

PROJECT MANUAL FOR:

BEVERLY MIDDLE SCHOOL

502 CABOT STREET • BEVERLY, MASSACHUSETTS



100% SCHEMATIC DESIGN

PREPARED BY:



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INTRODUCTION

10 PROJECT DESCRIPTION

1010 PROJECT SUMMARY

1010.10 Summary of Work: The Project consists of construction of the new 231,509 gross square foot Beverly Middle School building located at 502 Cabot Street, Beverly, Massachusetts, serving grades 5 through 8. The site is comprised of approximately 17 acres of land. The construction delivery method will be Construction Manager at Risk. The new building will be located on the site of the existing Memorial Building which will be vacated and demolished in its entirety prior to the construction of the new building. Exterior work will include the completion of related site improvements, underground utilities, parking and on-site service and fire access roadways, and new natural turf multi-purpose playing fields. The scope of site work includes ground improvements/piles, erosion control, roadways, pedestrian sidewalks, drainage improvements, retaining walls, earthwork, utility services, landscaping, site amenities, fencing, and athletic features. The Project includes the abatement and demolition of the existing Memorial Building. This Project has been designated as a Leadership-in-Energy-and-Environmental-Design (or "LEED") Project with an anticipated goal rating of Silver integrating into the construction the Owner's environmental operational mission. The Work of this Contract includes the construction process and special documentation, materials utilized, and the resulting building must meet the specified sustainability requirements.

- Contract Term: The Construction Manager may begin on-site work on or after receipt of a written Notice to Proceed, or suitable Letter of Intent. After commencement of work, the Construction Manager shall pursue the Work continuously and with diligence, and bring the Project to Substantial Completion by the date indicated in the Owner-Construction Manager agreement.
- Substantial completion is the stage in the progress of the Work when the work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the Work for its intended use. This includes any and all permits required by governmental agencies necessary for occupancy and use.
- Completeness: The Work shall be as shown on the Drawings and be complete in every respect and in conformance with all applicable requirements of the governing laws and codes.

1020 PROJECT PROGRAM

1020.10 Facility Program:

- The total floor area is 231,509 gross square feet.

1020.20 Program Spaces:

- Middle School Core Academic Spaces:
68,390 square feet inclusive of 47 Classrooms, 12 Science Labs (12 with prep rooms), and 12 Small Group Seminar

Beverly Middle School
Beverly, MA

Rooms, 12 Academic Team Rooms, and 4 Teacher Collaboration Rooms

- Special Education Spaces:
15,850 square feet inclusive of 4 Language Based Classrooms, 1 Opportunity Room, 2 Learning Centers, 4 Strategies Based Instruction Classrooms, 4 Student Support Program Classrooms, 1 Attain Classroom, 2 Therapeutic Learning Classrooms, 2 English Language Learners Room, 1 OT/PT Room, 1 Speech/Testing Room, 12 Small Group/Reading Rooms, 24 Small Inclusions Rooms, 1 SPED Dept. Chair Office, 1 SPED Meeting Room and 1 SPED Conference Room
- Art and Music Spaces:
6,550 square feet inclusive of 2 Art Classroom with Workroom/Storage & Kiln, 1 Band/Chorus Classroom, 1 MIDI Lab, and 4 Music Practice/Ensemble
- Vocations and Technology:
9,600 square feet inclusive of 1 Multimedia & Video Application Lab, 1 Technology Applications & Production Lab, and 1 Set Design & Construction Application Lab
- Health and Physical Education:
15,400 square feet inclusive of Middle School Gymnasium, Girls and Boy Locker Rooms, Health Instructor's Office, and Storage Rooms
- Media Center:
8,401 square feet inclusive of Reading Area, Computer Area, Circulation Desk, Office, Professional Library, and Classroom
- Auditorium:
7,300 square feet inclusive of Stage and seating area for 550 persons
- Dining and Food Service:
14,272 square feet inclusive of Kitchen, Serving Area, and Dining
- Medical Suite:
910 square feet inclusive of a handicap accessible toilet, Office, Exam Room and Resting Area
- Administration & Guidance Suite:
4,796 square feet inclusive of Conference Rooms, Offices, Administration Desk & Waiting Area, Work/Copy Room, Mail Room, Records Room
- Custodial and Maintenance:
2,870 square feet inclusive of Receiving Area, Storage, Workshop and Office

1030 PROJECT CRITERIA

1030.10 Code Analysis: Refer to Drawings G0.01 through G0.05 inclusive for additional information.

- All work shall be performed in accordance with all applicable codes including the following:

2009 International Building Code with Massachusetts Building Code, Eighth Edition amendments (780 CMR).

City of Beverly Zoning Ordinance, as amended.

2012 International Energy Conservation Code with Massachusetts Building Code, Eighth Edition amendments (780 CMR).

International Plumbing Code, 2012 edition, as published by the International Code Council, Inc. (ICC),

2009 International Mechanical Code, as published by the International Code Council, Inc. (ICC),

International Fuel Gas Code, 2009 edition, as published by the International Code Council, Inc. (ICC),

2008 Massachusetts Electrical Code (2008 National Electrical Code [NFPA 70], with Massachusetts modifications from 527 CMR 12.00).

Massachusetts Comprehensive Fire Safety Code (527 CMR).

