy sensors shall be capable of detecting occupants within the coverage area designated via detection of a doppler shift in the transmitted ultrasonic sound wave and a change in the infrared heat present. Major motion and minor motion shall cause the controlled load to switch to the "ON" mode.
- The dual technology passive infrared sensor shall use a multi-level 100 segment Fresnel lens and four pyroelectric detectors to insure adequate PIR coverage of the intended area.
- Dual technology sensors shall have an override to "ON" bypass logic key in the event of sensor failure.
- Sensors are to be ceiling mounted using a back mounting plate and

standard electrical outlet boxes.

- Dual technology sensors shall cover up to 2000 sq. ft. for walking motion, with a field of view of 360 degrees.
- Dual technology sensors shall be compatible with electronic ballasts, compact fluorescent, and inductive loads.

Access Panels

- Provide access panels for access to concealed junction boxes and to other concealed parts of system that require accessibility for operation and maintenance. In general, electrical work shall be laid out so access panels are not required.
- Access panels shall be prime painted and equipped with screwdriver operated cam locks.
- Acceptable manufacturers: Inland Steel Products Company - Milcor, Miami Carey, Walsh-Hannon-Gladwin, Inc. - Way Locator, Or Equal Sleeves, Inserts, and Openings
- Provide sleeves of proper sizes for all openings required in concrete floors and walls. Sleeves passing through floors shall be set with top of sleeve 1 inch above finished floor. Core drilling will also be acceptable if in accordance with any structural standards. Any unsleeved openings shall be waterproofed.
- Ground System – All equipment and systems shall be grounded. Refer especially to NEC Section 250 Requiring Connections to Building Steel, Foundation, Water Service, and Interior Piping. Provide transformer pad grounding to be in accordance with utility company standards.

D5040 – Lighting

- Provide luminaires complete with LED's, drivers, ballasts, and other devices as required for a complete installation. Furnish Ceiling Subcontractor with instructions concerning openings necessary, and provide frames for NEMA standard ceiling types or special mounting frames, as may be required. Luminaires shall be supported independently of hung ceiling construction.
- LED, light-emitting diode light sources shall have an output of 50,000 hours of operation at not less than 70% of the initial lumen output. LED drivers shall have total harmonic distortion of not more than 10%.
- Provide universal arrows on all exit signs.
- Pendant mounted luminaires shall be suspended by means of air craft cable with aligner and canopy in finished areas.
- USGBC – LEED Version 4.1 compliance will include provisions for PV installations. High efficiency lighting systems throughout building. Lighting controls including low voltage controls for common areas, occupancy/vacancy sensors, and photocells for daylight harvesting.
- Provide fully integrated Theatrical Lighting system with theatrical luminaires in the Auditorium.

D5040.10 Lighting Control

- A low voltage lighting control system will be provided for common areas such as corridors, Cafe, Fieldhouse, and other areas not controlled by vacancy/ occupancy sensors. Local low voltage override switches will be provided. Manufacturers include Wattstopper, Lutron Vive and Cooper Wavelinx.
- Vacancy/Occupancy sensors will control lighting in the majority of spaces including classrooms, offices, and utility type spaces.
- Classrooms will have 4 zones of lighting control for enhanced educational atmosphere. Scenes will include general, focused,

- presentation and programable additional scene.
- Daylight harvesting will be employed Gymnasium, Café, Media Center, Stairwells, Offices, and other spaces with substantial day lighting.
- Vacancy sensors will be employed in corridors using long range infrared sensors (approximately 90-foot range) to turn off two of every three corridor luminaires. The remaining luminaires will be wired to the emergency system, and key switched with listed emergency bypass relays.

D5040.20 Theatrical Lighting Control

- Provide a complete, fully functional theatrical lighting control and rigging system. Furnish and installation of stage lighting rigging equipment in the Auditorium.

Connector Strips

- Provide connector strips with 20A, 30A, 50A, 60A, and 100A devices in either flush mount or pigtail. Pigtails shall be three wire type SOW rubber jacketed cable sized for the circuit ampacity. Internal wiring of the connector strip shall be sized to the circuit ampacity and shall be rated at 125 degrees. Terminations shall be at one end of the connector strip using feed through terminal blocks. Terminal blocks shall be molded barrier type with screw lugs suitable for connecting multiconductor feed cable or incoming wire. These shall be located in an extended terminal box of appropriate length when the strip contains more than twenty-20A circuits. Terminal blocks can accept up to #8-gauge wire. Connector Strips shall be fabricated from extruded aluminum exceeding UL 1573 standards, 3.375 inch wide by 4.75 inch high in cross section and in the lengths specified furnished with an electrostatic paint finish in black and custom colors shall be available. Connector Strips are shipped fully wired with all section splicing hardware included. Connector Strip housing shall be inherently rustproof with circuits shall be labeled on one side of the connector strip with 2 inch high die-cut white lettering.

Cable Management

- Provide cable management system with CMS Pantograph assembly shall consist of an extruded aluminum wireway, CMS-1 6.605 inch wide by 1.450 inch high in cross section containing five cable compartments. CMS-II 2.882 inch wide by 1.450 inch high in cross section containing two cable compartments. The length of each section to be specified based on the distance between stage lighting pick up cables and maximum actual travel. The CMS shall raise and lower the enclosed electrical cable as it travels with the battens. The CMS shall provide a permanent electrical connection for the lighting system circuits. The CMS shall be installed between stage lighting lift lines and in such a way as to prevent electrical cables from fouling with other hoisting components or mechanism. The CMS unit housing shall have an electrostatic paint finish in black. CMS aluminum wireway shall have a uniform minimum wall thickness of .094. CMS housing shall be inherently rustproof. Festoon cable shall be 12 or 10 AWG annealed stranded bare copper insulated with flame-retardant Polyvinyl Chloride (PVC) and provided in the specified number of conductors. CMS units shall contain electrically

insulated, adjustable pressure pad strain relief devices to hold all cable securely in place. CMS unit shall be provided with two PMB1 pipe clamp mounting devices for attachment to 1-1/2 inch pipe (2 inch OD). Each CMS hinge section to be provided with a pair of 7 gauge hinge arms and grade 8 attachment hardware. Unistrut P1001 horizontal stabilization track to be supplied in the specified length. One P2950 trolley and PTB1 mounting bracket shall be provided with unit to attach extruded aluminum wireway to P1001. One P2949 trolley and PCB1 bracket shall be provided with unit to manage excess cable. Two P1001 end stop plates to be provided to prevent the P2950 trolley from exiting the P1001 track. Provide units in lengths and quantities as shown on drawings. Travel length to accommodate steel height and full travel of system. Provide appropriate junction boxes for each end of CMS system.

D5040.30 Theatrical Power Control

Power Control Equipment and Processors

- The control enclosure shall be the Unison ERn Series Control Enclosure as manufactured by Electronic Theatre Controls, Inc., or equal. The External processing enclosure shall be a surface mounted panel constructed of 18 gauge formed steel panels with a hinged, lockable full-height door containing an integral electrostatic air filter. Enclosures shall be convection cooled without the use of fans. The Control Enclosure for a single control processor (ERn2) shall support a single Station Power Supply module; The Control Enclosure for two control processors (ERn4) shall support a quantity of two modules. Exterior surfaces shall be finished in fine textured, scratch resistant, powder-based epoxy paint. Rack-mounted version shall have an independent enclosure suspension kit, with a full height, locking door/cover attached to the kit. Rack-mounted version shall have an opening to access the control module face panel, and openings to view indicators on option modules. Enclosure(s) shall also be available in a 19-inch rack mounted (RM) version.
- The Control Enclosure shall support an optional five-port Ethernet Switch, with at least 4 ports supplying Power over Ethernet (PoE). The Ethernet Switch module shall be 100BaseTX, auto MDI/MDIX, 802.3af PSE compliant. The Ethernet Switch module shall contain power, status, and activity indicators. All indicators shall be visible when the enclosure door is open for both rack and wall mounted Ern.
- The Control Enclosure shall support redundant power supply which shall automatically provide power to the control electronics upon failure or removal of the primary power supply. The Control Enclosure shall support an optional module to expand the station bus length an additional 400 meters, and the station count an additional 30 stations (60 maximum per processor/enclosure).
- External Processing enclosures shall be completely pre-wired by the manufacturer. The contractor shall provide input and control wiring and support all industry standard wiring methods including DMX512, Ethernet, UTP and RS232.
- The installation rack shall be the Sensor3 120V as manufactured by Electronic Theatre Controls, Inc., or equal. The Power Control System enclosure shall consist of up to 48 module spaces. The modules shall be Sensor3 ThruPower modules as manufactured by Electronic Theatre Controls, Inc., or equal. Sensor modules shall be designed for complete flexibility of choice for dimmed, non-dim, or hot power on each 20A branch circuit.

Intelligent Circuit Breaker Panels

- Intelligent breaker system shall be 120V as manufactured by Electronic Theatre Controls, Inc., or equal. Breaker Panels shall be UL508, UL67, and UL924 Listed and shall be so labeled when delivered. Breaker shall be UL489 listed and shall be labeled when delivered. Breaker Panels shall consist of a main enclosure with 12, 24, or 48 pole breaker subpanels, integral control electronics for low voltage terminations and provision for accessory cards.

Lighting Control Console

- The lighting control console shall be a microprocessor-based system specifically designed to provide complete control of stage, studio, and entertainment lighting systems. The console shall be the Ion Xe 20 with 1 – 22 inch touch screen and 1 - 22 inch LCD monitor as manufactured by Electronic Theatre Controls, Inc. The console shall be capable of touch screen monitor operation. The system shall provide control of either 2,048 or 12,288 outputs on a maximum of 32,768 control channels, which may be any number from 1 to 99,999. Systems that require external co-processing to control 12,288 outputs shall not be acceptable. Output shall be distributed over a 10/100 MB Ethernet network using Net3/ACN, ETCNet2, Avab and/or Artnet (multi-cast) protocols. The user shall be able to control the application of protocols at an individual address level. The system shall support full bi-directional RDM communication with compatible devices via Net3 DMX/RDM Gateways. RDM communication shall adhere to ANSI standard E1.20-2006 Entertainment Technology – RDM – Remote Device Management Over DMX512 Networks.

Remote Plug-In Stations

- The Remote Plug-in Stations shall consist of the appropriate connectors required for the system in use. These stations shall be available with DMX input or output, Remote Focus Unit, Network, or architectural control connectors. Custom control connectors shall be available.

Touch Screen Control Stations

- The Touchscreen Control Stations shall be the Unison Paradigm Touchscreen P-TS7 Series Control Stations as manufactured by ETC, Inc., or equal. The Lighting Control Stations shall be the Unison Heritage UH Series Control Stations as manufactured by Electronic Theatre Controls, Inc., or equal.

Stage Lighting Fixtures

- All stage lighting fixtures shall be a color-mixing high-intensity LED illuminator with DMX control of intensity and color and be provided with a C-clamp, a color frame, safety cable with spring clip, 36 inch 3-wire leads in black sleeving, and a 20A grounded stage pin connector installed. The fixture shall be a Source Four LED Series 2 as manufactured by Electronic Theatre Controls, Inc. or approved equal. All LED fixtures shall be provided by a single manufacturer to ensure compatibility. The fixture shall be UL 1573 listed for stage and studio use. The fixture shall comply with the USITT DMX-512A standard.
- The stage lighting instrument shall be a Source Four ellipsoidal spotlight as manufactured by Electronic Theatre Controls, Inc., or Shakespeare by Altman Stage lighting. The unit shall be constructed of rugged, die cast aluminum, free of burrs and pits, finished in black, high temperature epoxy paint. Tools shall not be required for either lamp alignment or cleaning the reflector or lens.

- The color mixing LED wash fixture shall be Red, Green, Blue, and White LED luminaire with motorized zoom and DMX control. The fixture shall be the AP-150 RGBW by Altman Stage Lighting, Inc. or approved equal.
- Provide the following Stage Lighting Fixtures with C-Clamp, Male 20 amp Stage Pin plug installed, Black Safety Cable, and 575 watt 115V lamp for all tungsten units. Provide the following LED Stage Lighting Fixtures with C-clamp, Male Edison plug installed, Black Safety Cable, 5 foot DMX Cable and 5 foot Powercon Extension Cable.

Theatrical Lighting Fixtures

- a. Six: ETC S4 LED Series 2 Lustr with Shutter Barrel includes C-Clamp, Soft Diffuser in A Size Holder and PC to Edison cable.
 - b. Six: ETC 70° Lens Tube
 - c. 28: ETC S4 LED Series 2 Lustr with Shutter Barrel includes C-Clamp, Soft Diffuser in A Size Holder and PC to Edison cable.
 - d. 28: ETC 50° LED Specific Lens Tube
 - e. 14: ETC S4 LED Series 2 Lustr with Shutter Barrel includes C-Clamp, Soft Diffuser in A Size Holder and PC to Edison cable.
 - f. 14: ETC 36° Enhanced Definition Lens Tube
 - g. 14: ETC S4 LED Series 2 Lustr with Shutter Barrel includes C-Clamp, Soft Diffuser in A Size Holder and PC to Edison cable.
 - h. 14: ETC 26° Enhanced Definition Lens Tube.
 - i. Six: ETC S4 LED Series 2 Lustr with Shutter Barrel includes C-Clamp, Soft Diffuser in A Size Holder and PC to Edison cable.
 - j. Six: ETC 19° Enhanced Definition Lens Tube.
 - k. Seven: ETC Source 4 36° Ellipsoidal includes C-Clamp and Color Frame with Stage Pin installed.
 - l. 12: ETC Source 4 26° Ellipsoidal includes C-Clamp and Color Frame with Stage Pin installed.
 - m. 12: Altman Pegasus 6 inch LED Fresnel includes C-Clamp, Safety Cable, Color Frame and PC to Edison cable.
 - n. 12: Barn Door for 6 inch Fresnel.
 - o. 24: Altman Siren AP-150 RGBW Par with Motorized Zoom includes PC to Edison.
 - p. Seven: Altman Spectra Cyc 200 includes Safety Cable and PC to Edison cable
 - q. Seven: Altman Spectra Cyc Yoke with Hardware includes C-Clamp.
- Stage Work Lights

- a. Six: Altman 130w LED Work Light includes C-Clamp, Safety Cable and Diffusion Filter Frame.
- Follow Spots - Manual
- a. Two: Altman Siren AFS-700 Follow Spot with Tripod Stand includes PC to Edison.
- Accessories
- a. 20: B Size Pattern Holders.
- b. 20: A Size Pattern Holders
- c. 20: S4 Top Hat
- d. 20: S4 Half Top Hat
- e. 20: Donut for S4
- f. 30: S4 Ellipsoidal Color Frames (Spare)
- g. 18: S4 70° and 6 inch Fresnel Color Frames (Spare)
- h. 30: Black Theatrical Safety Cable
- i. 15: Black C-Clamp
- j. 16: City Theatrical Safer Side Arm
- k. Four: SSRC 50lb Boom Base
- l. Four: 12FT Pipe Threaded Both Ends, Painted Black
- m. Four: 4 Rung Light Ladder
- n. One: Black Tie Line
- o. One: DMX Diagnostic Tool
- p. Four: HPL 575w 115v Stage Studio Lamp
- Cables
- a. 10: DMX Cable 5 feet
- b. 50: DMX Cable 10 feet
- c. 10: DMX Cable 15 feet
- d. Four: DMX Cable 25 feet
- e. Four: DMX Cable 50 feet
- f. Two: DMX Cable 75 feet
- g. 10: DMX Terminator five-pin

- h. 10: Powercon Extension 5 feet
- i. 30: Powercon Extension 10 feet
- j. 10: Powercon Extension 15 feet
- k. Four: Powercon Extension 25 feet
- l. Four: Powercon Extension 50 feet
- m. 10: Powercon Coupler
- n. 10: Edison M to 2P&G F Adapter
- o. 10: Edison F to 2P&G M Adapter
- p. 30: Edison Extension 5 feet
- q. 20: Edison Extension 10 feet
- r. 10: Edison Extension 15 feet
- s. 10: Edison Extension 25 feet
- t. Five: Edison Extension 50 feet
- u. Six: Edison Twofers
- v. 10: Stage Pin Extension 5 feet
- w. Six: Stage Pin Extension 10 feet
- x. Four: Stage Pin Extension 15 feet
- y. Two: Stage Pin Extension 25 feet
- z. Four: Stage Pin Twofer
- aa. Four: Multi Pin Cable 10 feet
- bb. Four: Multi Pin Cable 25 feet
- cc. Four: Multi Pin Break Out Edison - 6 feet
- dd. Four: Multi Pin Break Out Edison - 6 feet Staggered

Installation

- Hang, DMX address, patch and focus the stage lighting fixtures according to light plot provided by the Theatrical Lighting Contractor. attach safety cable to all fixtures.

Lighting Hoists and Controls

- Prodigy Low Profile Hoist, as manufactured by Electronic Theatre Controls (ETC), shall be purpose-designed, and fabricated for overhead lifting. Each wire rope lift line shall adhere to a design factor of 10:1 with an ultimate strength of 4200 pounds. All load path components between

the building structure and the batten shall exceed the breaking strength of the wire rope. The motor brake shall be rated at least at 150% of the motor torque. The entire hoisting system shall be operated by an ETC rigging control system. Hoist controller to have a handheld remote control with minimum 30 foot tether. It shall be purpose-designed and fabricated to manage and operate hoists specifically designed for overhead lifting. The controller shall be capable to control up to three hoists. The controller shall provide two connections for hoist communication, supplying up to three hoists per connection.

Remote-Control Follow Spot Luminaires and Controls

- Remote controlled follow spot system shall consist of a software package to provide manual remote control to track targets and follow spot the target with industry standard moving light fixtures with use of a single camera feed. System shall be compatible with lighting consoles from manufacturers ETC, High End and MA Lighting.
- Provide (2) remote controlled follow spot fixtures with a high intensity white light fixture with Cyan, Magenta, Yellow and CTO subtractive color mixing as well as framing shutters. The fixture shall be a SolaFrame 750 by High End Systems or approved equivalent. All LED moving light fixtures shall be provided by a single manufacturer to ensure compatibility. The fixture shall be UL 1573 listed for stage and studio use and comply with EN60598-2-17 standard per CE certification. The fixture shall comply with the USITT DMX-512A standard.

D60 – COMMUNICATIONS

- Telephone system wiring will be provided by the ITS Contractor. Data system outlets and interconnecting wiring will be provided by the ITS Contractor. Instructional audiovisual system outlets and interconnecting wiring will be provided by the ITS Contractor.
- For each telephone outlet or data outlet, and instructional audiovisual outlet indicated on the drawings, provide a 4" square flush outlet box with plaster ring and a 1-1/4" raceway stubup terminating with bushing to above nearest accessible hung ceiling.