National Fire Protection Association: NFPA 101 - Life Safety Code, 2009 Edition.

National Fire Protection Association: NFPA 241 – Standard for Safeguarding Building Construction And Demolition Operations, 2009 Edition.

International Code Council/American National Standards Institute, code standard: ICC/ANSI A117.1-2009 edition, Standard on Accessible and Usable Buildings and Facilities

United States Department of Justice, N° 28 CFR Part 36 - Americans with Disabilities Act, (Public Law 101-336).

United States Occupational Safety and Health Administration (OSHA): Standard N°. 29-CFR-1926.59 - Hazard Communication Standard.

1030.20 Sustainable Design Requirements:

- The Owner's environmental goals for the Project includes participation in the LEED™ (Leadership in Energy and Environmental Design) Program for Silver Certification under the United States Green Building Council's LEED Rating System, 2009 LEED NC (New Construction and Major Renovation), version 4. The Construction Manager shall refer to individual specification sections for more detailed requirements. In general highlights of the LEED program include the following goals:
 - Comply with sustainable site criteria.
 - Comply with energy efficiency criteria.

- Comply with water-use reduction criteria.
- Comply with low-emitting materials (low-VOC's) criteria and indoor air quality criteria.
- Comply with acoustics criteria.
- Comply with construction and debris waste diversion requirements.
- Comply with building commissioning criteria.
- Site Sustainable design features such as pervious concrete, bioretention, rainwater harvesting will be incorporated.
- Construction Manager's participation: The Construction Manager shall provide all administrative and procedural requirements necessary for the Owner to achieve its environmental goals in the construction of this Project.
- The Construction Manager shall incorporate into the construction specific "green" products, which comply with the Owner's environmental goals and objectives. Additionally the Construction Manager is required to utilize "green" products, which are part of the building process but not included in the final construction, (for example, cleaners, shipping containers and similar supplementary items).
- The Construction Manager is advised that special consideration and modification of the Construction Manager's means and methods may be additionally required to achieve the Owner's environmental goals which are beyond the requirements of the Contract Documents.
- The Construction Manager shall designate a trained and qualified representative responsible for instructing workers and overseeing the Owner's environmental goals for this Project.
- The Construction Manager shall provide a waste and recycling program for handling and disposal of solid waste, with a minimum 75% diversion rate.

1030.30 Facility Environmental Requirements:

- Major components of the Owner's environmental goals include stormwater management, potable water use reduction, energy efficient building enclosure and equipment, use of sustainable building materials, construction waste management/reduction, and indoor environmental quality.
- Stormwater management - The project is designed with low-impact site design strategies including pervious paving materials.
- Potable water use reduction - Water efficient plumbing fixtures are planned for all restroom facilities and showers. Externally, vegetation with low water demand is used as a substitute for turf grass in some places.
- Sustainable building materials - Preference is given to building materials with one or more of the following qualities: produced with recycled content – reducing demand on raw materials, manufactured regionally to reduce emissions related to

transportation, low-emitting material (VOCs), and wood-based products with no added urea-formaldehyde and harvested from well managed forests.

- Construction waste management – A construction waste management plan is to be developed by the Construction Manager prior to demolition and construction activity. The intent of the plan is to highlight the anticipated waste products that will be generated by the project and devise alternative methods of disposal to reduce landfilled material. Alternative methods may include salvaging materials, re-using materials off-site, or arranging for recycling pick-ups. The project goal is to recycled at least 75% (by weight) of C+D material from the project.
- Indoor environmental quality – From an air quality standpoint, low-emitting building materials will be used and the implementation of a construction IAQ management plan will be required of the Construction Manager. Among other things, the IAQ management plan will require absorptive materials to be protected from moisture and mechanical ducts and shafts to be covered during construction to protect against air quality issues during occupancy.

20 OWNER DEVELOPMENT

2010 SITE ACQUISITION

2020 PERMITS

2020.10 Building Permits: Construction Manager is responsible to ensure all required permits are obtained, and that the work pertaining to permits is properly inspected and certified. Trade subcontractors and subcontractors are required to obtain permits relating to their work.

2030 PROFESSIONAL SERVICES

2030.10 Architect:

- Ai3 Architects, LLC
526 Boston Post Road
Wayland, Massachusetts 01778

2030.20 Structural Engineering:

- Engineers Design Group, Inc.
350 Main Street, Floor 2
Malden, Massachusetts 02148

2030.30 Mechanical, Electrical, Plumbing and Fire Protection Engineering:

- Griffith & Vary, Inc.
Wareham Industrial Park
12 Kendrick Road
Wareham, Massachusetts 02571

2030.40 Civil Engineering:

- Pare Corporation
10 Lincoln Road, Suite 103
Foxboro, Massachusetts 02035

2030.50 Landscape Architect:

- Birchwood Design Group
46 Dike Street
Providence, Rhode Island 02909

2030.60 Specifications Consulting:

- Wil-Spec, LLC
Lynnfield Medical Office Building
15 Post Office Square
South Lynnfield, Massachusetts 01940

30 PROCUREMENT REQUIREMENTS

3010 PROJECT DELIVERY

3010.10 Project Delivery Method:

- CM At Risk as regulated by MGL c149A.

3010.20 Method of Payment:

- Guaranteed Maximum Price.

A SUBSTRUCTURE

A10 STANDARD FOUNDATIONS

A1010 WALL FOUNDATIONS

A1010.10 Wall foundations: Cast-in-place concrete foundation walls supporting exterior wall construction and interior wall bearing structure.

- Based on the recommendations of the Geotechnical Engineer, the structure would be supported on a pile foundation. The exterior walls will be supported on four foot deep Grade D Beams.
- Based on the recommendations of the geotechnical engineer for the alternate foundation system, the perimeter foundation walls would bear on continuous reinforced concrete strip footings extending at least 4 feet 0 inches below grade. The exterior foundation walls would be 14 inches to 16 inches thick, reinforced cast-in-place concrete walls on 24 inches to 36 inches wide continuous reinforced concrete strip footings around the perimeter of the building extending a minimum of 4 feet 0 inches below finished grade.
- Functional Requirements:
Performance requirements:
4,000 psi compressive strength concrete.
Bottom of exterior footing to be minimum 4 feet below grade.
Design requirements:
Sustainability or LEED requirements:
Recycled content shall not be less than 25% (flyash or slag).
Regionally extracted and fabricated materials.
- Components:
Concrete: Portland cement.

Aggregates:

Normal Weight Fine Aggregate: Shall be washed, inert, natural sand conforming to ASTM C33.

Normal Weight Coarse Aggregate: Shall be well-graded crushed stone or washed gravel conforming to ASTM C33.

Light Weight Fine and Coarse Aggregate: Shall conform to ASTM C330.

Potable water.

Admixtures:

Water reducing agent: ASTM C494, Type A. Water reducing agent shall be by same manufacturer as air entraining agent.

Mid-Range Water Reducing Agent: ASTM C494, Type A

High-Range Water Reducing Agent: ASTM C494, Type F or Type G.

Air entraining agent: ASTM C260.

Reinforcement:

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.

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.

A1010.20 Column Foundations:

- Based on the recommendations of the geotechnical engineer, a typical interior column in the four story classroom wings would be supported on 8 ft.-0 in. x 8 ft.-0 in. x 4 ft.-0 in. deep pile caps on a four pile group and a typical exterior column would be supported on 8 ft.-0 in. x 8 ft.-0 in. x 4 ft.-0 in. deep pile caps on a three pile group. The columns supporting the long span structure of the single story gymnasium, cafeteria, music spaces and other ancillary spaces would be supported on 8 ft.-0 in. x 8 ft.-0 in. x 4 ft.-0 in. deep pile caps on three pile groups. In addition, the ground floor slab would be supported on single piles with a 2 ft.-0 in. x 2 ft.-0 in. x 2 ft.-0 in. deep pile caps spaced out approximately 15 ft.-0 in. (including interior and exterior pile caps supporting the columns.) All of the interior and exterior pile caps will be tied to the supported concrete slab.
- Based on the recommendations of the geotechnical engineer for the alternate foundation system, the columns of the proposed structure would bear on reinforced concrete spread footings. With the proposed bearing capacity of the soil of 2 tons/square foot, a typical interior footing would be 9 feet by 9 feet by 24 inches deep in the four story wing and 8 feet by 8 feet by 24 inches deep in the two story areas. A typical exterior footing in the four story wing would be 8 feet by 8 feet by 24 inches deep and would be 7 feet by 7

feet by 24 inches deep in the two story space. Footings supporting the columns for the Auditorium and Gymnasium areas would be 8 feet by 8 feet by 24 inches deep. Footings at the braced frame locations would typically be 9 feet by 9 feet by 30 inches deep. The columns in the Media Center and the Main Entrance Lobby would be supported on 7 foot by 7 foot by 24 inch deep concrete footings.

- Functional Requirements:
Performance requirements:
4,000 psi compressive strength concrete.
Bottom of exterior footing to be minimum 4 feet below grade.
Design requirements:
Sustainability or LEED requirements:
Recycled content shall not be less than 25% (flyash or slag).
Regionally extracted and fabricated materials.
- Components:
Concrete: Portland cement.
Aggregates:
Normal Weight Fine Aggregate: Shall be washed, inert, natural sand conforming to ASTM C33.
Normal Weight Coarse Aggregate: Shall be well-graded crushed stone or washed gravel conforming to ASTM C33.
Light Weight Fine and Coarse Aggregate: Shall conform to ASTM C330.
Potable water.
Admixtures:
Water reducing agent: ASTM C494, Type A. Water reducing agent shall be by same manufacturer as air entraining agent.
Mid-Range Water Reducing Agent: ASTM C494, Type A
High-Range Water Reducing Agent: ASTM C494, Type F or Type G.
Air entraining agent: ASTM C260.
Reinforcement:
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.
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.

A40 SLABS-ON-GRADE

A4010 STANDARD SLABS-ON-GRADE

A4010.10 Alternate Slab Scheme Description: Based on the recommendations of the geotechnical engineer, the lowest level of the proposed building would be a 5 inch thick concrete slab-on-grade reinforced with welded wire fabric over a vapor barrier on 2 inch thick rigid insulation on 12 inches of compacted granular structural fill.