D6010 - Data Communications

Structured Cabling System

- Category 6e Data and Voice Station Cabling to all equipment requiring data and voice connectivity, including but not limited to data outlets, voice outlets, video surveillance cameras, access control network connections, and other equipment specified in related sections
- Fiber Station Cabling to fiber outlets
- Category 5e Voice Riser Backbone Cabling
- Category 6e RJ-45 Style Data Jacks
- Category 6e RJ-45 Style Voice Jacks
- Category 6e RJ-45/110 Style Voice and Data Patch Panels
- Category 6e Patch Cords
- Fiber Optic Cabling – 50-Micron OM-4 Multimode and OS-2 Singlemode
- Technology Outlet Faceplates
- Category 5e 110-style Voice Termination Blocks
- Equipment Racks
- Horizontal Cable Managers
- Vertical Cable Managers

- Cabling Distribution Support
 - Testing and Certification
- Data Communication System

D6020 – IPTV and Video on Demand System (FF&E)

- IPTV and Video on Demand System and Digital Messaging System and Displays
- Gymnasium, Commons, Library Audio-Visual Systems
- Programming, Integration and Configuration
- Testing and Certification

D6030 – Large Venue Audiovisual Systems

- Large Venue Sound Reinforcement Systems: Auditorium, Gymnasium, Student Commons, and Learning Commons Audio-Visual Systems
- Large Venue Video Presentation Systems: Auditorium, Cafeteria

D6040 – Classroom Speech Reinforcement Systems

- Classroom Speech Reinforcement Audio System Ceiling Speaker/Amp/Wireless Receiver
- Classroom Speech Reinforcement Audio System Desktop Media Connector
- Wireless Teacher and student microphones and chargers

D6040 – Interactive Flat Panel Display Systems (FF&E)

- Interactive Flat Panel Display with Wall Mount and PC module

D6060 - Distributed Communication System

- Public Address System Head End
- Corridor, Office, Classroom, Gathering Area Speakers, Bus Drop-off Area
- Interface to Clock System
- Programming, Integration and Configuration
- UPS

D6070 - Clock System

- Master Clock System Head End
- Office, Classroom, Gathering Area Secondary Clocks (12" and 16")
- Wire Guards
- Interface to Public Address System
- Programming, Integration and Configuration
- UPS

D70 – INTEGRATED ELECTRONIC SECURITY

D7010 Integrated Electronic Security

D7010.10 – Access Control

In accordance with MGL c.30, s-39M, after reasonable investigation in consideration of the compatibility between new and existing system components, the continuation of the existing high level of security, the Awarding Authority has concluded that, for sound rationale in the public interests, the system shall be a proprietary access control system by Genetec Inc.

System Cabling

- Provide and terminate all cabling per manufacturers recommendations for a completely operational system as specified.
- Provide & terminate all cabling as required for a completely operational Access Control System as required by equipment manufacturer.
- CR = Door Reader Device; provide CR, provide and terminate cabling

to associated ACC. The cable requirements of the card reader shall be a minimum five (5) conductor, 22 AWG, stranded cable with overall shield (for a Wiegand protocol interface). A six (6) conductor cable is required when controlling the red and green LED individually. A seven (7) conductor cable is required when both the red and green LED's are controlled by the Host. A 22 AWG twisted pair, shielded, stranded cable is required for use of the tamper switch. The card reader shall be provided with a 10 wire pigtail connector.

- DC = Door Contacts (recessed in door/frame); DC furnished, installed and wired by systems integrator, provide & terminate cabling to associated ALM (Alarm Line Module).
- ACC = Access Control System Controller.
- ACS = PC & Monitor for Access Control System.
- CCTV System interface
- Intrusion Detection System interface
- Fire Alarm System interface.

Provide and terminate cabling between applicable electronic door lock power supplies and the fire alarm system headend. Terminations to fire alarm control panel by fire alarm contractor.

Provide and terminate cabling between access control system head end and the fire alarm system head end. Terminations to fire alarm control panel by fire alarm contractor.

Provide and terminate cabling between access control system head end and the CCTV Video Surveillance system head end.

Provide and terminate cabling between access control system head end and the Intrusion Detection system main control panel.

Access Control System Hardware

Access Control Server

- Provide an access control server. Provide UPS as specified elsewhere in the specification.

Security Control Workstation (Client)

- Provide security workstations and provide a UPS with battery backup for 10 minutes for each workstation. The security control workstation shall be used for the USP. Each workstation CPU shall be rack mounted in the MDF. Provide KVM extenders as shown below for all monitors, keyboards and mice.

Photo Badging Workstation

- Provide a photo badging workstation for photo badge creation and printing. Provide a UPS with battery backup for 10 minutes for each workstation.

Photo Badge Printer

- Provide a single sided color photo badge printer.

System Setup Workstation

- Provide a rack mounted workstation to configure and manage all servers.

KVM Extender

- Provide CAT5 KVM extenders as required for each security workstation so all monitors, computer keyboards and computer mice can be used at each security workstation symbol as shown on the drawings.

Prox readers, Cards/Fobs

- Provide proximity readers as shown on plans

- Provide proximity cards/fobs

Programming, Integration and Configuration

UPS

- Provide

Reader and Input/Output (I/O) Control Panels

- The control panels include but not limited to card reader modules, input modules, output modules, power supply, harnesses, and batteries. Provide quantities as required for a complete working system. Each module card shall be neatly installed in a locked wall cabinet. Enclosures shall be located in each IDF/MDF or as shown on the drawings. Each controller shall be connected to the security network switch. Provide Hoffman enclosures or approved equal.
- Provide HID VertX series or approved equal. Provide with wall mounted cabinet and locking front door equal to Hoffman.

Combination Card Reader and Keypad

- Provide contactless smart card readers with keypad as shown on the drawings.

Card Readers

- Provide contactless smart card readers as shown on the drawings.
- Provide HID R40 iClass readers.
- Contactless Printable Smart Cards
- The smart card shall be 13.56MHZ and shall be an iClass card manufactured by HID Corporation or approved equal.

UPS Units

- Furnish and install UPS units for the complete Integrated Security systems as specified herein. UPS units shall be sized to support all equipment as specified herein for a minimum of 15 minutes. Provide calculations as required.
- Each UPS units shall be located in the MDF room and IDF closets.
- Provide APC SMART-UPS series or approved equal.

D7010.20 – Video Entry System

Aiphone IX Series IP Based (CAT-5e/CAT-6) system

- The system is a combination audio and video intercom system. Intercom stations and intercom master stations shall be audio and video intercom system.
- The system shall include indoor IX-MV master stations, VMS, as shown on the plans, IX-DVF outdoor wp stations, VES, as indicated on drawings. Connect to the security PoE switches furnished under this section.
- Acceptable Manufacturers: Must be equal in performance to the specified system: Aiphone IX Series, DSX, or equal

D7010.30 – Intrusion Detection

- Main Control Panel
- Door Contacts, Motion Sensors
- Keypads
- Programming, Integration and Configuration

Door Contacts

- Furnish and install 3/4 in. recessed magnetic door contacts as shown on the drawings.
- Provide Sentrol/GE 1078C or equal unless noted below.
- Request-to-exit devices
- Furnished by hardware doors will have integral request-to-exit switches as required. Coordinate with door hardware.
- Provide DS 150i or approved equal with trim plate.
Electric strike/magnetic locks power supply
- Furnished by hardware installed and wired by Electrical Contractor.
Security Interface by IESS Contractor.
- Fire Alarm interface by Electrical Contractor.
- Provide coordination with door hardware contractor.
- Power supplies shall be interfaced to the fire alarm system as required.
- Locking Devices (Electric strike/Magnetic locks/Electric locks/Electric Hinges locking hardware power supplies)
- Furnished and installed by others. Wired by security contractor.
- Beacons
- Provide blue security beacons as shown on the drawings. The unit shall wall or ceilings mount. The unit shall be 12/24 VDC and wired to the security management system.
- UPS Units
- Furnish and install UPS units for the complete Integrated Security systems as specified herein. UPS units shall be sized to support all equipment as specified herein for a minimum of 15 minutes. Provide calculations as required.
- Each UPS units shall be located in the MDF room and IDF closets.
- Provide APC SMART-UPS series or approved equal.
Intrusion Detection Control Panel
- Provide an intrusion system as required and as shown on the plans. The cost of monitoring the facility at a UL listed central station shall be included for a period of one year.
- The intrusion Detection panel shall be fully integrated to the USP.
- Provide DMP500 series or approved equal
Intrusion Detection Keypad
- Provide 32 character platinum keypad as shown on the drawings.
- The keypads can be used to both arm and disarm the intrusion system.
- Provide DMP 7060A-P or approved equal.
PIR Motion Detectors
- Provide motion detectors of "home run" type as shown on the drawings. Sensors shall process their signals independently and shall have coverage patterns individually adjustable.
- Each PIR shall be wired to the intrusion detection system.
- Provide DMP models 6155LX, AP750, FX series, KX-08, and SX-360Z or approved equal.
- Provide one (1) addressable input module per motion, DMP 700 series or approved equal.
- Door Contacts/switches
- Provide recessed door contacts/switches as shown on the drawings. Contacts shall be 3/4 inch and have wire leads of sufficient length for splices to be made in wiremold box or mud type box located adjacent to door. Provide GE model #1078C or approved equal for interior doors. Provide DPDT contacts for all exterior doors, GE model #1076-D or

- approved equal.
- Overhead Door
 - overhead door contacts as shown on the drawings. Provide one (1) input module per device.
 - Provide Sentrol 2200 series or approved equal.
- Addressable Input Module
 - Provide single input module devices for all non-addressable inputs (motions, door contacts, glass break detectors, etc).
 - Provide DMP 700 series or approved equal.
- Indoor Security Siren.
 - Provide interior security siren(s) as shown on the drawings.
 - Provide DMP 335 or approved equal.
- Outdoor Security Siren:
 - Provide outdoor siren(s) as shown on the drawings. The horn shall draw 550ma at 12VDC.
 - Provide Ademco 748LC or approved equal.
- Intrusion Detection Panel Accessories and Modules
 - Interface Adapter Module. Provide one (1) loop adapter bus card per system. Provide DMP 461 or approved equal.

D7010.40 – Video Surveillance

In accordance with MGL c.30, s-39M, after reasonable investigation in consideration of the compatibility between new and existing system components, the continuation of the existing high level of security, the Awarding Authority has concluded that, for sound rationale in the public interests, the system shall be a proprietary video surveillance system by Genetec Inc.

System Cabling

- All cabling shall be by ITS contractor.

Hardware and Peripherals

- Interior cameras in corridors and gathering areas
- Exterior cameras covering entrances and site areas
- Storage Server System Manager server
- Network Video Recorder (NVR)/Video Management Server (VMS)
- Archiver Storage Expansion Hardware storage solution for 30 days video archival
- Remote workstation and associated software
- Programming, Integration and Configuration
- Video Entry Station with Door Release
- UPS
 - Storage Server System Manager, Primary Network Video Recorder and Archiver Storage Expansion Hardware
- Storage Server System Manager server:
 - The Storage Server System Manager server shall have the following specifications:
 - Processor: Intel E3-1275 Xeon or better
 - RAM: 16GB (32GB for over 1,000 servers)
 - Hard drive: 250GB SSD
 - Network: 50 Kbps average, 1 Mbps peak per video
 - Operating system: Windows Server 2012 or Windows 8
 - Email host: SMTP email server

ADDITIONAL HARD DRIVES SHALL BE PROVIDED FOR VIDEO STORAGE REQUIREMENTS. STORAGE PARAMETERS ARE SHOWN IN ABOVE SECTION. PROVIDE RAID5 ARRAY HARD DRIVES INTERNAL TO SERVER OR IF REQUIRED EXTERNAL FOR ALL VIDEO STORAGE.

Standard SVGA Video Card

800x600 or higher screen resolution

10/100/1000 Ethernet Network Interface Card

DVD ROM Drive

Provide quantity of servers as required by manufacture based on recording parameters specified herein. Note use of solutions which do not support multicast per this specification, provide a maximum of 20 cameras per server.

Provide redundant power supply.

- Provide a UPS with battery backup for 10 minutes for each server.

Network Video Recorder (NVR):

- Provide NVRs with the following specifications (provide in quantity sufficient to support the number of cameras on the project):

Video compression – Analog: Not Available
Video compression – IP: MJPEG, MPEG-4, H.264, H.265

Video output: 0

Microphone input: 1 RCA connector

Audio:

Inputs: 0

Outputs: 1

Alarms:

Inputs: provision for 8 external TTL

Outputs: provision for 3 external TTL, 1

external relay

Server characteristics:

Operating system: Windows 10, Windows

2012 R2, or Ubuntu Linux 16.04

Operating system drive: 120 GB SSD – Windows / 60 GB SSD – Linux

Monitor outputs: 1 HDMI + 1 DVI-I + 1 VGA (max 2 simultaneously)

Processor: Gen 7 Intel® Core i7 (Gen 7 Intel® Xeon E3 optional)

Memory: 8 GB (16GB Optional)

Network: 2 x 1000 BASE-T (2 x 10

Gbps SPF+ optional)

USB 2.0 ports: 0

USB 3.0 ports: 6 (2 Front, 4 Rear)

Serial: 0

Enclosure

Material: painted steel

Dimensions (l x w x h): 27 in. x 17 in. x 7 in. (68.6 cm x 43.18 cm x 17.8 cm)

Weight: 49 – 90 lbs. (22.3 – 40.9 kg)
maximum

Electrical
Input voltage: 120/240 VAC auto-sensing
Power Supply: Dual Hot Swap

- Provide a UPS with battery backup for 10 minutes for each NVR unit.

Archiver Storage Expansion Hardware:

- Provide Archiver Storage Expansion Hardware (Exacq S-Series) to allow for a minimum of (30) days of recording retention.

Core and Edge Network Switch

- Provide Power over Ethernet (PoE) network switch(s) for all cameras, access control panels, encoders/decoders, security workstations, video servers, and access control servers.
- Provide a network aggregate switch to connect all Fiber Optic links on the security/building systems network.

Interior/Exterior Fixed Megapixel Vandal Dome Camera

- Provide cameras with the following specifications for all indoor/outdoor fixed cameras as shown on the drawings. Provide exterior model for all exterior cameras.
Image sensor: 1/4 progressive scan

CCTV Cameras

- Provide CCTV IP Cameras with the following specifications (provide in quantity as indicated on the drawings):

Lens: Vari-focal, DC iris. Provide either 6mm or 12mm.
Provide 12mm for all exterior fixed models.

Day/Night

Shutter time: 1/35500s to 1/6s

Resolution: 2048x1536

Digital PTZ functions

Video compression: H.264 and Motion JPEG

Frame rate per camera: 30 fps at max resolution

Video streams: Multiple, individually configurable

Audio streaming: Two-way

- Each camera shall be able to provide 5 megapixel resolution at 20 frames per second.
- The power source shall be Power over Ethernet (IEEE 802.3af).
- Provide Axis P3346-V or approved equal for all interior cameras.
- Provide Axis P3346-VE for all exterior fixed cameras. Provide with wall/corner mount where required.
- Exterior PTZ Megapixel Dome Camera and Housing
- Provide PTZ cameras with the following specifications for all outdoor PTZ cameras as shown on the drawings.

Image sensor: 1/3 progressive scan, 2.0 megapixels

20x optical zoom, 12 x digital zoom

Day/Night

Shutter time: 1/30000s to 1/4s 5)

Resolution: 1920x1080 (1080p)

Video compression: H.264 and Motion JPEG

Frame rate per camera: 30 fps at 1080p

Video streams: Multiple, individually configurable

Audio streaming: Two-way

- The power source shall be high powered Power over Ethernet (IEEE 802.3af).
- Provide Axis Q6035-E or approved equal. Provide with appropriate mounting bracket.
- Exterior Camera Fiber Transceivers
- Provide fiber optic transceivers for all pole mounted and remote building mounted cameras. Transceivers shall be located at the base of the pole in a NEMA rated heated enclosure.
- Provide American Fibertek MX2-MM-FX or equal media converters as required for each camera. Transmitter shall be located in NEMA rated enclosure at the pole. Receiver shall be located in the security rack.
- Provide Altronix T2428100WP or equal outdoor rated power supply for each camera, located at the pole. Power supply shall be located in NEMA 3R rated lockable enclosure at the pole.

D7010.50 - Integrated Security System

The IP Integrated Security System consists of the following subsystems. All systems referenced below shall be connected to a stand alone, dedicated security network as provided by the security contractor.

- CCTV IP Video platform
- Access Control platform
- Intrusion Detection System
- Servers and Workstations
- Network Electronics
- Preventative Maintenance and Service Agreement
- Integration between the CCTV IP Video, Access Control, Intrusion Detection system is defined as follows:
 - Each door contact, motion detector, shall be individually annunciated on the Security Platform GUI.
 - The ACS shall support integration with the CCTV IP Video Surveillance System.

D7020 – Visitor Management System

- ID Scanner
- Badge Printer
- Barcode Reader
- Camera
- Door Signage
- Programming, Integration and Configuration

D7030 – Vapor Detection System

In accordance with MGL c.30, s-39M, after reasonable investigation in consideration of the compatibility between new and existing system components, the continuation of the existing Vape Detection system, the Awarding Authority has concluded that, for sound rationale in the public interests, the system shall be proprietary to FlySense detectors by Soter

Technologies.

- Sixteen existing FlySense detectors shall be relocated to athletic locker rooms in the new building.
- Two additional new FlySense Gen 2.75, or latest version vape detectors with FlySense FS-SSA First Year Annual Software Subscription included shall be furnished and installed in each gang toilet.
- New vape detectors shall be added into the existing vape detector console.
- System Cabling
- All cabling shall be by ITS contractor.