- Functional Requirements:
Performance requirements:
4,000 psi compressive strength concrete.
Design Requirements:
Sustainability or LEED requirements:
Recycled content shall not be less than 25% (flyash or slag).
Regionally extracted and fabricated materials
- Components:
Concrete: Portland cement.
Aggregates:
Normal Weight Fine Aggregate: Shall be washed, inert, natural sand conforming to ASTM C33.
Normal Weight Coarse Aggregate: Shall be well-graded crushed stone or washed gravel conforming to ASTM C33.
Light Weight Fine and Coarse Aggregate: Shall conform to ASTM C330.
Potable water.
Admixtures:
Water reducing agent: ASTM C494, Type A. Water reducing agent shall be by same manufacturer as air entraining agent.
Mid-Range Water Reducing Agent: ASTM C494, Type A
High-Range Water Reducing Agent: ASTM C494, Type F or Type G.
Air entraining agent: ASTM C260.
Reinforcement:
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.
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.

A4020 STRUCTURAL SLABS-ON-GRADE

A4020.10 Description: Based on the recommendations of the Geotechnical Engineer, the lowest level slab of the proposed structure would be a 12 in. thick reinforced concrete slab reinforced with 6 psf reinforcing over a vapor barrier on 2 in. thick rigid insulation on compacted granular structural fill supported on piles

A4090 SLAB-ON-GRADE SUPPLEMENTARY COMPONENTS

A4090.10 Underslab vapor barrier: In areas with moisture sensitive floor finishes or if required by code or floor manufacturer, Vapor barrier sheeting should be placed on the approved subgrade below the granular mat. Vapor barrier must have the following qualities

- Minimum thickness: 15 mils.
 - Permeance complying with ACI 302.2R.
 - Permeance after conditioning when tested in accordance with ASTM E 1745 (where applicable): Less than 0.01 perms (gm/ft²/hr/in-Hg).
 - Water vapor barrier tested by ASTM E 1745: Meets or exceeds Class A.
 - Manufacturers:
Stego Industries LLC, San Juan Capistrano, CA, product: "Stego Wrap (15 mil)".
1. W.R. Meadows, Hampshire, IL, product: "No. 723 Perminator (15 mil)".
Reef Industries, Houston, TX, product "Griffolyn -15 Mil Green.

A60 WATER AND GAS MITIGATION

A6010 BUILDING SUBDRAINAGE

A6010.10 Subgrade Enclosure Waterproofing: Adhered vertical waterproofing consisting of self-adhesive sheet membrane vertical waterproofing applied to exterior surfaces of below-grade concrete walls with prefabricated composite drainage board protection. Waterproofing membrane prefabricated composite sheet, minimum of 60 mils thick, consisting of 56 mils thickness of rubberized asphalt and 4 mils thick cross-laminated polyethylene film, self-adhering after removal of release paper, and furnished in 36 or 48 inch wide rolls, formulated for anticipated ambient temperature.

- Manufacturers:
Stego Industries LLC, San Juan Capistrano, CA, product: "Stego Wrap (15 mil)".
W.R. Meadows, Hampshire, IL, product: "No. 723 Perminator (15 mil)".
Reef Industries, Houston, TX, product "Griffolyn -15 Mil Green.

A6010.20 Elevator pit waterproofing: Cementitious waterproofing at walls and floor of elevator pits.

- Manufacturers:
Five Star Products, Inc., Fairfield CT, product Five Star Cementitious Waterproofing.
Silpro Masonry Systems, Inc., Ayer MA, product Sealcoat.
Thoro System Products, Miami FL, product "Thoroseal".

B SHELL

B10 SUPERSTRUCTURE

B1010 FLOOR CONSTRUCTION

B1010.10 Floor Structural Frame: A 5 ¼ in. light weight concrete composite metal deck slab reinforced with welded wire fabric on wide flange steel beams spanning between steel girders and columns. The weight of the structural steel is estimated to be 13 psf for the typical framing.

- Beams: Beams would be wide flange structural steel members.
- Girders: Girders would be wide flange structural steel members
- Columns: Columns would consist of steel HSS columns. In the Classroom Wings, the typical column size will be HSS 8 x 8 x 5/16. In the Auditorium, Gymnasium, Cafeteria and other double story spaced, the typical column size will be HSS 12 x 12 x 3/8.
- Lateral Load Resisting System: The lateral load resisting system for the structure housing the Gymnasium and Auditorium spaces would be comprised of reinforced masonry shear walls.

The typical lateral load resisting system for the other parts of the school would be concentric steel braced frames comprised of hollow structural steel sections.

- Functional Requirements:

Design requirements:

Sustainability or LEED requirements:

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.

Regionally extracted and fabricated materials.

- Components:

All wide flange shapes shall be newly rolled steel conforming to ASTM A992, Fy = 50 ksi 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 Fy = 46 KSI.

Structural pipe shall conform to ASTM A53, Grade B.

Anchor bolts shall conform to ASTM A307 or ASTM F1554 Fy = 105 ksi 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.

Filler metal for welding shall conform to AISC Code, 2005 Edition, Section I.4.5.

B1010.20 Floor Decks, Slabs and Toppings: The typical floor slab is 5 ¼ inch light weight concrete composite metal deck slab reinforced with welded wire fabric.

- Functional Requirements:

Design requirements:

Sustainability or LEED requirements:

All metal 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.

Regionally extracted and fabricated materials.

Components:

Floor deck shall be composite wide rib 2 inch deep sheet carbon, galvanized conforming to ASTM A611 or A653 with a minimum yield point of 40,000 p.s.i. Deck shall be formed with deformations to provide a mechanical lock between concrete and steel

B1020 ROOF CONSTRUCTION

B1020.10 Roof Structural Frame: The roof construction would be galvanized, corrugated 3 in. deep, Type 'N' metal roof deck spanning between wide flanged steel beams and girders. At locations of roof supported mechanical equipment, a concrete slab will be provided similar to the typical supported floor slab. The weight of the structural steel is estimated to be 12 psf.

- Beams: Beams would be wide flange structural steel members.
- Girders: Girders would be wide flange structural steel members
- Columns: Columns will consist of steel HSS columns. The typical column size will be HSS 8 x 8 x 5/16. In the Auditorium, Gymnasium, Cafeteria and other double story spaces, the typical column size will be HSS 12 x 12 x 3/8.
- Lateral Load Resisting System: The lateral load resisting system for the structure housing the Gymnasium and Auditorium spaces would be comprised of reinforced masonry shear walls.

The typical lateral load resisting system for the other parts of the school would be concentric steel braced frames comprised of hollow structural steel sections.

- Functional Requirements:

Design requirements:

Sustainability or LEED requirements:

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.

Regionally extracted and fabricated materials.

- Components:

All wide flange shapes shall be newly rolled steel conforming to ASTM A992, $F_y = 50$ ksi 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 A307 or ASTM F1554 $F_y = 105$ ksi 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.

Filler metal for welding shall conform to AISC Code, 2005 Edition, Section I.4.5.

B1020.20 Roof Decks, Slabs and Sheathing: The typical roof slab is 3 inch metal deck

- Functional Requirements:

Design requirements:

Sustainability or LEED requirements:

All metal 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.

Regionally extracted and fabricated materials.

- Components:

Roof deck shall be 3 inch deep sheet carbon, galvanized conforming to ASTM A611 or A653 with a minimum yield point of 40,000 p.s.i.

B1080 STAIRS

B1080.10 Interior Stairs: Steel pan stairs with concrete fill, having intermediate landing construction, complete with all supporting members and customized railings.

B1080.20 Performance Requirements: Conform to all requirements of those codes and regulations referenced. Sizes of all headers, stringers, and other structural members; and gauges and configurations of all riser tread and landing plates and pans,

handrails, stringers, and posts shall be as indicated on the approved shop drawings, and in accordance with the standards of the National Association of Architectural Metal Manufacturers.

- Design, fabricate and install stairs to safely support a minimum live load of 100 pounds per square foot and a concentrated load of 300 pounds on any area of four square inches as required under Section 1607 of the 2009 International Building Code with Massachusetts Building Code, Eighth Edition amendments.
- Design, fabricate and install all railings in a manner which will ensure the railings will be capable of withstanding loads as follows and as required under Section 1607 of the 2009 International Building Code with Massachusetts Building Code, Eighth Edition amendments.
- Resist a load of 50 pounds per linear foot (0.73 kN/m) applied in any direction at the top and to transfer load through railing supports to structure.
- Resist a single concentrated load of 200 pounds (0.89kN) applied in any direction at any point along the top, and to transfer load through railing supports to structure. Concentrated loading requirements are not concurrent with other loading requirements.
- Intermediate rails, balusters and panel fillers shall resist a horizontally applied load of 50 pounds (0.89 kN) on an area equal to 1 square foot (.093m²), including openings and space between rails. Reactions due to this loading are not required to be superimposed with loadings specified for top rail.

B20 EXTERIOR VERTICAL ENCLOSURES

B2010 EXTERIOR WALLS

B2010.10 Exterior Wall Construction: Masonry (natural stone, precast concrete) and aluminum siding backed by cold-formed metal framing.

B2010.20 Cavity Wall Construction:

- Metal stud framing: Cold formed engineered stud framing, 18 gauge or heavier steel studs with G90 galvanizing, spaced not more than 16 inches on center.
- Veneer wall stud framing will be designed to resist wind loads calculated for the Project by the 2009 International Building Code with Massachusetts Building Code, Eighth Edition amendments, with deflection not to exceed 1/720 where framing carries masonry veneer.
- Sheathing: 1/2 inch thick gypsum sheathing board complying with ASTM C 1177 with fiberglass mat surface front and back with silicone-treated gypsum core.
- Nailable Composite Insulation: Provide polyisocyanurate foam core insulation panels with a nailable wood fiber composite board surface that is acceptable to the roofing manufacturer for its warranties.

Provide panels consisting of an polyisocyanurate foam core bonded to oriented strand board (OSB) top layer and a fiber reinforced facer sheet on the bottom layer complying with ASTM C1289, Class 1 type V panel.

Nailable face: APA rated Sheathing OSB, 7/16 inch thick having a minimum span rating of 24/16, touch-sanded OSB.

Core: closed cell polyisocyanurate foam having a nominal compressive strength of 20 PSI (38 kPa) and a density of 2.0 pounds per cubic foot (32 kg/m³).

Bottom face: black glass fiber-reinforced felt facing sheet.

Manufacturers:

Carlisle, Denver CO, product "R2+ Base Commercial Grade Insulating Nail Base".

Atlas Roofing Corporation, Meridan MS, product "ACFoam Nail Base Insulation".