D7050 – Fire Detection and Alarm

D7050.10 - Fire Detection and Alarm

Automatic, fully supervised, analog addressable, voice evacuation system
Automatic, fully supervised, analog addressable, voice evacuation system will be provided with following:

- Manual pull stations at exit doors (with tamperproof covers).
- Audible/visual units in corridors, classrooms, and places of assembly (ADA approved).
- Visual units in conference rooms, meeting rooms, and small toilets.
- Smoke detector coverage will be provided in corridors, stairwells, Electric Rooms and Closets, Telephone/IT Rooms and closets, and rooms with substantial computer equipment. Smoke detectors will be located in elevator lobbies and machine rooms for elevator recall.
- Smoke duct detectors in HVAC units over 2,000 CFM, and within 5 feet of smoke dampers.
- Connections to sprinkler water flow and valve supervisory switches.
- Connections to smoke and fire dampers, and fire suppression systems in kitchen and culinary areas.
- The system will utilize transponder panels as required in lieu of booster panels.
- 60-hour battery back-up.
- 24 VDC magnetic hold open devices at smoke doors.
- The Maintenance and Athletic Buildings will have a radio master box, exterior beacon, fire alarm transponder cabinet, annunciator panel, pull stations, audio/visual signals, and connections to sprinkler flow alarm and tamper switches, interconnected to main system serving school.
- Radio master boxes shall be as manufactured by Sig Com.
- Exterior beacons shall be located at front and rear entrance and at select exit doors per Wakefield Fire Department.
- 25 percent spare capacity shall be provided in FACP for notification appliance circuits (NAC's).
- Wiring will be run in minimum 3/4 inch EMT with red markings.
- Connection to fire suppression systems.
- A bi-directional amplifier with remote annunciator shall be provided per Wakefield Fire Department.
- z
- Leased phone line connection to UL Central Station will be provided.
- Knox boxes and exterior beacon will be provided.
- The system shall be ADA compliant and installed in accordance with NFPA 72.
- Antenna Systems:

- Provide complete system for Fire Department radios and Police Department radios.
- Ladder Tray
- Provide 12 inch wide aluminum ladder tray with 9 inch rung spacing with 6 inch side rail. Ladder tray shall be as manufactured by B-Line. "Ladder Type". Provide all hangers required.
- Uninterruptible Power Supply
- General: Provide three phase, online, solid state uninterruptible power system hereafter referred to as the UPS. The system consists of a solid state inverter, rectifier/battery charger, a static switch, an internal maintenance bypass switch, an internally assembled battery cabinet and synchronizing circuitry as described herein.
UPS Requirements and Performance Characteristics:
Ratings – 20kVA/16kW
Input Requirements:
Voltage: 208, 3 phase, 4 wire plus ground $\pm$ 15 percent.
Battery back-up of 7 minutes at 100 percent load.
Output Characteristics:
Voltage: 208Y/120, 3 phase, 4 wire plus ground.
Output voltage adjustable $\pm$ 3 percent.

ELEMENT E EQUIPMENT AND FURNISHINGS

E10 EQUIPMENT

E1010 Vehicle and Pedestrian Equipment

E1010.50 Loading Dock Equipment

E1020 Automotive Equipment (FF&E)

E1020.10 Automotive Lifts

EXTENDED SCISSOR ALIGNMENT LIFT RACK (12,000 LBS.)

Power: 26 Amps., 208V/60C/1 phase.

Air Pressure: 90-150 PSI.

Description: Provide extended scissor alignment lift rack complete with standard construction, features and accessories, including 12,000 lbs. lift capacity; surface-mounted; long deck; clear access in front and rear with no cross members; for use in 24" wide runways; airline kit built into the rack that provides power for jacks and air tools at front and rear; gutters to guide water away from turn plates and rear slip plates; flush runways – front turn plates and rear slip plates shall be recessed at deck level; louvered approach ramps for drive on ease in

slippery conditions; low voltage feedback system that keeps runways level and safely stops if obstruction is hit; 18-position air-operated safety locks level at all alignment heights; long-life chromed, hardened pins and Teflon coated bearings at all pin locations; separate operation console that may be mounted left, right, front, or rear; hydraulic velocity safety fuses that shut down lift operation in the event of pressure loss; two (2) wheel chocks; two (2) rolling swing air jacks; 184" general service maximum wheelbase; 179" two-wheel alignment maximum wheelbase; 158" four-wheel alignment maximum

wheelbase; 10" lowered height; maximum lifting height – 71"; narrow 7'-4-1/2" overall width; minimum width of 40" between runways; FIA Fully Integrated PowerSlide System that locks and unlocks turntables and slip plates automatically at the appropriate points of the alignment process; FIA Fully Integrated Air Inflation System that automatically inflates or deflates tire pressure depending on preselected value. ALIGNMENT SYSTEM PACKAGE Make & Model: Hunter Components as specified herein; or equal.

1-Hunter #WA485 HawkEye Elite Alignment System.

1-Software #HC421.

1-Hunter #HS421LC Vertical Lift Camera Imaging Sensors.

2-Hunter #20-2882-1-1 Cordless Remote.

Description: Provide alignment system package complete with standard construction, features and accessories.

Aligner: Aligner shall be 44"W x 23-1/2"D x 72-1/2"H, provided with 32" flat panel display; 4GB RAM 250GB (or greater) hard drive; two (2) USB 2.0 ports in front side; DVD/RW/CD-RW drive; 64MB (or greater) integrated video card; color printer with pull-out printer drawer; keyboard; mouse; steering wheel holder; brake pedal depressor; ISHOP compatible; wireless remote control; wireless network module; AutoVin bar code reader; Intel i3 Processor 3.06 GHZ (or greater); Windows 7 Operating System; and the following:

1-#20-2532-1 Two (2) Stainless Steel Turnplates.

1-#30-418-1/#20-2072/1 Cordless LED Remote Control/XF2 Pod Kit which operates aligner, displays readings, and allows technician to perform rolling compensation when console is out of view – records tire pressure, tread depth, measures tire temperatures, and frame angle.

1-#20-1978-1, #20-1979-1 and #20-2577-1 Wheel Off Adapters that allow alignment adjustments with the wheel removed.

1-#125-100-1 Alignment Simulator.

1-#20-2011-1 Bump Steer Winch Kit.

1-#20-2050-1 Live Ride Height Targets.

1-#125-100-1 Simulator.

1-#20-2664-1 Wheel Off Adaptors.

1-#20-2151-1 CodeLink – Resets Steering Angle Sensors and is fully integrated with the Alignment Procedure.

Software: Provide with the following software:

2 Years Free Vehicle Information Database updates.

2 Years Free subscription Webspecs database.

1 Year subscription UndercarInfo.net.

1-Year subscription ShipResults.net.

WinAlign Software.

WinToe Procedure – virtually ensures straight steering wheel on the first try.

Express Align – provides direct shortcuts to minimize steps to align vehicle in the proper sequence.

Shim Select II – calculates and displays correct shims for proper alignment.

CAMM – control arm movement monitor instructs technician what direction and how much to move front and rear cams or slots.

Automatic Bushing Calculator – shows required bushing and position to make desired correction in caster and camber.

Faster Caster – reduces number of steps needed to perform a caster sweep.
Tools and Kits Database – displays hand tools, special tools, and aftermarket correction kits for the specific vehicle.
Suspension Body Dimension Audit – provides a quick screening to determine if the vehicle is alignable – identifies need for body shop procedures.
Symmetry Angle Measurements – indicates conditions that may be the result of collision or frame repair.
Virtual View – 3 dimensional models of alignment angles and their relation to specifications.
Alignment Procedure Tool Bar – displays an icon for each step of the alignment procedure and allows technician to proceed to any step with a click of the mouse.
Sound Guide – allows technician to tell how close an adjustment is with an audible tone when he cannot view the monitor.
Work Management – customer and vehicle information can be stored in the database allowing quick reference to past alignments.
Digital Photo on DVD – Provides vehicle specific inspection and adjustment photos.
Digital Video
Printouts should include inspection, pre-alignment analysis, results, and work management reports.
Tuner software gives technician procedures to align vehicles with altered ride height.
TPM Specs Database – Data and Procedures.
AlignGuide Training Software.
WinAlign Video Library Training Videos.
Roll Forward Compensation Procedure: To compensate for run out, operator will only need to roll the vehicle forward onto the turnplates. Rolling back and then forward, or having to lift the vehicle to accomplish runout will not be acceptable.
Sensors: Sensors shall be provided with Image Technology digital cameras which shall provide continuous “live” measurements; four (4) 5-Megapixel high-resolution digital video cameras (one (1) per target); electronically operated vertical lift system with full range of travel for additional work height; four (4) 3-Dimensional TD Targets for Quick Grip tire engaging wheel adapters capable of accurate off center clamping, no metal-to-metal contact and no knob twisting; and two (2) turnplate bridges for rolling compensation.
Note: Deliver and install according to Manufacturer’s specifications. Electrical and compressed air connections to equipment will be by MEP. Provide two (2) days of Staff Training, on-site, for the proper operation and use.

TWO-POST ABOVE GROUND ASYMMETRICAL LIFT (10,000 LBS.)

Dimensions: 11'-5-1/2"W x 11'-8-1/2"H O.A.

Power: 2 H.P., 208V/60C/1 phase.

Description: Provide two-post above ground asymmetrical lift complete with standard construction, features and accessories, including 10,000 lbs. lifting capacity; electric-hydraulic operation; two (2) full stroke high-pressure cylinders, one (1) in each column; three-position flip-up adapters with built-in truck adapters; patented “Double S” single –piece construction column design that provides a channel for the bearings to travel that maximize the strength of the column; adjustable height options; slider block bearings; overhead padded switch bar; single point lock releases

which release the locks at the same time; latches every 4"; arm restraints that allow for easy lift arm positioning; dual controls; third party tested by ETL and certified by ALI to meet strict ANSI standards. The three-stage arm shall increase overall arm sweep and minimum arm reach to precisely lift vehicles that have unibody construction, visually marked pick-up points on the vehicle; wider vehicle tread width and lower profile; and a short or long wheelbase. The true asymmetrical design allows for easy vehicle entry with columns at rotated 30°. The factory rotated columns allow doors of vehicle to be fully opened while properly positioned on lift. This places the approximate center of gravity of the vehicle in line with the optimum load capability of the column. Lift shall be provided with conventional two-hand operating control, power unit down; and manual release locking system.

Rise:	78-1/4"
Drive-Thru Clearance:	95-1/4"
Floor to Overhead Switch:	11'-2-3/4"
Reach (Front Arm Min.):	20-1/2"
Reach (Front Arm Max.):	40-3/4"
Reach (Rear Arm Min.):	40-1/4"
Reach (Rear Arm Max.):	61"
Min. Adapter Height:	4-3/4"
Low Step Height:	7"
High Step Height:	10-1/4"
Inside Columns:	107-1/4"
Cylinder Height:	11'-10-3/4"
(Full Rise):	12'-4-3/4"
Lifting Capacity:	10,000 lbs.
Time of Full Rise:	45 seconds
Max. Load (Per Arm):	2,500 lbs.
Min. Bay Size:	12' x 24'
Ceiling Height Required:	12'

Note: Item shall be installed complete and ready for use. Electrical Subcontractor shall provide final connection, including safety wiring. Provide O&M Manuals for use by CM-R and Owner.

TWO-POST ABOVE GROUND SYMMETRICAL LIFT (16,000 LBS)

Dimensions: 11'-5/8" W x 14'-9"H O.A.

Power: 2 H.P., 208V/60C/1 phase.

Description: Provide two-post above ground symmetrical lift with standard construction, features and accessories, including 12,000 lbs. lift capacity; thread-up pad adapters; lifting pad 3" higher than standard model and top overhead beam height 2' taller than standard model;

patented "Double S" single -piece construction column design that provides a channel for the bearings to travel that maximize the strength of the column; overhead equalization system; electric-hydraulic operation; slider block bearings; overhead padded switch bar; single point lock releases which release the locks at the same time; latches every 4"; arm restraints that allow for easy lift arm positioning; dual controls; third party tested by ETL and certified by ALI to meet strict ANSI standards. The three-stage arm shall increase overall arm sweep and minimum arm reach to precisely lift vehicles that have unibody

construction, visually marked pick-up points on the vehicle; wider vehicle tread width and lower profile; and a short or long wheelbase. Columns are not rotated on true symmetrical design lifts. The vehicle load shall be centered between the columns to maximize lifting capacity, with more width between columns to accommodate larger vehicles and improve vehicle access; and shall allow maximum door opening on trucks and vans for improved access to vehicle interior. The two-stage arms shall be designed to accommodate a wide range of typical vehicles with three-position adapters. Lift shall be provided with one touch control on each column, power unit down; and manual release locking system. Lifts shall be provided with polymer adapters that thread-up, and have stackable inserts.

Rise:	83-1/4"
Drive-Thru Clearance:	102-3/8"
Floor to Overhead Switch:	13'-3-1/8"
Reach (Front Arm Min.):	27-1/2"
Reach (Front Arm Max.):	59"
Reach (Rear Arm Min.):	27-1/2"
Reach (Rear Arm Max.):	59"
Min. Adapter Height:	4-3/4" – 7-1/4"
Low Step Height:	8-1/4" – 10-3/4"
High Step Height:	9-3/4" – 12-1/4"
Inside Columns:	113-3/8"
Lifting Capacity:	16,000 lbs.
Time of Full Rise:	60 seconds
Max. Load (Per Arm):	3,000 lbs.
Min. Bay Size:	12' x 26'
Ceiling Height Required:	16'-8"

Note: Item shall be installed complete and ready for use. Electrical Subcontractor shall provide final connection, including safety wiring. Provide O&M Manuals for use by CM-R and Owner

E1020.20 Spray Booths and related equipment

AUTOMOTIVE SPRAY BOOTH – FULL DOWNDRAFT

Dimensions: 24'-6-1/2" L x 15'-3-1/2" W x 12'-9"H External Booth overall; 24'-0" L x 14'-0" W x 9'-0"H Internal Booth overall.

Front Opening with Curtain: 14'-0" W x 9'-0" H.

Personnel Door: 2'-8" W x 6'-8-3/4" H.

Power Requirements:

In-Take Motor: 7.5 H.P., 23.3 Amps., 200V/60C/3 phase., Full Load Amps 28.6.

Exhaust Motor: 5.0 H.P., 15.9 Amps., 200V/60C/3 phase.

Minimum Circuit Capacity: 50.0 Amp. Full Load Amps. 60.

Lighting: 40.0 Amp. Circuit, 120V/60C/1 phase.

Rating: 1" gas inlet pipe, 19,000 BTU/H minimum to 1,139,000 BTU/H maximum energy production.

PAINT MIX ROOM

Dimensions: 12'-4" L x 9'-1-1/2" W x 11'-0" H Exterior; and 12'-0" L x 9'-0" L x 9'-0" H Interior.

Power Requirements: 20.0 Amp., 120V/60C/1 phase.

Description: Provide Paint Mix Room with all standard construction, features and accessories as described and outlined herein. Room shall be three-sided and installed against rear wall of Automotive Spray Booth, Item AC-01. The mix room exhaust shall be located in the ceiling of the booth. Air shall be drawn through the filter and exhausted through the top of the booth. GFS Wave Exhaust Filter

Specifications: Removal Efficiency – 99.83%;

Holding Capacity – 4.4 lbs.;

Pressure Drop – 0.12 inwc (initial)/0.50 inwc (final);

Flammability Rating – UL Class II; and Material shall comply with the requirements of UL900, NFPA-33, OSHA, and New York rule. The paint mix room walls shall be composed of self-supporting panels, 1-1/2' or 3' wide by 9' high. Each insulated wall panel shall be an assembly composed of an inside and outside skin internal support channels and insulation. The inside and outside skins and internal support channel shall be made of 20 gauge galvanized, then pre-painted white, and PVC film protected sheet metal. The thickness of the insulated wall panel shall be 2-1/2". Insulation

Specifications:

- Material: Thermo set resin bonded flexible roll;
- Maximum operating temperature: 450°F; and
- Initial thickness – 2-1/2".

The light fixtures shall be mounted and serviced from inside the paint mix room. Light fixtures shall be installed in the ceiling of the paint mix room. The 9' x 12' paint mix room shall be provided with two (2) ceiling mounted light fixtures.

Light Fixture Specifications: ETL listed for use in paint spray booth; Energy efficient T8 lamps; four (4) tube light fixture requires 1.0FLA @ 120V; and Tempered glass light cover with proximity safety switch to ensure covers are correctly replaced after servicing.

Note: Provide two (2) days of Staff Training, on-site, for the proper operation and use of Items.

E1030 Commercial Equipment

E1030.80 Foodservice Equipment

Description: Mobile and stationary commercial foodservice equipment.

Functional Requirements: Equipment shall be of the latest design; new and unused, unless indicated otherwise in the Item Specifications, complete with all standard parts for normal operations and including such accessories or materials as may be required to comply with these Specifications.

Performance Requirements:

Electric equipment and accessories shall conform to the standards of the National Electric Manufacturers Association (NEMA), Underwriters Laboratories, Inc. (UL) or Electrical Testing Station (ETS).

- Steam generating equipment and accessories shall conform to the standards of the American Society of Mechanical Engineers (ASME).
- Energy Star - Specified Energy Star rated equipment and appliances shall serve

as the standard for all types of equipment and appliances whenever possible.

Design Requirements:

- Work shall be in accordance with the governing health, building and safety, and fire protection codes and regulations.
- Standards of the National Sanitation Foundation (NSF) shall serve as guidelines for the work of this Section.

Refrigeration:

- Fabricated walk-in rooms
- Refrigerated display cases
- Commercial refrigerators
- Mobile milk coolers

Freezers:

-
- Fabricated walk-in rooms
- Commercial freezers

Food Storage Shelving:

- Stainless steel wire
- Open grid polymer mats on enamel steel wire supports
- Aluminum dunnage racks

Worktables and Preparation:

- Stainless steel tables and sinks
- Food slicer
- Food processor
- Mixers

Cooking Equipment:

- Ranges
- Ovens
- Kettles
- Steamers
- Braising pans
- Exhaust hood
- Pizza Oven
- Hood Fire Suppression system

Serving Equipment:

- Drop-in mechanical cold-pans
- Drop-in hot wells
- Food shields
- Stainless steel counters
- Hot holding cabinets
- Cashier Stations
- Air Curtain refrigeration

Sinks:

- Hand washing sinks
- Three compartment wash sink
- Mop sink

Dishwashing:

- Hand washing sink
- Dish machine

- Pre-Rinse sink
- Clean Dish table
- Pass thru opening with trim
- Mop sink
- Miscellaneous:
 - Staff lockers
 - Trash bins
 - Mobile carts
 - Condiment counters
 - Mobile cash registers

E1040 Cosmetology Equipment

E1040.10 Cosmetology Equipment

WET STATION W/SIDE APPROACH

Description: Wet station shall provide cabinet base with access door, faucet, with spray. The ceramic bowl shall be 22" L x 20" W x 10" D.

Note: Plumbing shall rough-in to base of cabinet.

BACK-TO-BACK STYLING STATION

Dimensions: 34" W x 42" D x 78" H.

Description: Styling station shall be provided with two (2) 28" x 43" mirrors and panels connected with two (2) U-panels bolted into T-nuts into back panel to floor, with extruded PVC laminated drawers with locks, full-extend ball-bearing slide; open purse shelf; steel plate on underside of top for mannequin clamp protection; appliance center with blow dryer holder; two (2) vented iron holders; and quad outlet with cover. Provide with all exterior high-pressure laminate.