Cornell Corporation, Cornell WI, product "ThermaCal".

- Air and Vapor Barrier Systems:

Wall air barrier systems at masonry veneer: Prefabricated composite sheet 0.9 mm (36 mils) of self-adhesive rubberized asphalt integrally bonded to 0.1 mm (4 mils) of cross-laminated, high-density polyethylene film to provide a minimum 1 mm (40 mil) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed.

Manufacturers:

Henry product: "Blueskin SA".

Carlisle product: "CCW-705 Vapor/Air Barrier System".

Grace product: "Perm-A-Barrier Wall Membrane (Air & Vapor Barrier)".

Tremco product: "ExoAir 110" or "ExoAir 110LT" (low temperature), as recommended by manufacturer for field conditions present at time of installation.

- Exterior Wall Insulation:

Rigid Insulation: 3 inch thick of size to suit spacing through-wall reinforcement. Closed cell rigid extruded polystyrene foam board insulation, square edge, self-extinguishing, conforming to ASTM C 578, Type IV, with a compressive strength of 25 pounds per square inch when tested in accordance with ASTM D 1621 equal to Dow Chemical Corp., Styrofoam Brand "Cavity Mate Plus" insulation.

Manufacturers:

Amoco Foam Products Company, Atlanta, GA.

Dow Chemical Corp., Midland MI.

UC Industries (Division of Owens-Corning), Parsippany, NJ.

- Precast Concrete: Furnish finished and cured, reinforced plant-cast architectural concrete panels, sills, caps, lintels, medallions, watertable, and trim elements for installation under Masonry.

Design Loads: Design panels and connections to support total loads including dead loads, live loads, earthquake loads, thermal loads, wind loads and other loads as prescribed by applicable building codes for this project location and by reference standards.

Precast concrete fabricator shall prepare design calculations in accordance with PCI Manual 121, "Manual for Structural Design of Architectural Precast Concrete". The calculations shall be certified, stamped and signed by a Structural Engineer registered in the State where project is located.

Cement: ASTM C 150, Portland Type III - High Early Strength, white color. Use only one brand throughout project.

Fine Aggregate: Washed, inert, sand of with color characteristics which when combined with other constituents will produce concrete of specified color. Fine aggregate shall conform to ASTM C33.

Coarse Aggregate: Provide aggregate conforming to ASTM C 33. Hard, durable, carefully selected and graded; free of material causing staining or reacting with cement. 3/8 inch and 3/4 inch stone of color, type and size gradation to Architect approved sample.

Air Entraining Admixture: ASTM C260 as approved by Architect.

Water-Reducing Admixture: ASTM C494, Type A, unless otherwise approved by Architect.

Water: Clean and not detrimental to concrete.

Color Additive: Color additives shall contain pure, concentrated mineral pigments specially processed for mixing into concrete, resistant to alkalis and complying with ASTM C979

B2010.30 Natural Stone Veneer:

- Simulated stone product, pattern and color shall be equal to Natural Stone Veneers International, Inc., simulated stone veneer in color mix as selected by the Architect. Stone shall simulate naturally textured and layered stone with long dimensional splits along parallel planes with distinct textural foliation and rock cleavage.

Reinforcing: Expanded metal lath, with opposed 'U-shaped' 3/8 inch deep solid metal ribs at 1-15/16 inches on center, weighing 3.4 pounds per square yard, hot-dipped galvanized, and complying with ASTM C 847.

Specified Manufacturer (Basis of Design): To establish a standard of quality, design and function desired, Drawings and specifications have been based on the products and

materials of Natural Stone Veneers International, Inc, Fond du Lac, WI.

B2010.40 Mineral Fiber Cement Siding:

- Wall panels: Cellulose fiber-reinforced cement panel siding with smooth surface texture, factory primed and finished with acrylic paint.

ASTM Standard Specification C1186 Grade II, Type A.

Panel size: 5/16 inch thick, by nominal 4 by 8 feet.

Flexural strength:

Along direction of panel: 2,300 psi when tested in accordance with ASTM C 473.

Across panel: 2,900 psi when tested in accordance with ASTM C 473.

Tensile strength:

Along direction of panel: 1,600 psi.

Across panel: 1,000 psi.

Basis of Design manufacturer: James Hardie Building Products, Inc., Orlando FL, product "Hardie Panel Smooth Panel Siding" or approved equal.

- Permeable insect barrier: Crush resistant extruded polypropylene fluted core with integral enhanced insect screen, equal to Cor-A-Vent, Inc., Mishawaka, IN., product No. SV-5.
- Reveal trim: Extruded aluminum 6063 aluminum alloy in T-5 temper with a minimum thickness of 0.050 inch, furnished in 12 foot lengths.

B2010.50 Exterior metal panels and soffits:

- Extruded Aluminum Siding and Soffits: Longboard Wood Grain Aluminum Siding and Soffits with alluminate bonded film finish is extruded aluminum with integrated venting system complying with the following:

Size: 6 inch "V" groove configuration.

B2010.60 Exterior Trim:

- Expanded rigid poly vinyl chloride with a small-cell microstructure, in profiles indicated, and complying with the following:

Density: Minimum of 0.50 g/cc per ASTM D792.

Water absorption: Less than 1 per cent per ASTM D570.

Hardness: At least 50 per ASTM D2240 (Shore D).

Flexural strength: At least 3,300 psi per ASTM D790.

Tensile strength: At least 2,200 psi per ASTM D638.

Basis of Design manufacturer: Vycom Corporation, Moosic PA, product: "Azek". or approved equal

B2020 EXTERIOR WINDOWS

B2020.10 Aluminum Windows: Aluminum framed windows in “punched” openings (masonry surrounding the window). These will be windows of single hung, project out or fixed design, 4 inch deep frame, thermal barrier window. Window frame extrusions will incorporate a non-metallic thermal break to reduce heat loss, and the insulating glass units will include a low-emissivity coating. Insect screens will be provided.

- Performance values: Conform to ANSI/AAMA 101-97 requirements for minimum performance classification H-AW45 (single hung) FW-AW100 (fixed) and AP-AW100 (project out), for air leakage, water drainage, water penetration, uniform structural loading.
- Glazing: Insulating glass, nominal 1 inch thick consisting of (1/4 inch clear glass and 1/2 inch air space and 1/4 inch clear glass), with high-performance low-E (low-emissivity) coating on the #2 surface. Glass performance U-value = 0.31 or less, (solar heat gain coefficient (SHGC) 0.39 or better.
- Basis of Design manufacturer: Graham Architectural Products, York, PA, product “Model 1450 (fixed), Model 2200SH (single hung) and Model 6800 (project out)” or approved equal.

B2020.20 Aluminum Framed Storefront: Prefinished aluminum exterior entrance and interior storefront framing systems, of the types specified herein, all required integral reinforcing, bracing members and related accessories for the framing systems, and all angles and clips, and other items required to anchor the systems to the building structure including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

- Doors: Entrance doors shall be extruded aluminum, preglazed, single acting, hinged doors, heavy duty, wide stile-and-rail type.
- Glazing: Insulating glass, nominal 1 inch thick consisting of (1/4 inch clear glass and 1/2 inch air space and 1/4 inch clear glass), with high-performance low-E (low-emissivity) coating on the #2 surface. Glass performance U-value = 0.31 or less, (solar heat gain coefficient (SHGC) 0.39 or better.
- Basis of Design manufacturer: EFCO Corp., Monett, MO.

B2020.30 Aluminum Curtain Wall: Extruded aluminum curtain wall system. Mullions 2-1/2 inch face width, by depth required to resist wind loads, Framing will incorporate a non-metallic structural strut between interior and exterior metal framing. U-value of 0.42 or lower when glazed.

- Glazing: Insulating glass, nominal 1 inch thick consisting of (1/4 inch clear glass and 1/2 inch air space and 1/4 inch clear glass), with high-performance low-E (low-emissivity) coating on the #2 surface. Glass performance U-value =

0.31 or less, (solar heat gain coefficient (SHGC) 0.39 or better.

- Glazing Type B: Insulating safety glass, nominal 1 inch thick consisting of (1/4 inch fully tempered clear glass and 1/2 inch air space and 1/4 inch fully tempered clear glass), with high-performance low-E (low-emissivity) coating on the second surface. Glass performance U-value = 0.31 or less, (solar heat gain coefficient (SHGC) 0.39 or better.
- Basis of Design manufacturer: EFCO Corp., Monett, MO, product "S-5600".

B2050 EXTERIOR DOORS AND GRILLES

B2050.10 Hollow Metal Doors and Frames:

- Exterior Frames: 14 gage, 0.067 inch thick, with a zinc coating supplied by the hot-dip process conforming to ASTM A653, Grade 37, with coating applied in accordance with A 924.
- Exterior Doors: ANSI 250.8, Level 3, Model 2 (Seamless), ANSI A250.4 Physical Performance Level B, (Extra Heavy Duty) having 16-gage, 0.058 inch thick (1.46 mm) galvanized steel faces, with a minimum R factor of 14.

B2050.20 Overhead Coiling Doors:

- Overhead Coiling Doors: Insulated aluminum slat doors, complete with tracks, clip angles, guides, operating hardware and mechanisms, operating control station, and all related items.

Curtain: Interlocking, roll formed, insulated slats with endlocks attached at each end of alternate slats to prevent lateral movement.

Counterbalance: Oil tempered helical torsion springs, housed in steel tube or pipe barrel, supporting the curtain designed for a 50,000 cycle life with a deflection not exceeding 0.03 inch per foot of width, equipped with ball or roller bearings, and adjustable by means of external tension wheel.

Brackets: Minimum 3/16-inch thick steel plate, for supporting barrel, counterbalance mechanism, and hood, with a high factor of safety.

Hood: 24 gage, minimum, aluminum, beaded, and flanged to prevent deflection with intermediate support. Equip hood with internal neoprene/rayon baffle weatherseal.

Guides: Continuous, vertical mounted galvanized, formed from three 3/16 inch thick angles. Provide guides with vinyl weather strips to seal against interior and exterior faces of curtain. Provide windlock bars per manufacturer's standard.

Motor: 1/2 HP 115/230 VAC single phase, totally enclosed, instant reversing, with electric interlock to prevent operation when lock bolts are engaged in guides.

Finish: Slats, bottom bar, guides and hood: Phosphate treatment followed by baked-on polyester powder coat, minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better.