EUROPEAN WET STATION

Dimensions: 45-11/16" L x 27-3/16" W x 37-3/4" H.

Description: Backwash unit shall be provided with a Black vinyl upholstered chair; silicone gel neckrest; adjustable angle ceramic shampoo bowl; Black fabric covered wooden base; and a full set of plumbing fixtures, including chrome faucet, sprayer, vacuum breaker and hoses.

PEDICURE CHAIR

Dimensions: 47" L x 23" W x 17" H at base.

Description: Provide pedicure chair with standard construction, features and accessories, including adjustable, fiberglass, waterproof footrest; front-mounted faucet pull-out shower hose; built-in LED light; two (2) vents; fiberglass sink bowl; matching stool; and massage feature.

MANICURE TABLE

Dimensions: 16-3/4" L x 74" W x 30-1/2" H.

Description: Manicure table shall be provided with two (2) knee spaces, built-in exhaust fan; 4" diameter side connection; arm rest; and bottle organizer. Table shall be provided with multiple drawers for storage. Top shall be provided with grommets to cover any

holes.

Note: Vent shall be wall accessed.

E1050 Carpentry Equipment (FF&E)

E1050.10 Carpentry Equipment

CNC Router Table

Make & Model: Baileigh #WR-84V with #BOBCAD Software; or equal.

Location: Carpentry

Dimensions: 118" L x 78" W x 65" H.

Power: 220V/60C/1 phase.

Description: CNC routing table shall be provided complete with standard construction, features including 4' x 8' table; welded steel frame; software for plasma and wood routers; tooling; and a dust shroud; 0 to 18,000 RPM variable spindle speed range; 7.4 H.P. spindle with power to cut hardwoods; air-cooled spindle; 15,000 mm per minute travel speed; solid steel gantry; stepper motors with square rails; hand-held digital controller; USB drive; rack and pinion mechanism; four (4) collets; ten (10) different tooling profiles; steel T-clamps; and four (4) vacuum zones, each with a separate valve and handle. The dust shroud spindle and vacuums out sawdust and wood chips while cutting. Table shall be vacuum ready.

Actual Working Area:	97" x 48"
Z-Axis Stroke:	5.375"
Max. Moving Speed (Inches Per Minute):	590
Max. Engraving Speed (Inches Per Minute):	590
Reposition Accuracy:	0.0019
Tool Diameters:	ER32
AMP Draw:	35 at Full Load
Accessories:	Provide vacuum pump.

E1060 Residential Equipment

E1060.10 Residential Appliances

- Clothes Dryer
- Clothes Washer
- Undercounter Dishwasher
- Electric Oven and Microwave Wall Unit
- Four-Burner Electric Cooktop Unit 36"W
- Refrigerator/Freezer, Side-by-Side
- Ventless Hood

E1070 Entertainment and Recreational Equipment

E1070.10 Theater and Stage Equipment Rigging Systems and Controls Stage Curtains

Description: This Stage Curtains and Rigging Equipment Subcontractor shall

furnish and install all curtains, rigging, counterweights, lockbar, frames and cables, all necessary hardware as specified herein and shown on the equipment drawings.

Components:

- Main Valance Curtain, Counterweight #1.
- Main Draw Curtains – Electrically Operated
- Border Light Pipe Batten, Counterweight #2.
- Movie Projection Screen – Electrically
- Border Curtain, Counterweight #3.
- Pipe Batten #1 W/Acoustical Panel, Counterweight #4.
- Leg Curtain Set #1, Counterweight #5.
- Spare Pipe Batten #1, Counterweight #6.
- Spare Pipe Batten #2 , Counterweight #7.
- Border Light Pipe Batten #2 , Counterweight #8.
- Olio Draw Curtains (Manual Operation), Counterweight #9.
- Spare Pipe Batten #3 , Counterweight #10.
- Pipe Batten #2 W/Acoustical Panel, Counterweight #11.
- Border Curtain #2, Counterweight #12.
- Leg Curtain Set #2, Counterweight #13.
- Spare Pipe Batten #4, Counterweight #14.
- Border Light Pipe Batten #3, Counterweight #15.
- Pipe Batten #3 W/Acoustical Panel, Counterweight #16.
- Border Curtain #3, Counterweight #17.
- Rear Draw Curtain (Manual Operation), Counterweight #18.
- Cyclorama Sky Drop Curtain (NO SEAM), Counterweight #19.
- Backdrop Curtain – Square Shaped
- Pipe Grid
- Rigging/Counterweights/lockbar/headblocks/lines.

E1070.20 Gymnasium Wall Padding

WALL PADDING

Lot shall consist of wall padding on all exposed wall surfaces
Make & Model: Porter #00570-OXX Wall Padding – “Z” Clip (Wall Attachment) Margins; or equal.

Description: Panel shall meet the min. ASTM F2440 Standard Specification for impact performance requirements. The maximum gmax values for the padding shall not exceed 200 and the HIC shall not exceed 10000 when tested at a 4'-0" drop height. Panels that have not been tested to this minimum standard shall not be considered as equal.

Entire pad assembly has been tested and meets the requirements of NFPA 101 Life Safety Code when tested in accordance with NFPA 286. Entire pad assembly has been tested and meets the criteria set forth in the International Building Code (2003 IBC section 803.2.1) when tested in accordance with NFPA 286. ASTM E-84 test is not considered an equal test to NFPA 286.

Wall pad shall be 2'-0" W x 6'-0" H, with “Z” Clip System for for securing

panels to the wall. Panels shall be constructed with a 2" thick flame retardant foam. Interior foam shall be bonded to a 7/16" oriented strand wood board to minimize warping.

Entire face of panel shall be upholstered in a heavy (15 oz.) fire-retardant, high tensile, vinyl-coated polyester fabric material with a leather-like embossed finish. Cover material shall be designated as flame resistant in accordance with NFPA 701, and State of California. The cover material shall have a tear strength of 100 P.S.I. and shall be mildew and rot resistant and fortified with an infection combating fungicide. Vinyl covering shall be folded and stapled securely to backside of oriented strand board. Vinyl covering is available in 14 colors – see color chart for options.

The installing contractor shall be responsible for proper inspection and installation of all panels. Installation shall be made in accordance with current factory procedures, and ASTM Standard Specification F2440

E1070.30 Gymnasium Batting Cage

Gymnasium Batting Cage:

Power: 1 H.P., 120V/60C/1 phase with cord and plug.

Dimensions: 12'-0" W x 70'-0" L x 11'-0" H.

Description: Batting cage shall be provided complete with standard construction, features and accessories, to include electric-operated; ceiling suspended; single pull; frame; net; fittings; cables and electric winch for lowering to floor when in use and raising to roof structure for storage. Unit shall be recommended for ceiling heights in excess of 28'.

All perimeters of the cage shall be sewn together bound to a 3/8" polypropylene rope. The cage shall be of size to allow for approximately 1' of netting to lay on the floor when the cage is in the lowered position.

The cage frame shall be constructed of 1.90" O.D. x .145 wall aluminum tube with galvanized malleable iron "T" and "L" fittings with case hardened setscrews. Provide cross supports spaced symmetrically along the length of the cage. Cage shall be hoisted by seven (7) individual 1/8" diameter steel aircraft cables secured to the drive pipe and encased within formed cable guides. The hoist lines shall terminate at the cage frame at twenty-one (21) locations, utilizing a "V" style attachment. This attachment shall be provided to stabilize the ends of the frame and keep in parallel with the floor, and shall provide maximum attachment points to the cage frame. Single hoist cable "Clew" system shall not be approved as equal. Suspension from the roof support member shall be provided with clamp-type malleable fittings. The drive system shall consist of a UL Listed, 1 H.P., 120/60/1 phase reversible winch, with a capacitor start, built-in thermal overload protection, direct drive, self-lubricating gearing, and built-in POSILOK over-speed arrest system. Provide with a drive pipe, consisting of 2-3/8" O.D. galvanized pipe, supported with hanger/rollers spaced approximately 12" from cable guides

along the length of the drive pipe. Integral upper and lower limit switches shall control the upper and lower travel of the cage. Provide with ETEC Easy Touch Equipment Controller; Net; Cord and Plug.

Note: Wiring of all electrical components shall be in accordance with National and Local

Electrical Codes, as well as specific wiring instructions provided by the manufacturer.

E1070.40 Gymnasium Wrestling Mat and Hoist

Wrestling Mat Hoist:

Make & Model: Porter Athletic Equipment Co. #91101-100 (for hoisting one (1) 42'-0" x 42'-0" wrestling mat).

Power: (2) 1.0 H.P., 208V/60C/3 Phase Motors.

Description: Wrestling mat hoist shall be provided with standard construction, features, and accessories, including two (2) independent, steel frame sub-assemblies with drive and lifting mechanisms enclosed. Each hoist assembly shall be monitored continuously by a factory preset programmable logic control unit to ensure simultaneous operation and self-leveling feature. Standard hoists, load bar and sling shall be capable of lifting and supporting a 42'-0" x 42'-0" wrestling mat weighing one pound per square foot. The two (2) hoist units shall be mounted 22'-0" on center, and may straddle trusses, scoreboards, etc., or be mounted at different elevations to conform to the building structure's slope. Units with a single hoist mechanism shall not be considered equal. Hoist shall be driven by two (2) heavy-duty 1 H.P., 208V/60/3 phase electric motors with integral 6 ft./lb. brake mechanisms and automatic overload protection, attached to a 200:1 ratio gearbox assembly. Under no load conditions, RPM of motor is 1725; RPM of drum is 8.625. Approximate hoist speed shall be 8.5 feet per minute in both the up-and-down travel cycles. The motors shall be controlled by a special dual-keyed, flush wall mounted momentary key switch, which cannot be instantly reversed, providing a safety provision to prevent damage to the motor. Switch assembly shall be furnished with a 4-1/2" square stainless-steel cover plate for mounting into a masonry wall box by the Electrical Contractor. The two (2) hoist mechanisms shall be monitored by a factory wired, preset control panel and shall provide the following safety/monitoring systems: A 20" x 20" x 8" steel enclosure, complete with lock and keys; a cover-mounted main disconnect switch (208/60/3 phase); control circuit transformer with primary and secondary protection; two (2) full voltage reversing contactors with motor circuit protection; motion logic controller, which monitors the take-up and pay-out of cable at each hoist; ensuring the units remain synchronized throughout the up-down cycle; watchdog timers, to ensure the motion of each hoist is transmitted to the control system a minimum of eight (8) times per 12" of travel, providing a consistent level operation; and audible motion arm, which activates when unit is in the raising or lowering cycle, to increase athletes' awareness of mats being moved into and out of storage. Control panel shall be mounted within proximity of the mat hoist for ease in

field wiring and effectiveness of the motion alarm system. Actual hoisting of mats shall be accomplished by means of two (2) 5/16", 6-strand, 37-wires per strand, fiber core, 4.26 ton breaking strength steel cables, each secured to a 4" diameter drum, and terminating at a heavy wall 2" x 6" x 40'-0" long steel load bar. The load bar shall be connected to a 40-pound per square foot vinyl fabric sling with heavy-duty straps and fasteners. The sling capacity shall govern the lift capacity of the system. Each Bidder shall become familiar with all job conditions and dimensions and provide any necessary additional structural support to accept unit specified herein.

Wrestling Mat:

Make & Model: Resilite Sports Products #RSP-625 (Double-Sided).

Dimensions: 42'-0" x 42'-0".

Description: Wrestling mat shall be fabricated in one (1) section, with an overall dimension of 42' x 42'. Mat shall be provided with 1-1/4" thick Ensolite "AMC" PVC foam. Foam core shall have 5 to 7 pound/cubic foot density; 5.5 to 7.5 P.S.I. 25% compression resistance; 75 P.S.I. tensile strength; 125% minimum elongation; no odor; and 0" minimum/maximum flammability (F.M.V.S. – 302). Mat shall be provided with Resilite coating, and have a three-toned top surface with 32' diameter wrestling circle.

Provide underside of mat with four (4) practice circles. Mat shall be provided with built-in "Microban" Antimicrobial Protection. Mat shall meet

ASTMF1081-97 (03) "Specification for Competition Wrestling Mats."

Insignia, letter and color information shall be provided by the Architect.

Provide mat with straps and storage tube.

E1070.50 Gymnasium Dividers

Gymnasium Curtain:

Lower section of curtain shall be 8'-0" high Flexivide solid vinyl, polyester reinforced 18 oz. vinyl coated fabric (per square yard, containing antibacterial, fungi-resistant and flame-retardant chemicals to meet requirements of ASTM E-84 Class A Rating (25 Flame Spread, 450 Smoke Development), and NFPA-701 large scale, ULC-S-109 large and small scale, and State of California test requirements. Material shall conform to all State and Local Fire Code Regulations. All hems and pockets on curtain shall be double needle lock stitched seams.

- Upper section of curtain shall be Fleximesh, designed for air breathing areas in gym dividers, tennis screens or other custom air transfer applications. Fleximesh material shall be an open polyester type interlocking grid weave coated with polyvinyl chloride with an approximate 45 to 50% open area. Weight of material is 7 oz. per square yard. Flame resistant (meets California Health and Safety Code Section 13115 Large and Small Scale Test, Fed. Std. 191A, CPAI-84, NFPA 701, BIFMA F-1-78, MSHA-155). Fleximesh begins at a standard height of 8'-0" above the floor. Material shall conform to all State and Local Fire Code Regulations.
- Electrical operation of the drive shaft shall consist of a compensating type power unit with a 3/4" H.P., 115 volt, single phase reversible motor

with built-in thermal overload protection. Speed reduction to be through load holding worm and worm gears. Remote control operation to include integral limit switch to control the upper and lower limit of curtain travel. A security key lock, three position momentary contact wall switch shall be furnished with flush type cover plate. Key switch to be located so that operator has full view of the curtain while it is being operated.

- Divider curtain vinyl and mesh to be low emitting and certified to meet all the requirements of the GREENGUARD Children & Schools and GREENGUARD certification program. Manufacturer to provide certificate and/or test results upon request.

E1070.60 Gymnasium Basketball Equipment, Volleyball Equipment and Scoreboards

Main Court and Side Courts:

- Basketball backstop shall consist of a main center mast of 6-5/8" O.D. heavy-wall structural steel tube with diagonal side sway braces of 2-1/2" x 1-1/2" rectangular steel tubing. Ends of diagonal brace tubes shall be fully welded to main mast. Top horizontal mast member to be of a heavy 5" structural channel to support adjustable suspension hangers. Mast shall be fully welded and suspended by adjustable hangers (3) to provide for precise plumbing of frame during installation. Support hangers shall be offset a minimum of 1" behind centerline of welded mast to properly weight lock unit in playing position.
- Goal shall mount directly through backboard and into a heavy structural steel Center-Strut weldment which shall be clamped to the vertical 6-5/8" O.D. center support to eliminate any strain on backboard should a player hang on the front mounted goal (conforms to the NCAA latest rules). All fittings shall be attached to the 6-5/8" O.D. vertical drop tube by heavy 1/4" thick precision saddle die-cut formed steel fittings secured in place by 5/8" diameter "U"-bolt type hardware.
- Backstop to operate with a 2-3/8" O.D. side brace assembly with a folding knee joint. Knee joint to incorporate an internal torsion spring design to lock brace assembly firmly in playing position. Hoist cable shall automatically disengage brace knee joint during the hoist cycle.
- Backstop shall be supported from pipe anchored to roof framing members by precision die-formed support fittings or custom attachments as required. All cap screws shall be rated a minimum SAE Grade 5. Grade 2 cap screws will not be approved as equal.
- All metal parts shall be powder coated. See swatch card SMPL00048024 for standard color options.
- Backstop provided with specified backboard and goal.
- Volleyball Equipment including sleeves (as necessary for the elevated slabs) and uprights with nets.
- Protective wall and corner padding

Interior Electronic Scoreboard And Shot Clocks (By Electrical)

Fair-Play Electronic Scoreboard, Model BB-6620, with metric clock, by Fairtron Corporation and distributed by Hampden Engineering Corporation or equal. Provide two remote shot clocks per scoreboard.

E1070.70 Telescoping Bleachers

Description: Provide new Telescoping bleacher to conform to current ADA code.

- Frame Section:

Wheels: Not less than 5" diameter by 1-1/4" with non-marring soft rubber face to protect wood and synthetic floor surfaces, with molded-in sintered iron oil-impregnated bushings to fit 3/8" (10) diameter axles secured with E-type snap rings.

Lower Track: Continuous Positive Interglide System interlocks each adjacent CPI unit using an integral, continuous, anti-drift feature and through-bolted guide at front to prevent separation and misalignment. CPI units at end sections of powered banks and manual sections shall contain a Low Profile Posi-Lock LX to lock each row in open position and allow unlocking automatically. Provide adjustable stops to allow field adjustment of row spacings.

Slant Columns: High tensile steel, tubular shape.

Sway Bracing: High tensile steel members through-bolted to columns.

Deck Stabilizer: High tensile steel member through-bolted to nose and riser at three locations per section, interlocks with adjacent stabilizer on upper tier using low-friction nylon roller to prevent separation and misalignment, incorporates multiple stops to allow field adjustment of row spacings.

Deck Support: Securely captures front and rear edge of decking at rear edge of nose beam and lower edge of riser beam for entire length of section.
- Seat:

Polymer Seat System – Seat Modules: 18" long assembled, gas assisted injection-molded, high density, 100% recyclable HDPE (high density polyethylene) modules in monochromatic colors providing, dual textured scuff resistant 10% or 12" wide seat surface with 1/2" minimum interlock on seat and face. Unit structural tested to 600 lbs. occupant load.

10" depth continuous comfort curve style bench seat module.

Ergonomically contoured toward "waterfall" edge for enhanced spectator comfort and minimization of sensitive pressure point area, regardless of leg positioning.

Fore and aft contoured seat surface for uniform support and minimize high pressure points under the buttocks.

Seat height ranges from deck to seat range from 16-1/8" to 18-1/8".

21-1/8" clear foot space area, regardless of leg positioning.

Integrally molded end caps at aisle end locations for clean finished appearance.

Integrally molded recess pockets to accept seat number and row letters.

Integrally molded rear closure panel at back of seat to allow for "continuous clean sweep" of debris at deck level and minimized visibility of structural ribbing.

Seat Attachment: Each polymer seat module shall be securely anchored by a 12-gauge steel clamp bracket that provides steel-to-steel, through bolted attachment to the front nose beam of the bleacher. Attachment eliminates fore/aft movement of the seat module on the nose beam.

E1070.80 Fixed Auditorium Seating

- Steel Platform
- Rear panel one-piece injection molded HDPE (polyethylene)
- Inner upholstery panel 5-ply 7/16 plywood
- 2" thick back poly
- Seat foundation injection molded, glass fiber polypropylene.
- Formed poly cushion
- Cam-driven seat hinge mechanism
- Built-in isle lighting
- Removable seating at the front row and handicapped accessible locations
- Cal fire tested certificate required

E20 FURNISHINGS

E2010 Fixed Furnishings

E2010.20 Window Treatments

- Manually operated fabric roller window shades with solar fabric
- Motorized fabric roller window shades with solar fabric.
- Vertical louver blinds with 3 ½" wide lover vanes.

E2010.30 Casework

Description: Cabinetry shall be provided per drawings, including science, classrooms, and miscellaneous assemblies. Casework will include sinks, appliances, Fume Hood, faucets, hinges, pulls, catches, latches, locks, shelves, doors, drawers and other components.

Construction: Provide plastic-laminate-faced casework as required by referenced quality standard, but not less than the following:

Balanced Construction: Provide panel components of balanced construction, with plastic laminate on both sides of each panel.

Joinery: Provide AWI premium-grade joinery, consisting of dowels, biscuits, or dowel screws and glue; or interlocking mechanical fasteners of equivalent strength as demonstrated by testing to performance standard indicated.

Bases: Provide bases of moisture-resistant construction consisting of one of the following:

- Plywood base separate from base cabinets designed to fully support base cabinet end panels and bottoms. Provide supports spanning front to back at 30-inch intervals.

- Provide components within 2 inches of floor constructed of solid lumber or exterior plywood.

Bottoms and Ends of Cabinets, and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch-thick particleboard, plastic-laminate faced.

Shelves Fixed and Adjustable: Plastic-laminate faced particleboard; 3/4-inch-thick for shelves no more than 30 inches long, 1-inch-thick for shelves more than 30 inches long.

Shelving in Cabinets over 60 Inches Tall: Provide one fixed shelf approximately centered vertically.

Adjustable Shelving Support: 5-mm holes on 32-mm centers.

Backs of Cabinets: 1/2-inch-thick particleboard, plastic-laminate faced. Provide removable backs for casework in laboratory areas for access to concealed utilities.

- Provide separate 3/4-inch-thick back panel where back of cabinet is exposed.

Drawer Fronts: 3/4-inch-thick particleboard, plastic-laminate faced.

Drawer Sides and Backs: 1/2-inch-thick thermoset decorative panels, with glued dovetail or multiple-dowel joints.

Drawer Bottoms: 1/4-inch-thick hardwood plywood, thermoset decorative panels dadoed into front, back, and sides of drawers. Use 1/2-inch-thick material for drawers more than 24 inches wide

Doors: 3/4-inch-thick, with particleboard cores, plastic-laminate faced.

Utility-Space Framing: Educational casework manufacturer's standard steel framing units consisting of 2 steel slotted channels complying with MFMA-4, not less than 1-5/8 inches square by 0.105-inch nominal thickness, and connected at top and bottom by U-shaped brackets made from 1-1/4-by-1/4-inch steel flat bars. Framing units may be made by welding specified channel material into rectangular frames instead of using U-shaped brackets.

Filler and Closure Panels: Provide where indicated and as needed to close spaces between cabinets and walls, ceilings, and indicated equipment.

Fabricate from same material and with same finish as adjacent exposed cabinet surfaces unless otherwise indicated.

- Provide utility-space closure panels at spaces between base cabinets where utility space would otherwise be exposed, including spaces below countertops.

- Provide closure panels at ends of utility spaces where utility space would otherwise be exposed.

- Provide knee-space panels (modesty panels) at spaces between base cabinets, where indicated. Fabricate from same material and with same finish as exposed cabinet backs.

Plastic-Laminate-Faced Cabinet Construction: As required by referenced quality standard, but not less than the following:

- Bottoms and Ends of Cabinets, and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch particleboard, plastic-laminate faced on exposed surfaces, thermoset decorative panels on semi-exposed surfaces.

- Shelves: 3/4-inch particleboard, plastic-laminate faced on exposed surfaces, thermoset decorative panels on semi-exposed surfaces.

- Backs of Cabinets: 1/2-inch particleboard, plastic-laminate faced; thermoset decorative panels on semi-exposed surfaces.

- Drawer Fronts: 3/4-inch particleboard, plastic-laminate faced.

- Drawer Sides and Backs: 1/2-inch thermoset decorative panels, with glued dovetail or multiple-dowel joints.

- Drawer Bottoms: 1/4-inch thermoset decorative panels glued and dadoed into front, back, and sides of drawers. Use 1/2-inch material for drawers more than 24 inches wide.

- Drawer Bodies: Steel drawer pans formed from 0.0359-inch-thick metal, metallic phosphate treated, and finished with manufacturer's standard 2-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat with a minimum dry film thickness of 1 mil for topcoat and 2 mils for system.

- Doors: 3/4-inch particleboard or MDF cores with wood stiles and rails, plastic-laminate faced.

- Leg Shoes: Vinyl or rubber, black, open-bottom type.

- Filler Strips: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets.

- Tables: Legs shall be 4-piece construction, 2-1/2" square with all corners radiused 1/4". Legs shall be secured to apron frame by heavy-duty corner bolt and a 14-gauge metal corner brace. Brace shall be locked into apron frames by accurately located grooves and securely fastened with screws. All apron frames shall be 3/4" thick x 5" high Maple hardwood (unless otherwise noted) with bottom edge radiused 1/4" and top edge grooved for securing top fasteners. Leg stretcher and cross-braces, 1-5/16" x 2-1/2", are to be provided secured to legs through a heavy-mortise and tenoned joint as well as 4" long chromium plated bolts. Movable tables, here identified as such, shall be provided with floor leveling glides, and leg shoes. Provide lockable heavy-duty casters, where specified, for movable open-leg tables.

Plastic-Laminate-Faced Manufactured Casework:

- Case Systems Inc.
- LSI Corporation of America; a Sagas International company.
- Stevens Industries, Inc.
- Terrill Manufacturing Company.
- Thermo Fisher Scientific Inc.

ELEMENT F SPECIAL CONSTRUCTION AND DEMOLITION

F20 FACILITY REMEDIATION

F2010 Hazardous Materials Remediation

F2010.1 SUMMARY

- Comply with the United States Environmental Protection Agency (USEPA) Renovation, Repair, and Painting (RRP) Rule Title 40 CFR, Part 745 and the Occupational Safety and Health Administration (OSHA) Demolition Involving Lead-Based Paint regulation (Title 29 CFR, Part 1926.62).
- Comply with USEPA Resource Conservation and Recovery ACT (RCRA) regulations located at Title 40 CFR, Part 263 for disposal of hazardous wastes.
- Conduct the work as described herein, including but not limited to, the following:
- Develop and implement a Health and Safety Plan.
- Demolition, handling, transportation, and disposal of hazardous materials and building materials which are coated with lead-based paint (LBP).

- .
- A. Identify, sample for disposal, package, label, document, remove, transport and dispose of containerized waste, refrigerants, oils, lubricants, paints, coatings, cleaners, lighting ballasts and fluorescent lamps, mercury switches, transformers, thermostats and any discovered items behind fixed walls or buried vaults.
- B. The Contractor shall be made aware that LBP exists on painted surfaces throughout the building.
- C. The Contractor is required to ensure the protection of workers performing asbestos abatement and any related demolition work that will affect surfaces coated with LBP, as well as protecting the public and the environment from exposure to lead-containing dusts.
- D. Contractor is responsible to either sample and analyze painted surfaces or assume that all existing painted surfaces are coated with LBP. Contractor is responsible for costs for sampling and analysis, at no additional cost to the Owner.
- E. The responsibilities of the Contractor in this Section include the furnishing of labor, materials and equipment required to remove, contain, recover, and dispose lead coatings and associated waste.
- F. Removal of paint from surfaces to facilitate demolition;
- G. Removal of temporary containment system structures daily, or as allowed by the Architect;
- H. Hazardous waste characterization sampling and analysis and disposal of abatement or demolition debris generated as a result of LBP removal and demolition in accordance with requirements of this section and Federal and State regulations pertaining to hazardous and solid wastes;
- I. Personal air sampling as required by OSHA for Contractor's employees that have the potential for exposure to airborne lead dusts as outlined in this section.

F2010.2 REGULATORY REQUIREMENTS

- J. OSHA Title 29 CFR 1910.1025 and 29 CFR Part 1926.62.
- K. USEPA, Resource Conservation and Recovery Act (RCRA).
- L. Commonwealth of Massachusetts, Department of Labor Standards 454 CMR 11.00, Structural Painting Safety Code, as currently amended.
- M. Commonwealth of Massachusetts, Department of Labor Standards 454 CMR 22.00.
- N. Commonwealth of Massachusetts, Department of Environmental Protection, Hazardous Materials Regulations at 310 CMR 30.00 as currently amended.
- O. Commonwealth of Massachusetts, Department of Environmental Protection, 310 CMR 6.0-8.0.

F2010.3 OTHER HAZARDOUS MATERIALS

- P. The Contractor is hereby informed that equipment, switches or transformers containing PCBs, and mercury-containing lamps, thermostats or switches may exist within the building. Equipment and fixtures containing hazardous materials must remain intact for proper disposal.
- Q. Responsibility for Hazardous Material Identification: The Contractor shall be responsible for taking necessary measures, methods or procedures appropriate to safeguard the health and safety of workers, visitors, and members of the public with respect to identification and of previously unidentified hazardous materials during the Work.
- R. Contractor shall be solely responsible for means and methods, and techniques used in the identification, sampling, collection, segregation, transportation and disposal of Hazardous Materials. Contractor is responsible for all sampling for laboratory sampling and analysis for disposal.
- S. Contractor shall at their own cost and expense comply with the Federal, State, and local laws, ordinance, rules and regulations during dismantling, demolition, and cutting of equipment containing hazardous materials, and the handling, storing, transportation and disposal of hazardous materials.
- T. Contractor shall be responsible for immediately notifying the Owner of evidence of a release of hazardous materials into the building or to the environment.
- U. Limited sampling was conducted for poly-chlorinated biphenyls (PCBs) in building materials such as caulk, paint and expansion joint. No PCBs were detected in building materials sampled. NO sampling by the Contractor or affiliates of the Contractor (subcontractors or sub consultants) for total PCBs shall be performed at any point during the performance of the work specified herein. If disposal facilities require PCB analytical testing of the waste stream, then Contractor is responsible for said testing at no cost to owner.

F2010.3 EXECUTION

- V. Prior to the commencement of work that may cause employees to be exposed to an airborne concentration of lead above the Permissible Exposure Limit (PEL), isolate the work area.
- W. Provide personnel monitoring, air sampling, recording and reporting in accordance with OSHA standards when work involving a potential exposure to airborne lead is in progress.
- X. Dispose of hazardous wastes and materials contaminated by lead-based paint in accordance with applicable regulations and guidelines, including the requirements of the Resource Conservation and Recovery Act (RCRA). Lead containing materials must be tested for Toxicity Characteristic Leaching Procedure (TCLP) analysis to determine appropriate disposal requirements.
- Y. Hazardous Material Locations – Any painted surfaces to be affected during building renovation. The Contractor is responsible for verifying final quantities prior to start of work. Contractor is responsible for characterizing via laboratory analysis all materials for disposal at no cost to owner.

Sample ID	Site	Lead Concentration (% Weight)
LP-1	White Paint on Wood-Sloped Roof Under Soffit	2.5
LP-2	White Paint on Wood Main Roof	6.7
LP-3	Red Paint-Steel Window Lintel	0.3
LP-4	Gray Paint on Roof Stair Rail	12
LP-5	Tan Door Paint on Metal Door #23	0.034
LP-6	Brown Paint Metal Door Assembly #23	0.068
LP-7	Brown Paint on Metal HVAC Ext. Near Kitchen	0.0084
LP-8	Tan Paint on Wood Garage Door	0.1
LP-9	Brown Paint Metal Door U2	0.12
LP-10	Brown Over Red Stair Rail Paint	20
LP-11A	White Textured Paint on Concrete- Front	0.035
LP-11B	White Textured Paint on Concrete- Front	0.013
LP-12	Tan Paint Ext. Metal Door	<0.008
LP-13	Brown Over Red Metal Door Assembly 109	0.42
LP-14	Pink- White Paint- Hall on CMU	0.0094
LP-15	Gray Paint Metal Door Dental	<0.008
LP-16	White Parking Stripe Paint Rear Near Kitchen	0.02
LP-17A	Yellow Paint on Curb	<0.008
LP-17B	Yellow Paint on Curb	0.6
LP-18	Gray Wall Paint on CMU Hall	<0.008
LP-19	Silver Paint on Bleachers Football Field	0.71
LP-20	DK Gray/Black/Green Announcement Booth	<0.008

A. Other Materials:

Material Description	Location	Est. Quantity	Units
Compact Fluorescent Bulbs	Throughout	200	EA
Fluorescent Bulbs (Mercury)	Throughout	12000	Tubes
Electric Light Ballasts	Throughout	6000	Each

Material Description	Location	Est. Quantity	Units
Thermostats and Switches (Mercury)	Throughout	500	Ampules
Emergency Light Batteries (Lead)	Throughout	80	EA
Refrigerants Associated With HVAC, Bubblers, HVAC Shop, Kitchen, Cooling Unit	Throughout	10000	Gallons
Fire Extinguishers (Compressed Gas)	Throughout	250	EA
Lead-Based Paint	Metal	NA	NA
Dark Room Chemicals	Dark Room	10	Gallons
Exit Signs (Tritium)	Throughout	80	EA
Chemicals in Sludge	Science Sink Traps, Drainage in Floor Trench, Science, Cosmetology, Xray, Auto Shop	50	Gallons
Laboratory Chemicals	Science Labs	Reuse	Reuse
Waste Oil and Other Fluids (Brake, Antifreeze, Etc.).	Automotive	20	Drums
Fuel Oil UST	Subsurface	1	Each
Lead Backed Wall and Door	Dental Shop	Reuse	Reuse
Xray	Dental Shop	Reuse	Reuse
Old Door Retractors	Remnant-Classrooms, Main Doors, Offices, Assemblies	50	Each
Hydraulic Fluid	Old Hydraulic Reservoirs	200	Gallons

Material Description	Location	Est. Quantity	Units
PCB Fluid	Transformers	200	Gallons

F2010.20 Asbestos Remediation

F2010.21 SUMMARY

- Z. Remove, encapsulate, or otherwise abate asbestos-containing materials (ACM) as described herein.
- AA. Dispose all ACM in accordance with governing laws and regulations; pay costs of permits and disposal.

F2010.22 CODES, REGULATIONS, AND STANDARDS - ASBESTOS ABATEMENT

- BB. OSHA: U.S. Department of Labor, Occupational Safety and Health Administration,
- CC. DOT: U.S. Department of Transportation
- EPA: U.S. Environmental Protection Agency (EPA)
 - State Requirements that govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:
 - Department of Environmental Protection (310 CMR 7.00) Latest Version
 - Department of Labor Standards (453 CMR 6.00—The Removal, Containment or Encapsulations of Asbestos)
 - Department of Transportation
 - Occupational Safety and Health Administration (OSHA)
 - Title 29 CFR 1926 - Construction Standard Requirements - Demolition Work
 - Title 29 CFR 1910.38(a);(b) - Emergency Action Plan
 - Title 29 CFR 1910.132 - Personal Protective Equipment
 - Title 29 CFR 1910.20 - Access to Employee Exposure and Medical Records
 - Title 29 CFR 1910.1200 - Hazard Communication
 - Title 29 CFR 1910.151 - Medical and First Aid

- EPA Guidance Documents: Discuss asbestos abatement work or hauling and disposal of asbestos waste materials listed below for the Contractor's information only. These documents do not describe the work and are not a part of the work of this contract. EPA maintains an information number (800) 334-8571, publications can be ordered from (800) 424-9065 (554-1404 in Washington, DC):
 - Guidance for Controlling Asbestos-Containing Materials in Buildings (Purple Book) EPA 560/5-85-024.
 - Title 40 CFR 61 Subpart A and M (Revised Subpart B) - National Emission Standard for Hazardous Air Pollutants - Asbestos.
 - Title 40 CFR 763 - Asbestos Hazard Emergency Response Act (AHERA) and Asbestos

the Asbestos Project Designer.

- Submit manufacturer's information that vacuums, ventilation equipment, and other equipment required to contain airborne asbestos fibers conform to ANSI Z9.2.
- Submit a detailed plan of the work procedures to be used in ACM abatement. Such plan shall include location of asbestos control areas, decontamination units, layout of decontamination units, location of access routes to asbestos control areas, interface of other trades involved in the building construction, sequencing of asbestos-related work, disposal plan, type of wetting agent and asbestos encapsulant to be used, air monitoring, and a detailed description of the method to be employed to control air or water pollution. Expand upon the use of portable HEPA ventilation system, closing out of the building's HVAC system, method of removal to prohibit visible emissions in work area, and packaging of removed asbestos debris. This plan must obtain written approval from the Architect prior to the start of asbestos work.
- Permit: Submit evidence that asbestos waste transporter maintains a current "Industrial waste hauler permit" specifically for asbestos-containing materials, as required for transporting of asbestos-containing materials waste to a disposal site.
- Waste disposal: Submit name, address, telephone number and asbestos waste permit information for landfill where asbestos waste will be disposed.
- Submit to the Asbestos Project Designer and Owner's Project Manager the design of the negative pressure system. Do not begin work until the submittal is approved by the Asbestos Project Designer.
- Accreditation and Certification: submit evidence in form of training course certificate of accreditation of Supervisor as an asbestos abatement supervisor and Workers as asbestos abatement workers. Also, submit applicable Massachusetts Department of Labor Standards (MA DLS) personnel certifications. All personnel must carry certifications on-site. Personnel without such certificates may not perform any functions related to asbestos abatement. Provide proof of training compliance with requirements as specified US EPA and OSHA.
- Submit to the Asbestos Project Designer a description of the plans for decontamination enclosure system construction and for work area isolation in compliance with this technical specification and applicable regulations.
- Submit a copy of a valid insurance certificate to conduct asbestos abatement work in the Commonwealth of Massachusetts.
- Five days before removing asbestos materials, contractor shall inventory the quantity of asbestos materials in each area of work and submit the quantity for written approval to the Owner's Technical Representative. It shall include the location, date, quantity of asbestos material, and name of the authorized person conducting the quantification. The Owner's Air Monitoring Technician shall verify all asbestos material quantification before work is begun. No claims for additional materials will be considered without performing this inventory and submitting it within the proper time to the Owner's Technical Representative.

F2010.24 NOTIFICATIONS

- Notify other entities at the job site of the nature of the asbestos abatement activities, location of asbestos-containing materials, requirements relative to asbestos set forth in these specifications and applicable regulations.
- Notify emergency service agencies including fire, ambulance, police or other agency that may service the abatement work site in case of an emergency. Notification is to include methods of entering work area, emergency entry and exit locations, modifications to fire notification or firefighting equipment, and other information needed by agencies providing emergency services.
- Notifications of Emergency: Any individual at the job site may notify emergency service agencies if necessary, without effect on this Contract or the Contract Sum.
- Notify federal, state, and local agencies having jurisdiction over the work

F2010.25 EXECUTION

- Material to be removed: materials previously-identified are located in the below table. The Contractor shall be responsible for selective demolition to locate hidden and inaccessible materials and providing unit prices for abatement of such materials prior to abatement. Quantities are listed in the below table.

Material Description	NESHAP Cat.	Location	Est. Quantity	Units
Pipe Insulation and Fittings >6-Inches in Diameter	Friable ACM	Pipe Trench, Behind Wet Walls, Boiler Room, Fixed Walls, Tunnels	2,500	LF
Pipe Insulation and Fittings < 6-Inches in Diameter	Friable ACM	Pipe Trench, Behind Wet Walls, Boiler Room, Fixed Walls, Tunnels	12,000	LF
Thermal System Insulation	Friable ACM	Breeching in Boiler Room, Generator Exhaust Insulation	800	SF
Vinyl Floor Tiles and Mastic, Various Colors	Cat. 1 Non-friable ACM	Classrooms and Offices	93,000	SF
Doors with Fire Insulation	Friable ACM	Majority of Classroom Doors with Windows, Doors Without Windows, Ten Doors in Cafetorium and Metal Doors at Electric and Transformer Room	245	EA

Wood Door Window Glaze	Cat. 2 Non-friable ACM	Majority of Classroom Doors with Windows	200	EA
Pink and Black Sink Coating	Cat. 2 Non-friable ACM	Science, Art, Break Rooms, Various Rooms	50	EA
Interior Window Glaze	Cat. 2 Non-friable ACM	Doors and Sidelights in Hall Assemblies	25	EA
Interior Window Glaze	Cat. 2 Non-friable ACM	2'x3' Windows Above Doors to Classrooms and Other to Hallways and Some Divider	200	EA
Interior Window Glaze	Cat. 2 Non-friable ACM	Admin Area, Offices in Kitchen Areas, Locker Rooms, Tech Areas. Majority 4'x4'	80	EA
Interior Vertical Caulking	Cat. 2 Non-friable ACM	Room 162	100	LF
Slate Window Sills Including Grout	Cat. 2 Non-friable ACM	Classrooms, Offices, Some Tech	2,200	LF
Black Mastic	Cat. 2 Non-friable ACM	Under Wood Floor In Gym	8,200	SF
Slate Boards With Glue Daubs	Suspect ACM, Not Sampled	Classrooms	100	EA
Old Flex Connectors	Suspect ACM, Not Sampled	On HVAC Near Ceiling in Technical Classrooms (HVAC, Auto Shop, Etc.), Gym, Other Areas in Tunnel or Fixed Walls	50	EA
Gaskets	Suspect ACM, Not Sampled	Located on Piping Connections, Valves, Ts	500	EA
Walk In Refrigerator and Freezer Mastic	Suspect ACM, Not Sampled	Cafeteria Kitchen and Kitchen for Foodservice	4	EA
Boilers	Suspect ACM, Not Sampled	Interior Components, Boiler Room and Pool Area	3	EA
Vault Door Fireproofing	Suspect ACM, Not Sampled	Admin Area	1	EA

Dry Transformer Transite	Suspect ACM, Not Sampled	Noted on Walls in Tech Shops	20	EA
Transite in Switch Gear	Suspect ACM, Not Sampled	In Electric Room, Typical Panels are 12"x6" with 20 Per Switch	100	EA
Fire Brick	Suspect ACM, Not Sampled	Chimney Lining	1	EA
Transite Fume Hood	Suspect ACM, Not Sampled	Science, Chemistry	1	EA
Gray Caulk *also assumed to contain PCBs	Cat. 2 Non- friable ACM	On Metal Flashing, Wood Shop to Low Roof	200	LF
Expansion Joint Caulk * assumed to contain PCBs	Non ACM, Sampled	Non-ACM Caulk at Exterior Gym, Pool, Tech Shops, Interior Gym, Pool, Hall Near Gym	2,600	LF
Gray Window Glaze *also assumed to contain PCBs	Cat. 2 Non- friable ACM	On Fiberglass Frosted Windows, Tech Shops, Gym, Pool. Approximate Sizes 10'x4', 20'x10', 6'x4'	190	EA
Gray Window Caulk *also assumed to contain PCBs	Non ACM, Sampled	Non ACM Exterior Window Caulk, Assumed to Contain PCBs	6,500	LF
Gray Window Glaze *also assumed to contain PCBs	Cat. 2 Non- friable ACM	On Exterior Windows, Various Sizes, Approximately 15'x4', 8'x4', 6'x4', 10'x4', 4'x4', other various sizes. Quantity includes any old caulk under new.	250	EA
Gray Caulk *also assumed to contain PCBs	Cat. 2 Non- friable ACM	Around Exterior Univents	480	LF
Dark Brown Caulk * also assumed to contain PCBs	Cat. 2 Non- friable ACM	Exterior of Chimney	40	LF
Roofing Asphaltic Type	Cat. 1 Non- friable ACM	Sloped Roof on Main School Building, Outbuilding with Football Training Gear and Wood Sheds Outside of Wood Shop	11,600	SF
Exterior Vapor Barrier	Cat. 2 Non- friable ACM	Black Coating on Copper Behind Brick Façade, Lower Courses Only	8,500	SF

Exterior Door Caulk *also assumed to contain PCBs	Cat. 2 Non-friable ACM	Exterior Doors, Old Under New	600	LF
Subsurface Transite	Suspect ACM, Not Sampled	Subsurface	1,000	LF
Other Latent/Inaccessible Items	Suspect ACM, Not Sampled	Inaccessible	--	--

F2010.26 ASBESTOS REMOVAL

- Do not begin any work in any abatement work area until the Owner's Technical Representative has performed a pre-work inspection. It is the Contractor's responsibility to notify the Owner's Technical Representative of their schedule and anticipated dates for the pre-work inspection.
- Inspection will be performed to assure all work area preparations are in place, as described herein. Any deficiencies in work area preparations will be corrected at this time. Work may not proceed until the Contractor receives written authorization from the on-site representative of the Owner's Technical Representative.
- Thoroughly wet to satisfaction of Owner's Technical Representative Asbestos-Containing Materials to be removed prior to stripping to reduce fiber dispersal into the air. Accomplish wetting by a fine spray (mist) of amended water or removal encapsulant. Saturate material sufficiently to wet to the substrate without causing excess dripping. Allow time for amended water or removal encapsulant to penetrate material thoroughly. If amended water is used, spray material repeatedly during the work process to maintain a continuously wet condition. If a removal encapsulant is used, apply in strict accordance with manufacturer's written instructions.
- Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels.
- Remove intact, saturated Asbestos-Containing Material in small sections from all areas. Do not allow material to dry out. For roofing or ceilings, lower ACM to ground—do not drop ACM from any height. As it is removed, simultaneously package material while still wet into disposal bags or other appropriate waste container. Twist neck of bags bend over and seal with minimum three wraps of duct tape.
- Evacuate air from disposal bags with a HEPA filtered vacuum cleaner before sealing.
- Clean substrate from which ACM was removed by wet wiping and using a HEPA vacuum until no visible debris remains.
- Encapsulation of Substrate: Perform encapsulation of substrate to lockdown any nonvisible fibers that may be remaining.

F2010.27 WORK AREA DECONTAMINATION

- Once the affected substrates are deemed clean by Owner's Technical Representative, Contractor shall collect all polyethylene sheeting to be disposed of as ACM waste and HEPA vacuum the general area.
- In both cases operation of the pressure differential system is used to remove airborne fibers generated by the abatement work.

F2010.28 DISPOSAL OF ASBESTOS WASTE

- Disposal Bags or Polyethylene Sheet Wrapping: Provide 12 mil thick, in total, leak-tight polyethylene bags or sheet wrapping, to contain all waste. On outermost layer, apply three labels
- Carefully load containerized waste in fully enclosed dumpsters, trucks or other appropriate fully enclosed vehicles for transport. Exercise care before and during transport, to ensure that no unauthorized persons have access to the material.
- Employ a waste hauler with required licenses from state and local authority with jurisdiction to haul the waste from the abatement work.
- Dispose of waste in a landfill that accepts asbestos waste materials. Advise the landfill operator or processor, at least ten days in advance of transport, of the quantity of material to be delivered. All waste shall be delivered to only one landfill.
- At disposal site unload containerized waste. At a disposal site, sealed plastic bags may be carefully unloaded from the truck. If bags are broken or damaged, repair or re-bag materials. Clean entire truck and contents, as appropriate.
- Retain receipts from landfill or processor for materials disposed.
- At completion of hauling and disposal of each load, submit copy of waste shipment record (WSR) and landfill receipt to the Owner's Technical Representative. The WSR must be returned to the Building Owner in no more than 35 days.

F30 DEMOLITION

F3010 Structure Demolition

F3010.10 Building Demolition

ELEMENT G SITEWORK

G10 SITE PREPARATION

G1010 Site Clearing

- Tree & shrub vegetation clearing and grubbing removal as required accommodating new construction shown on Drawings.

G1020 Site Utility Demolition

- Removal and/or abandonment of utility pipes, conduits, ducts, and structures indicated on the Contract Drawings.

G1020.10 Site Elements Demolition

- Protection of Existing Improvements: Provide protection necessary to prevent damage to existing buildings, paving, services and all other improvements indicated to remain in place. Restore improvements damaged during construction to their original condition, as acceptable to the parties having jurisdiction

- Sawcutting and removing asphalt paving and concrete pavement, removal, demolition and salvage of site improvements as required to accommodate new construction shown on Drawings.
- Salvageable Improvements: Carefully remove items indicated to be salvaged and returned to the Owner or reused, and store at the site for future use. Protect such items from accidental damage, vandalism and theft.
- Protection of existing Trees and Vegetation: Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, damaging heat from paving equipment, excess foot or vehicular traffic, or parking of vehicles within drip line. Tree protection along the edge of clearing and saved trees. Fencing to be 6' galvanized chain link or approved substitute.
- Water trees and other vegetation to remain within limits of contract work as required maintaining their health during the course of construction operations.
- Pruning existing trees where required by licensed Arborist.
- Repair or replace trees and vegetation indicated to remain that are damaged by construction operations as determined by a licensed arborist.
- Topsoil stockpiling (annual seed for stabilization).

G1030 Site Earthwork for Utility Trenching

- Satisfactory Soils
 - ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- Unsatisfactory Soils
 - Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
 - Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- Ordinary Borrow
 - Ordinary borrow shall meet the requirements of MassDOT M1.01.0.
 - It shall be well-graded, natural inorganic soil containing no stone greater than 6 inches maximum dimension.
 - The materials shall be free of trash, ice, snow, tree stumps, roots, and other organic and deleterious materials. It shall be free of highly plastic clays, of all materials subject to decay, or other materials that will corrode piping or metals.
 - Ordinary borrow shall have a maximum dry density of no less than 110 pounds per cubic foot. It shall be of such a nature and character that it can

- be compacted to the specified densities. Topsoil shall not be considered ordinary borrow.
- Existing available fill materials from onsite excavations may be reused as ordinary borrow if it meets the above requirements.
- Gravel Borrow
 - Gravel borrow shall meet the requirements of MassDOT M1.03.0, Type B.
 - It shall be an inert, hard, durable sand and gravel or stone obtained from an offsite commercial source.
 - It shall be free of ice, snow, roots, sod, rubbish, oil, hazardous material, and other deleterious or organic matter.
- ¾" Crushed Stone
 - ¾" crushed stone shall meet the requirements of MassDOT M2.01.4.
 - It shall consist of durable crushed gravel stone, free of ice, snow, sand, silt, clay, loam, shale, or other deleterious or organic matter.
- 1-1/2" Crushed Stone
 - 1-1/2" crushed stone shall meet the requirements of MassDOT M2.01.4.
 - It shall consist of durable crushed gravel stone, free of ice, snow, sand, silt, clay, loam, shale, or other deleterious or organic matter.
- Dense Graded Crushed Stone
 - Dense graded crushed stone shall meet the requirements of MassDOT M2.01.7.
 - It shall consist of a mixture of crusher-run aggregate of crushed stone mixed with natural sand and gravel soil obtained from an offsite commercial source.
 - It shall be free of ice, snow, roots, sod, rubbish, soil, hazardous material, and other deleterious or organic matter.
- Sand
 - Sand shall meet the requirements of MassDOT M1.04.1.
 - It shall consist of clean inert, hard, durable grains of quartz or other hard durable rock, free from clay, organics, surface coatings, or other deleterious or organic matter.

G1070 Site Earthwork

- Provide topsoil stripping, stockpiling, and screening
- Provide general excavation, stockpiling, placing and compacting and offsite disposal of excess materials as required to accommodate new construction shown on Drawings.
- Provide rock excavation/ledge removal and all associated permits, plans and coordination required for blasting. Reuse blasted rock fill in deep fills at landscape areas only no less than 36 inches from finish grade and of diameters of greater than 12".
- Provide dewatering, dust control, erosion and sedimentation controls to enable steady work progress.
- Provide fill materials: gravel borrow, structural fill, dense grade, sand, and crushed stone as required to accommodate new construction shown on Drawings.
- Provide erosion control blankets where vegetated slopes exceed 3:1.
- Stone Slopes: Placed stone (not dumped rip rap), reuse of excavated rock on site.

G20 SITE IMPROVEMENTS

G2010 Roadways

- Vertical Granite Curb (VGC): type VA-4, light gray color, free from seams and other structural imperfections, min. length shall be 6' unless otherwise specified on plan.
- Radial Curb: Type VA4 shall be used on all curves with a radius of 100' or less, where vertical granite curb is indicated.
- Vertical to Flush Transition Curb: Furnish vertical to flush transition curbs of same material as adjacent curb where shown on the drawings, to taper the reveal of the curb from 6 inches to 0 inches. Transition curb along a curve shall be of the same radius. The curb shall be manufactured for the purpose intended at the plant and shall not be field cut.
- Sloped Granite Edge (SGE): Sloped granite edging, Type SB as described in Section M9.04.2 of the MassDOT SSHB. Where shown on plan.
- Bituminous Concrete Curbing – Berms shall consist of Class I Bituminous Concrete, Type I-1, Top Course conforming with the Job-Mix Formula given in Section M, paragraph M3.11.03, SSHB and in accordance with the details of design as shown on the Drawings.
- Driveways: Paved driveways shall be of Bituminous Concrete conforming to MassDOT Specifications for 12-inches Gravel Borrow for Aggregate Base, 2 ½ -inches Bituminous Concrete Binder, and 1 ½ -inches Bituminous Concrete Top Course.
- Pavement Markings: Marking paint for crosswalks and lane markings shall be fast drying white traffic paint and fast drying yellow traffic paint as specified in MassDOT Standard Specifications under Sections M7.01.10, and M7.01.11, respectively. Work under this item shall be in conformance with Section 860 of the Standard Specifications and the Manual on Uniform Traffic Control Devices. Paint shall be applied with mechanical equipment to produce uniform straight edges, in two coats, at manufacturer's recommended rates.

G2020 Parking Lots

- Vertical Granite Curb (VGC): type VA-4, light gray color, free from seams and other structural imperfections, min. length shall be 6' unless otherwise specified on plan.

- Radial Curb: Type VA4 shall be used on all curves with a radius of 100' or less, where vertical granite curb is indicated.
- Vertical to Flush Transition Curb: Furnish vertical to flush transition curbs of same material as adjacent curb where shown on the drawings, to taper the reveal of the curb from 6 inches to 0 inches. Transition curb along a curve shall be of the same radius. The curb shall be manufactured for the purpose intended at the plant and shall not be field cut.
- Sloped Granite Edge (SGE): Sloped granite edging, Type SB as described in Section M9.04.2 of the MassDOT SSHB. Where shown on plan.
- Bituminous Concrete Curbing – Berms shall consist of Class I Bituminous Concrete, Type I-1, Top Course conforming with the Job-Mix Formula given in Section M, paragraph M3.11.03, SSHB and in accordance with the details of design as shown on the Drawings.
- Bituminous Concrete Paving: 12 inch compacted gravel borrow, min. 2-1/2 inch binder course, 1-1/2 inch top course type i-1
- Pavement Markings: Reflectorized traffic paint. 2 component epoxy adhesive at non-pedestrian areas. Acrylic traffic paint at handicapped markings and drop off zones.
- Concrete Vehicular Paving: medium broom finish 6" depth w/ reinforced welded wire mesh, 12" compacted gravel borrow, type B.
- Regulatory Parking Signs, reflectorized aluminum, galvanized steel sq. post.

G2030 Pedestrian Plazas and Walkways

- Basis of Design for Concrete Unit Pavers, Granite Pavers and Roof Deck Pedestal Pavers is Hanover Pavers (www.hanoverpavers.com). Please contact rep Harold Henry (hhenry@hanoverpavers.com) 800.426.4242 Ext.1201 for accurate quote
- a. Type A: Granite Pavers with following specifications
 - i. Custom Size – 2' x 4" (Stocked Size cut in half)
 - ii. Finish: Thermal/Flamed
 - iii. Weight: 2" thickness, 32 lbs/sf
 - iv. Tolerance: +/- 1/16"

- v. Color: Superior Black
- b. Type C – Pedestal Roof Deck Concrete Pavers
 - i. Green Roof Pavers
 - ii. Size – Primarily 2' x 2' with 2 additional rectangular sizes.
 - iii. Paver Color shall be one of the colors with high SRI that meets LEED certification
- c. Type D – Pedestal Roof Deck Wood Pavers
 - i. Basis of Design is TileTech IPE Wood Decking Tiles by www.tiletechpavers.com
 - ii. Surface shall be smooth
 - iii. Manufacturer shall provide adjustable pedestal system.
- Bituminous Concrete Pedestrian Paving: 8" compacted gravel borrow, min. 1 1/2" binder course, 1" top course type I-1.
- Concrete Pedestrian Paving: medium broom finish 4" depth w/ reinforced welded wire mesh 8" compacted gravel borrow. Sawn expansion joints maximum 30' O.C., control joints maximum 10' O.C. Integrally colored concrete admixture shall be incorporated in the concrete mix where indicated with sandblasted feature bands.
- Exposed Aggregate Concrete with Integral Color
- Integrally colored admixture concrete (for color concrete bands)
- Sawn Score Joints at all concrete
- Accessible Curb Ramps: Wheelchair Ramps shall be provided at all pedestrian crossings in compliance with the Americans with Disabilities Act (ADA). Ramps and landings shall be 4-inch concrete, air-entrained, 4,000 psi at 28 days. Ramps and landings shall be a minimum of 4-feet and transition slopes shall be a maximum of 12:1 and include ADA compliant detectable warnings with truncated domes.
- Reinforced concrete stairs and ramps with associated fabricated metal handrails and guardrails conforming to MAAB/ ADA regulations. Provide full-depth, precast concrete stair treads where shown on plans. Stainless steel handrails for exterior stairs and ramps shall be specified under Misc. Metals.
- Stone Dust Paving: on 12" compacted gravel borrow. Min 2" thick compacted stone dust. Stabilizer additive

G2050 Athletic, Recreational, and Playfield Areas

Baseball

- Baseball Field: Skinned infield consisting of 4" depth engineered infield mix (Basis of design DuraEdge Classic), a blend of 72% Sand; 12% Silt; 16% Clay. Pitchers mound and batters boxes shall include reinforced mound clay.
- Backstops: BVC CLF backstop with Hood. 22' height baseball (no hood baseball). Pressure treated wood kickstop.
- Bleachers: Galvanized angle frame structure with extruded aluminum seating, risers and decking. 50 person capacity. Chainlink perimeter guard. Wheelchair accessible seating in conformance with MAAB & ADA. Securely erected and surface-mounted to reinforced concrete pad. Basis of design GT Grandstands.
- Dugouts at Baseball: Pre-engineered, overhead canopy shade structure, sloped metal roof, metal posts, structure frame to be powder coated in custom color. Shade structure to be attached to thickened structural concrete slab. Basis of design Sportsfield Specialties.
- Scoreboards: Electronic LED scoreboards remote control. Console controller. 5 yr warranty. Basis of design Daktronics. Specified under Electrical Sections.
- Foul poles – 4" dia. powder coated steel 15' ht with mesh wing. Basis of design Sportsfield Specialties.
- NFHS compliant breakaway bases, pitching and home plate.
- Batting Tunnel: Steel structural support posts with high tension wire and netting system. Stone dust surfacing on 8" gravel base with 6"x6" recycled plastic edging. Basis of design Sportsfield Specialties BTTBS contact Matt Moyse tel 607-746-1462.

Softball

- Softball JV and Varsity Field: Skinned infield consisting of 4" depth engineered infield mix (Basis of design DuraEdge Classic), a blend of 72% Sand; 12% Silt; 16% Clay. Pitchers mound and batters boxes shall include reinforced mound clay. All softball fields including overlapping soccer field will be natural grass turf system. Varsity field will be irrigated.
- Backstops: BVC CLF backstop with Hood. 16' height. Pressure treated wood kickstop.
- Bleachers Varsity and JV Softball fields. Aluminum plank seating, risers and decking. 50 person capacity for Varsity, 30 person capacity for JV field. Chainlink perimeter guard. Wheelchair accessible seating in conformance with MAAB & ADA. Securely erected and surface-mounted to reinforced concrete pad. Basis of design aluma-stand by Dant Clayton.
- Dugouts Shelters at Varsity Softball: Pre-engineered, overhead canopy shade structure, sloped metal roof, metal posts, structure frame to be powder coated in custom color. Shade structure to be attached to a

thickened structural concrete slab. Basis of Design Sportsfield Specialties.

- Team Areas at JV Softball: team bench shall be extruded aluminum, mounted on concrete pad. Basis of design Sportsfield Specialties ATBNBSP contact Matt Moyse tel 607-746-1462
- Foul poles – 4" dia. powder coated steel 15' ht with mesh wing. Basis of design Sportsfield Specialties contact Matt Moyse 607-437-6622 mmoyse@sportsfield.com

Synthetic Turf (Football, Softball/Soccer Multi)

- Infilled Synthetic Turf Sports Field – Organic infill (basis of design Brockfill), rounded silica sand. 2" polyethylene slit film / monofilament dual fiber, permeable backing with dimensional stability layer. Shock pad basis of design Brock SP17 or equal. Perimeter reinforced cast in place concrete turf edger with. 8" thick open graded base stone layer with 4" thick top stone choker course. Herring bone flat drain system at 20' O.C. with 12" perf. CPP perimeter collector drains. Filter fabric over entire subgrade. Tufted/inlaid field markings.
- Bleachers – refer to home bleacher section.
- Scoreboards: One scoreboard for the football/track field and one scoreboard for the soccer/softball field. Electronic LED scoreboards remote control. Console controller. 5 yr warranty. Basis of design Daktronics. Specified under Electrical Sections.
- Soccer Goals: NCAA regulation portable goals with net. Tip resistant in accordance with ASTM F2673-08. Qty 6
- Football Goal Posts: MIAA 8' Gooseneck football goal posts (pair) with baseplate and anchor bolts. Qty 2

Sports netting: 20' – 40' height as indicated on plan, 1-3/4" Square Mesh, 1.2mm 4-Strand Braided, Ultra Cross Knotless Dyneema® netting with black vinyl steel posts supports and stainless cable tension system, distributed by Sportsfield Specialties. Stamped engineered submittal. Integrated with chain link fencing and concrete mow strip where indicated on drawings

Tennis

- 4" asphalt with 12" dense grade base.
- Sports Surfacing Color Sealcoat with Line Striping: Acrylic/sand textured court color sealer. 2 colors. Basis of design Nova Sports.
- Tennis Posts and Net: NFHS compliant net posts, powder coated steel, and net with tightening and tie down system.
- Pickle ball posts and nets - portable
- Tennis mesh windscreen with printed graphics 6' height installed to perimeter fencing. Basis of design Sportsfield Specialties.

Track and Field – 400m 6 lanes.

- Perimeter trench drain ACO-4000 or equal. Shall be installed entire inner radius of track.
- Track surfacing. 4" asphalt with 12" gravel base. Paved in place 1/2" permeable urethane track surfacing. Polyurethane binder base with SBR rubber granules, multi sprayed pigmented polyurethane EPDM granules, colored structural spray finish surfacing. (color blue). Certified installer and strip. Basis of design Beynon BSS 100
- Shot put concrete pad, toe board and stonedust throwing sector with recycled plastic timber edging.
- Discus concrete pad, ring, cage and net. NFHS compliant. Basis of design Sportsfield Specialties
- Long & Triple Jump aluminum pit system with integrated sand catchers and heavy vinyl pit covers.

Home Bleacher/ Pressbox/Wheel Chair Lift -

- Modular press box with galvanized steel flooring, galvanized steel stud wall units with architectural panel system, steel joists with aluminum soffit panels, EPDM rubber membrane roof, tempered glass with vinyl frame windows. Basis of design Dant Clayton
- Wheelchair lift to the press box to meet accessible building code compliance.
- Bleachers/Grandstands: 750 seat home bleacher, AISC certified steel fabrication, powder coated steel I-beam understructure, fully closed aluminum welded deck system, enhanced slip resistant deck finish, powder coated aluminum risers, ADA compliant seating.

G2060 Site Development

Site Furnishings

- Basis of Design for most site furnishings listed below is Landscape Forms (www.landscapeforms.com). Please contact rep Nadene Worth (nadenew@landscapeforms.com) for accurate quote
1. Wood/Metal Bench – Link Bench with following specifications
 - a. Straight Bench (Qty 14) with following dimensions 23.5" W x 87.5" L
 - b. Curved Piano Key Bench (140"R) (Qty 2) with following dimensions 27.5" x 78.5"
 - c. Powder coated metal supports shall be a standard color
 2. Gabian Seat Wall Mount Wood Toppers – Link Bench with following specifications
 - a. Straight Bench (Qty 10)
 - b. Curved Piano Key Bench (30 Degree Radius) (Qty 8)

3. Café Table – Model “Catena” (Qty 17) with following specifications
 - a. 36 “ Square with a metal base
 - b. Surface Material shall be Solid Surface Marneaux in color “Pebble” or “Mist”
4. Roof Deck Lounge Chairs – Model “Adirondack by LOLL” Qty (5)
5. Concession Table/Bench – Model “Rai Bench” with Configuration One High/2 Low (Qty 7)
6. Trash & Recycling Container – Model “Generation 50 Litter” with side open (Qty 9)
- Café Wood Seats – Basis of Design is “Diller Single Seats and Chairs” by Timber Site form Furnishings (www.site-furnishings.columbia-cascade.com) – Backless Seat (Qty 48). Backed Chair (Qty 20)
- Bike Racks – Basis of Design is “Letter Bike Rack” by Madrax (www.madrax.com). (Qty 8)

Play Equipment and Surfacing

- Playground Equipment (Ages 2-5)
 1. Basis of Design is Berliner Play (<https://berliner-playequipment.com/us/>)
Contact: Margie Salt (msalt@parkstreetplaygrounds.com); 978-337-6698 for accurate quote.
 - a. Fairview.01
 - b. O-Tannenbaum
 2. Basis of Design for Trike Bridge is Nature of Play (<https://natureofearlyplay.com>)
 - a. Trike Arch Bridge with custom embedded supports
 - b. Trick bridge shall be embedded between two PIP rubber mounds
 3. Basis of Design for Fence and Gate at Pre-K is Omega Elite Double Wire fence by Omega Fence Systems (<https://www.omegafence.com/en/elite.php>) Contact Martine Patenaude (martine.patenaude@metaltechna.com)
 4. Playground Safety Surfacing – poured in place rubber granules, 3-5 inch depth, SBR rubber basemat with ½” EPDM Wearing course, multi-color combinations
 5. Turf Mounds – “SYNAugustine347” available from SYNLawn (www.synlawn.com) 55 Fulton St #100, Canton, MA 02021 with sand infill
 6. Seating Stumps and Seating Logs are black locust, bark removed, sanded smooth and free of any sharp edges.
 7. Outdoor Dry Erase Board with Lockable Cabinet, including posts and hardware.

- a. Basis of design for 60"x36" outdoor dry erase board is by mywhiteboards.com
- b. Posts are 6"x6" southern yellow pine

Green Roof

- Extensive Green Roof –Sedum carpet in shale-based growing medium with drainage and protection mat as part of system. System thickness 4". Basis of Design: Green Roof System by www.zinco-greenroof.com and Sedum Blanket Supplier - Sempergreen. (www.sempergreen.com/en). USA Contact: Ivo van Breukelen – ivo@moeringsusa.com 312-995-3725.
- Semi-Intensive Green Roof –Shallow rooted shade loving perennials plants in shale-based growing medium with drainage and protection mat as part of system. System thickness up to 12". Basis of Design: Green Roof System by www.zinco-greenroof.com and Sedum Blanket Supplier - Sempergreen. (www.sempergreen.com/en). USA Contact: Ivo van Breukelen – ivo@moeringsusa.com 312-995-3725
- Intensive Green Roof –Shallow rooted shrubs and medium size trees in shale-based growing medium with drainage and protection mat as part of system. System thickness up to 24". Basis of Design: Green Roof System by www.zinco-greenroof.com and Sedum Blanket Supplier - Sempergreen. (www.sempergreen.com/en). USA Contact: Ivo van Breukelen – ivo@moeringsusa.com 312-995-3725

Misc. Site Improvements

- Gabian Site Improvements – Basis of Design is Omega Fencing. Please contact rep Jennifer Ress for accurate quote (jennifer@johnroccosales.com) Cell (609) 672-0748
1. Curved Gabian Seat Wall with following specifications
 - i. Elite Model "Framed Gabion Elite" with following specifications.
 1. Straight with powder coated metal and custom dimensions (Qty 20)
 2. Curved with power coated metal and custom dimensions (Qty 12)

Inspiration photo of the curved Gabion Seat with wood slat topper shown below:



- b. Gabion Fence Metal Signage – The Fence panels shall have 2 wrap-around corten steel panels with school logo laser cut. Inspiration photo below:



- Metal Shade Roof Pergola – Basis of Design is “DB107” in size 10’ x 20’ with Open Gable Extended Truss Ends by Poligon (www.poligon.com). Please contact rep Meghan O’Brien (MeghanO'Brien@obrienandsons.com) for a quote
- Outdoor Fitness that contains the following equipment. Basis of Design is Kompan (www.kompan.com). Please contact rep Erik Walsh for accurate quote (eriwal@kompan.com)
 - 1) Wide Overhead Ladder
 - 2) Decline Bench
 - 3) Parallel Bars
 - 4) Pull Up Station Pro
 - 5) Custom Include Press and Multinet
- Custom Granite Bench – The base of the seat wall shall be fabricated powder coated aluminum framed box with perforations and LED light inside. The wall mount shall be dark grey or black granite slab in 2 inch thickness and thermal finish. See inspiration photo below



- Drinking Fountains with Bottle Filling Station for exterior use: Steel outdoor drinking fountains/bottle filling stations. Securely attached to concrete pad. Basis of Design Halsey Taylor Endura 2. Qty. 1
- Flagpole: 50' high fiberglass flagpole with internal halyard. Qty. (2) Flush LED uplighting.
- Concrete filled steel bollards with welded cap reflective bands at service area specified under misc. metals.
- Steel barrier bollard fabricated from 3.2" x 1.8" I-beam profile steel stock with top plate welded to post. Hot-dip galvanized prior to painting. Mounting condition: removable and direct embed into concrete foundation. Basis of Design: HessAmerica Toro 900.
- Electronic vehicle access gates: The vehicle access control gates shall be an electronic bar arm gate with a 90° vertical raising motion. There are two (2) gates for control of the athletic field parking lot. Entry gate shall be controlled by code and/or access card mounted on separate bollard, refer to Security Section for controls. Gate housing shall be heavy duty steel with powder coated finish. Bar arm shall be aluminum with length of 12'. Bar shall raise within 2 seconds of activation. Ground loop activation shall be installed for free-exiting of parking lot. The basis of design shall be Model 1601 as provided by DoorKing 800-826-7493 www.doorking.com;
- Segmental Retaining Walls: 5000 PSI block gravity wall units with architecture finish on face and end Includes caps, drainage stone. Fence post anchoring system above wall where required. Basis of design: RediRock
- Wood/Metal Dumpster Screening Fence
 - a. Fence fabricated with galvanized steel C posts, brackets and eastern white cedar horizontal rails
 - b. Super C-Post by Gregory Industries, Canton, OH
 - c. 18 gauge pressed galvanized steel brackets
- Vehicular Barrier Gate
 - a. Steel Posts, rails, braces and fittings; SCH 40 pipes
 - b. 6" OD hinge post over 5" OD pipe with 4" arm and brace
 - c. Two 5" OD latch posts for open and closed conditions

- d. Locking equipment to include lock for owner and Knox padlock
- e. Shop painted black after fabrication.
- Cast-in-place Concrete Retaining Walls with precast concrete cladding and precast concrete cap. See drawings for locations.
- Stabilized Stone Dust Paving: 4" thick compacted stabilized stone dust on 6" compacted gravel borrow.
- Chain link Fence & Gates: Schedule 40 galvanized pipe, hot dipped per ASTM standards, black vinyl coated, thermally fused. Installed in concrete footings and continuous concrete mow strip. Integrated with sports netting where indicated on drawings.

Custom Site Improvements

- Entry Sign – Monumental entry sign masonry/concrete/metal with LED message board (by electrical) Qty 1.
 - Building mounted dimensional letters and graphics
 - Vehicular wayfinding signage
 - Specialty graphics and banners, including large format logos and mascots
 - Boulder Terraced Seating
1. As shown on drawings, these are terraced boulders and/or stand alone boulders, sourced from site (from the blast/excavation) and shall be irregular shaped; in roughly rectangular shapes, height dimensions range from 18" to 36" and length from 24" to 60" and widths from 24" to 36" (+/- 1.0 cy maximum size). Shown below is an inspiration photo of the intent



G2090 Landscaping and Soil Amendments

- Topsoil at planting and general lawn areas: fertile, friable, natural, loam,

amend existing topsoil to meet organic and ph requirements. 6 inch depth min. at lawns and seeded areas. 12 inch depth at planting areas.

- Topsoil at sports fields shall be sand-amended topsoil with minimum 80% sand. Coarse to medium sand shall be 60% or greater. Silts and Clays less than 10%. 8" depth. Minimum 6 inches per hour hydraulic conductivity.
- Sand base underlayer at sports fields shall be a compacted 80/20 2mm sand. 8" depth.
- Underdrainage at natural grass sports fields shall include 6" flat panel drains, laid on subgrade at 20' O.C in a herring bone pattern.
- Sand-based structural soil under pavements within tree root-zones. Planting mix combination of 4 parts medium to coarse sand, 1 part compost and 1 part topsoil. The hydraulic conductivity shall exceed 6 inches per hour
- Bioretention soil media within bioretention. Apply biofilter soil media from a qualified vendor in 12" lifts to the desired elevation of the bioretention.
- Planting mix for raised planters: Soil-less organic potting mix.
- General Seeded Lawns: Premium quality 50-30-20 Kentucky Blue Grass/Fescue/Perennial Rye. Maintenance period 90 days after germination includes fertilizer, mowing, watering, weed killer, aeration, reseeding.
- Seeded Lawn at Sports Fields: Premium quality Kentucky Bluegrass blend with sand amended native soil root zone. Maintenance period: Minimum 60 days after approved installation includes fertilizer, mowing, watering, pest control, aeration.
- Erosion Control Mats on all slopes 3:1 or greater.
- Deciduous Trees: Standard nursery stock, 1 year warranty. Tree guying, tree water bags.
- Evergreen Trees: Standard nursery stock, 1 year warranty. Tree guying, tree water bags.
- Deciduous & Evergreen Shrubs: Standard nursery stock, 1 year warranty
- Ground Cover: Standard nursery stock, container grown, 1 year warranty
- Irrigation – At natural turf sports field. Provide full coverage utilizing commercial grade equipment and heads such as Hunter I25-06-SS or equal. Provide controller with weather proof enclosure and remote, rain sensor, moisture meters and ET weather-based controller. Rotor spray heads only, PVC mainline and laterals. Domestic water source.

G30 LIQUID AND GAS SITE UTILITIES

G3010 Water Supply

- Water Supply:

- Use one or more of the following:
 - Ductile Iron Pipe and Fittings for Water Distribution: Water distribution mains shall be assumed to be 8-inch diameter. Fire service connections to buildings shall be assumed to be 8-inch diameter and domestic water service connections to buildings shall be assumed to be 4-inch diameter. All ductile iron water pipe shall conform to American Water Works Association (AWWA) C150 and AWWA C151. Water distributions systems shall be Class 52 ductile iron pipe with push-on or mechanical joints with gaskets conforming to AWWA C111. Ductile iron water pipe shall be double cement lined inside and asphalt seal coated in accordance with AWWA C104. The pipe shall be furnished with necessary materials and equipment recommended by the manufacturer for use in joining pipe lengths and fittings conforming to ANSI Specifications.
 - Hydrants: Fire hydrants shall have 6-inch mechanical joint inlet connections to the main, two 2 ½-inch hose connections, 180-degrees apart, and one 4 ½-inch steamer connection with valve openings 5 ¼-inches in diameter minimum in the valve seat. The standpipe shall have an 8 ½-inch minimum diameter. Hydrants shall have mechanical joint shoes, 5-feet 6-inches bury, 5 ¼-inch valve, and conform to the most recent revision of AWWA Specification C-502. Hydrants shall be thoroughly cleaned and given two shop or field coats of paint in accordance with AWWA C502. Hydrants shall be installed in conformance to AWWA C600 Section 11 using thrust blocks and restrained joints.
 - Disinfection of Water Mains and Appurtenances: All pipelines shall be disinfected, after testing and prior to being placed into service, in accordance with the AWWA Standard C651.
 - Hydrostatic Tests: After the pipe is laid, the joints completed, fire hydrants permanently installed, and the trench partially backfilled leaving the joints exposed for examination, the newly laid piping or any valved section of water supply lines or water service piping shall, unless otherwise specified, be subject for 2 hours to a hydrostatic pressure test of 200 psi as specified in AWWA Standards.
 - Siamese Connection (if required): Siamese shall be a "two-way" Siamese 4 x 2-1/2 x 2-1/2.
- Do not use:
 - PVC pipe or fittings.

G3020 Sanitary Sewer

- Pipe:
 - Use one of the following as directed on the plans:
 - Polyvinyl Chloride (PVC) Pipe for Sanitary Sewage Conveyance: Sanitary Sewage discharge pipes from buildings shall be assumed to be 6-inch diameter polyvinyl chloride (PVC) pipe. Sanitary Sewage mains shall be assumed to be 8-inch diameter PVC pipe. Sanitary Sewage pipe shall be type PSM, SDR-35 PVC pipe conforming to the requirements of American Society for Testing and Materials

(ASTM) D3034, current edition. Joints shall be elastomeric, oil resistant gasket joints conforming to the requirements of ASTM D3212, current edition, push-on type. Tee branches, wyes, and fittings shall be type PSM SDR-35 PVC pipe, conforming to ASTM D3034, current edition.

- Do not use:
 - Cast iron soil pipe and fittings, hub and spigot.
 - Cast iron soil pipe and fittings, hubless.
 - Concrete pipe.
 - Clay pipe.
 - Copper tube or pipe.
 - ABS pipe and fittings.
- Precast Concrete Vaults and Tanks
 - The precast reinforced concrete vault and tank structures shall be designed by a Massachusetts Registered Professional Engineer employed by the Contractor.
 - Concrete shall have a minimum 28-day compressive strength of 5,000 psi using Type II or III Portland cement with 8% maximum content of tricalcium aluminate, ASTM C150. Reinforcement shall be deformed billet-steel ASTM A615 or 7-wire strand ASTM A416, Grade 270 (if prestressed).
 - Pipe Connections: Vault and tank structures shall have pipe openings to accept the type of pipe specified. Pipe opening shall be minimum size required to receive the pipe and shall be accurately set to conform to the required line and grade. Sewer pipe shall be joined to the wall of the concrete structure with flexible pipe sleeves as indicated on the drawings. Flexible pipe sleeves shall be cast in the walls of the structure during the manufacturing process. Flexible pipe sleeves shall be NPC Kor-N-Seal Pipe-to-Manhole Connector as manufactured by Trelleborg Pipe Seals Milford, Inc., Milford, NH; Z-Lok as manufactured by A-Lok Products, Inc., Tullytown, PA; Tylox CIB Series Cast-In Boot Connector as manufactured by Hamilton Kent, Winchester, TN; or approved equal.
 - Bituminous Waterproofing: The exteriors surfaces of precast concrete structures shall be given two heavy coats of bituminous waterproofing material. The material shall be No. 35-J-10 Hi Building Bituminous Coating made by Mobil Chemical Company, Edison, NJ; Bitumastic Super Service Black made by Koppers Company, Inc., Pittsburgh, PA; Bitumastic 300M made by Caroline Company, St. Louis, MO; Sonoshield HLM 5000 as manufactured by BASF Corporation Building Systems, Shakopee, MN; or acceptable equivalent products. The waterproofing material shall be applied by brush or spray and in accordance with the instructions of the manufacturer. Time shall be allowed between coats to permit sufficient drying so that the application of the second coat has no effect on the first coat.

- Brick Masonry: Bricks shall be sound, hard, uniformly burned, regular, and uniform in shape and size. Only whole brick shall be used.
- Cleanouts and Tap Connection
 - Use one or more of the following:
 - Cleanouts shall be cast iron with a heavy-duty brass top. Cleanout frame and cover shall be set in concrete 12 by 12 by 6-inches deep, except where location is in bituminous paving. Set top of cleanout 1-inch above surrounding earth grade or flush with grade when installed in paving.
 - Tap Connections shall be branch connections to existing pipes shall be made by installing a saddle or wye connection.
- Sanitary Sewer Manholes:
 - Use the following:
 - Precast Concrete Manholes: Precast reinforced concrete manhole structures shall comply with material, design, and construction standards specified under ASTM C478. Manholes shall be 4-foot diameter. Manhole tops shall be precast concrete designed to meet American Association of Standard Highway and Transportation Officials (AASHTO) H20 loadings. Frames and covers shall be of cast iron conforming to the requirements of ASTM A48, Class No. 30. Cement for manholes shall be Type II and concrete shall have a minimum strength of 4,000 psi. Joints between sections of concrete structures shall be sealed with a self-sealing butyl rubber based flexible joint sealant gasket complying with ASTM C443. Manhole Steps and reinforcing rods shall conform to ASTM A615. Manhole frames shall be adjusted to finish course with brick masonry.
 - Do not use:
 - Poured-in-place concrete manholes.

G3030 Storm Sewer

- Pipe:
 - Use one or more of the following:
 - Corrugated Polyethylene Pipe: Stormwater collected within catch basins on site and on rooftops shall be conveyed through a closed drainage system using corrugated polyethylene pipe (CPP) as indicated on the Construction Documents. The CPP pipe shall be sized utilizing accepted engineering practices for closed drainage systems. CPP pipe shall conform to AASHTO M-294, AASHTO M242, or AASHTO MP6, Type S depending upon the diameter of the pipe. Corrugated Polyethylene Flared End Section: The pipe shall have an interior surface that is smooth and even, free from roughness, projections, indentations, offsets, or irregularities of any kind. Flared end section shall be high-density polyethylene meeting ASTM D3350 minimum cell classification 213320C. Metal threaded fastening rods shall be stainless steel.
 - Do not use:

- Cast iron soil pipe and fittings, hub and spigot: Hub and Spigot Cast Iron pipe and fittings shall be manufactured from gray cast iron and shall conform to ASTM A74. Joints shall be made using a compression gasket manufactured from an elastomer meeting the requirements of ASTM C564. Installation shall comply with manufacturer's recommendations and applicable code requirements.
- Cast iron soil pipe and fittings, hubless.
- Clay pipe.
- Copper tube or pipe.
- ABS pipe and fittings.
- PVC pipe and fittings.
- Reinforced concrete pipe except in public right-of-way.
- Catch Basins including Frame and Grate:
 - Use one or more of the following:
 - Precast reinforced concrete catch basins shall comply with material, design, and construction standards specified under ASTM C478. Frames and grates shall be of 4-flange cast iron. Catch basins shall have removable hoods and a minimum 4-feet deep pump.
 - Do not use:
 - Concrete block catch basins.
 - Stainless steel frame and grate.
 - Bronze frame and grate.
 - Wrought iron frame and grate.
- Area Drains including Frame and Grate:
 - Use the following:
 - Area drains shall be manufactured from PVC pipe stock, utilizing a thermo-molding process to reform the pipe stock to the specified configuration. The pipe stock used to manufacture the main body and pipe stubs of the surface drainage inlets shall meet the mechanical property requirements for fabricated fittings as described by ASTM D3034, Standard for Sewer PVC Pipe and Fittings; ASTM F1336, Standard for PVC Gasketed Sewer Fittings. Area drains shall be manufactured by Nyloplast or approved equal. The grates furnished for area drains in lawn and bioretention areas shall be ductile iron grates and 24" in diameter. Grates for area drains in paved areas shall be ductile iron and 12" square. Grates for area drains shall be capable of supporting H-25 wheel loading for in vehicular areas or H-10 loading in pedestrian only areas. Metal used in the manufacture of the castings shall conform to ASTM A536 grade 70-50-05 for ductile iron.
 - Do not use:
 - Bronze frame and grate.
 - Wrought iron frame and grate.
- Manholes:
 - Use one or more of the following:
 - Precast reinforced concrete manhole structures shall comply with material, design, and construction standards specified under ASTM

C478. Manholes shall be 4-foot diameter. Manhole tops shall be precast concrete designed to meet H20 loadings. Frames and covers shall be of cast iron conforming to the requirements of ASTM A48, Class No. 30. Cement for manholes shall be Type II and concrete shall have a minimum strength of 4,000 psi. Joints between sections of concrete structures shall be sealed with a self-sealing butyl rubber based flexible joint sealant gasket complying with ASTM C443. Manhole Steps and reinforcing rods shall conform to ASTM A615. Manhole frames shall be adjusted to finish course with brick masonry.

- Cast-in-place concrete.
- Do not use:
 - Concrete block drain manholes: Concrete block manholes shall only be utilized when it is not feasible to utilize a precast concrete manhole and then only with written approval from the Owner's Representative. Concrete block drain manholes shall be minimum 48 inches inside diameter and built of standard solid manhole barrel blocks set on a concrete or precast sectional plate base. The upper 2 feet of masonry shall be built using batter blocks. All joint spaces shall be completely filled, horizontal and vertical. All block to be thoroughly wet before jointing. A leveling course of two bricks at the top shall be used to meet proper grade. Cement concrete blocks shall be machine-made solid segments conforming to the requirements for Concrete Masonry Units for Construction of Catch Basin and Manholes, ASTM-C-139. Blocks shall be 6 inches in width with the inside and outside surfaces curved to the necessary radius and so designed that the interior surfaces of the structures shall be cylindrical. The top batter courses shall be designed to reduce uniformly the inside section of the structure to the top size and shape. The blocks used in the top courses shall be designed to produce a surface 8 inches in width upon which to seat the frame.
- Manhole Frames and Covers:
 - Frames and Covers: shall be of cast iron conforming to the requirements of ASTM A48, Class No. 30 and shall be manufactured by General Foundries Inc., North Brunswick, New Jersey; East Jordan Iron Works (formerly LeBaron Foundry, Inc.), East Jordan, Michigan; Neenah Foundry Company, Neenah, Wisconsin; or approved equal. Manhole covers shall be machined to fit securely and evenly on the frame. Frames and covers shall be designed to accept H20 loads, have a diamond surface finish, and frame height of 6 to 9-inches. Covers shall be equal to Item Numbers 12665 and 12685 (6" and 8-1/8" frame heights, respectively) as manufactured by General Foundries Inc. Catalog numbers are provided to establish a standard of quality and configuration of castings. Covers shall bear the word "DRAIN" "BOSTON DRAIN" (in Boston) in 3-inch-high letters.
 - Underground Infiltration and Detention Basins:
 - Use one or more of the following:

- Underground Detention or Infiltration Basins: Underground detention or infiltration basins shall be composed of corrugated polyethylene pipe (CPP) shall conform to AASHTO M-294, AASHTO M242, or AASHTO MP6, Type S depending upon the diameter of the pipe. CPP shall have an interior surface that is smooth and even, free from roughness, projections, indentations, offsets, or irregularities of any kind. Pipe and pipe fittings shall be high-density polyethylene meeting the requirements of ASTM D3350. Pipe shall be installed with a minimum 12-inch cover for AASHTO H-20 loading.

The pipe shall be placed within the crushed stone so that it is a minimum of 6-inches above the suitable base and has a minimum 6-inch cover. The crushed stone shall be wrapped in geotextile fabric with a 6-inch overlap. The crushed stone shall be covered with 6-inches of gravel borrow (MHD M1.03.0 Type A), ordinary borrow (MHD M1.01.0), and either 12-inches of gravel subbase (MHD M1.03.0 Type B) beneath paved surfaces or 4-inches of loam (MHD M 1.07.0) beneath pervious surfaces. Access manholes shall be provided at the four corners of the basin and inspection ports shall be provided for each pipe run.

- - Do not use:
 - Precast Concrete Vaults and Tanks: the precast reinforced concrete vault and tank structures shall be designed by a Massachusetts Registered Professional Engineer employed by the Contractor, in accordance with the Commonwealth of Massachusetts State Building Code, latest edition, American Concrete Institute, ACI 318 "Building Code Requirements for Reinforced Concrete", AASHTO, "Standard Specifications for Highway Bridges", Precast Concrete Institute, "Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products, MNL-116."
 - Water Quality Structures/Systems:
 - Use one or more of the following:
 - Water Quality Structures: The water quality structure shall have a proven laboratory test record of having the capability to remove a minimum of 80 percent of the sediment load from the low-flow storm conditions from the total catchment area of the drainage system. Laboratory testing methods shall conform to the "Technology Acceptance Reciprocity Partnership" (TARP) Tier II protocol or other acceptable equivalent method and shall have the capability of removing clay and silt size particles. The available water quality structure laboratory performance documentation shall achieve a grade of "2" or better as rated through the "Massachusetts Stormwater Evaluation Project" (MAStep). The water quality structure shall be installed underground as part of the stormwater system and be designed to accept AASHTO H-20 Loading. The water quality structure shall be equipped with a high flow bypass and

without backwater conditions so as to prevent resuspension of material. The structure shall be maintainable from the surface. Water Quality Structures shall be as manufactured by Stormceptor or approved equal.

- Water Quality Swales and Vegetated Swales: Swales shall meet the Massachusetts Department of Environmental Protection's Massachusetts Stormwater Manual design standards.
- Bioretention Basins: The bioretention basin shall be constructed of pea gravel, underdrain piping, drainage fabric geotextile, and plant soil media. The drainage-type woven geotextile fabric shall be used as a separation layer to prevent the soil media mix from migrating into the underlying gravel layer. The permeability of the drainage fabric shall be a minimum of 110 gal/min/sq.ft. The planting soil media shall contain a minimum of 65% sand, with 10%-25% clay and the balance as silts. The media shall be a uniform mix, free of stones, stumps, roots or other similar objects larger than one inch. The media shall be tested and shall have a pH range of 5.5 to 6.5, and shall also have a minimum permeability of 2 inches/hour in order to fully drain the surface volume of the bioretention area within 72 hours.
- Drains:
 - Use one or more of the following:
 - Area Drain: Area drains required for this contract shall be manufactured from PVC pipe stock, utilizing a thermo-molding process to reform the pipe stock to the specified configuration. The drainage pipe connection stubs shall be manufactured from PVC pipe stock and formed to provide a watertight connection with the specified pipe system. This joint tightness shall conform to ASTM D3212 for joints for drain and sewer plastic pipe using flexible elastomeric seals conforming to ASTM F477. The pipe bell spigot shall be joined to the main body of the area drain. A PVC cap shall be installed at the bottom of the area drain sump. The raw material used to manufacture the pipe stock that is used to manufacture the main body and pipe stubs of the surface drainage inlets shall conform to ASTM D1784 cell class 12454. Area drains shall be manufactured by Nyloplast or approved equal.
 - Manufactured Trench Drains: Trench drains shall be a pre-engineered, manufactured system that conforms to the design loading requirements of AASHTO H-20 and HS-20 (minimum) with the following minimum requirements:
 - Channels shall be manufactured from polyester resin polymer concrete with an integrally cast-in ductile iron edge rail. Each edge rail shall be at least 1/4" thick.
 - The polymer concrete shall be frost proof, dilute acid and alkali resistant, and salt proof (B117 Salt Spray Test Compliant)

- The system shall be 12" nominal internal width with a 14.2" overall width and a built-in slope of 0.5%. Channel invert shall have a partial radius in the trench bottom. All channels shall be interlocking with a male/female joint.
- Trench drain grates shall be slotted ductile iron conforming to ASTM 536-84, Grade 65-45-12. After removal of grates, there shall be uninterrupted access to the trench to aid maintenance.
- Units shall have horizontal cast in anchoring keys on the outside wall to ensure maximum mechanical bond to the surrounding bedding material and pavement surface.
- The trench drain shall have a locking device that directly connects the grate to the frame.
- Channel shall be designed to withstand loading to Load Class F as outlined by EN 1433. Grate type shall be appropriate to meet the system load class specified.
- Trench drain system shall be installed in strict accordance with manufacturer's installation instructions, recommendations, and shop drawings.

G40 ELECTRICAL SITE IMPROVEMENTS

G4010 Site Electric Distribution Systems

- 3000A concrete encased duct banks for underground secondary electric service
- 1200A concrete encased duct banks for underground electric services
- 800A concrete encased duct banks for underground electric services
- 400A concrete encased duct banks for underground electric services.
- 200A concrete encased duct banks for underground electric services.
- Electrical vehicle service equipment (EVSE) will be provided consisting of exterior 75kva transformers, panel boards mounted in NEMA3R enclosures, 2 inch conduit, and associated wiring serving 2 dual-charger charging stations each in a total of 5 locations. shall be located at Provide 2 EVSE locations at Athletics Building and 3 EVSE locations School Building.

G4010.10 Site Electrical Equipment

- Scoreboards: Electronic LED scoreboards remote control. Console controller. 5 yr warranty. Basis of design Daktronics. 3 scoreboards total.
- Electronic Message Board – see entry sign

G4050 Site Lighting

- Ornamental Pedestrian Light, full cut-off light, as specified under Section Element D5040.
- Street/Roadway Light, full cut-off light, as specified under Section Element D5040.
- In-ground Uplight (flagpole): ADA protective lens cover, as specified under Section Element D5040.
- Roadways and parking lots will have LED pole mounted luminaires in type II, III, IV light distributions mounted on aluminum poles. Luminaires will be high cut-off/dark sky friendly

- fixtures with no light spill at property lines. Pole mounted fixtures shall have wireless communication for network control-based dimming. All exterior lighting will be tied into the building low voltage lighting control system.
- Two Sports Lighting Systems: 70-80 ft. ht. galvanized steel poles with pole top luminaire assemblies and Controls. Concrete footings, 25 year warranty.

END OF DOCUMENT