Basis of Design manufacturer: Overhead Door Corporation, Inc., Lewisville, TX, Product: "Stormtite 625 Series".

B2050.30 Multi-Leaf Vertical Lift Doors:

- Electrically operated sectional door assembly, complete with tracks, clip angles, guides, operating hardware and mechanisms, operating control station, and all related items.

Panels: Paneled aluminum construction, extruded aluminum stiles and rails; stile and rail joints welded; rabbeted joints at meeting rails.

Door Nominal Thickness: 4 inches thick minimum.

Track: 11 gage thick, 2 inch wide rolled steel track, continuous on piece per side; galvanized steel mounding brackets, 1/4 inch thick.

Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of stainless steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.

Lift Mechanism: Torsion spring on cross head shaft, with braided steel lift cables.

Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of stainless steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.

Motor: 1/2 horsepower, 120 VAC single phase 60 hz, NEMA MG1, Type 1 -general purpose, instant reversing, with electric interlock to prevent operation when lock bolts are engaged in guides.

Aluminum finish: Shop-applied, fully oven cured Polyvinylidene Flouride (PVDF) resin based, high performance thermoplastic organic coating applied to all exposed surfaces, including all exposed screws, fastenings, having a minimum total film thickness of 2 mils and conforming to AAMA 605.2 (latest edition), NAAMM - Metal Finishes Manual.

Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Renlita Doors North America, LLC, Bonham, TX, "Series 2000 Hingeway Doors" or approved equal.

B2070 EXTERIOR LOUVERS AND VENTS

B2070.10 Exterior Louvers and Vents

- Louvers: Extruded aluminum fixed blade louvers with drainable blade profile; high performance painted finish, with

bird screen, and with insulated blank-out panels to cover excess louver area not connected to duct.

- Finish: Spray-applied multi-coat polyvinylidene flouride (PVDF) resin based, high performance thermoplastic organic coating conforming to AAMA 2605 having a total dry film thickness of not less than 2.0 mils in custom "non-exotic" color.

B30 EXTERIOR HORIZONTAL ENCLOSURES

B3010 ROOFING

B3010.10 Low-Slope Roofing Systems

- Fully adhered white EPDM membrane roofing system, including insulation and substrate, shall meet Underwriters Laboratories, Inc. Fire Hazard Classification "Class A" roof.
- Basis of Design Manufacturer: Carlisle SynTec, Carlisle, PA, product "Sure-White" or approved equal.
- Performance Requirements: Design roofing system for peak wind speed (3 second gust) of 110 miles per hour.
- Color: As selected by Architect having a Solar Reflectance Index (SRI) of 78 or greater.
- Warranty: Total system warranty, 20 years with enhanced wind uplift warranty.
- Roofing Components:

Roofing membrane: Fully adhered membrane: White colored (white on black) Ethylene propylene diene monomers formed into uniform, flexible sheets, fabric reinforced complying with ANSI/RAM IPR-2, with a nominal thickness of 60 mils.

Overlayment (recovery) Board: Non structural glass mat faced, noncombustable, water-resistant treated gypsum core panel, Dens-Deck by Georgia-Pacific 1/2 inch thick complying with ASTM C 1177 and FM 4450, Class I.

Extruded polystyrene roofing insulation having a compressive strength of not less than 25 psi. Minimum 6 inch thickness having R-value of not less than 30.

Thermal barrier: UL fire resistance rated, ASTM C79 'Type X' board, 5/8 inch thick, of largest sizes to minimize joints.

B3020 ROOF APPURTENANCES

B3020.10 Factory fabricated and finished roof edging, scuppers and trim formed aluminum alloy 6063, temper T5 0.050 inch thick.

- Fascia trim/ roof edge: Multi-component aluminum cant dam system, Factory Mutual Inc. certified Class I-90, and shall conform to the following additional requirements:

Edging shall lock membrane, preventing wind pullback.

Fascia shall freely thermal cycle on spring cant substrate.

Fascia may be factory modified for true radius application.

Fabricate assembly such that the fascia may be field installed without fastener penetration of either the roofing membrane or the cant waterdam.

Factory fabricate all pier miters, fascia sumps and spillouts.

- Finish: Polyvinylidene Fluoride (PVDF) shop applied three coat resin based, high performance thermoplastic organic coating in custom non-standard color to match Architect's sample, conforming to AAMA 605.2, NAAMM - Metal Finishes Manual.
- Basis of Design Manufacturer: Carlisle Corporation, Syracuse NY, product "Secure-Edge 3000".

C INTERIORS

C10 INTERIOR CONSTRUCTION

C1010 INTERIOR PARTITIONS

C1010.10 Metal Framed Drywall Partitions

- Framing: Non-structural steel framing members to receive gypsum board (drywall) finish extending from floor slab to overhead structure having acoustical insulation full height of partition.
- Furring channels: 7/8 x 2-3/4 inch, roll-formed, hat-shaped, furring channel 25 gage hot-dip galvanized steel conforming to ASTM C 645.
- Studs: 'C-shaped' screw studs, hot-dip galvanized steel complying to ASTM C 645, 20 gage (0.0329 inch [0.84 mm] minimum thickness), of widths indicated on the Drawings, or other gages as required under the specified standards to meet fire resistance ratings.
- Runners for metal studs: 'U-shaped' hemmed, hot-dip galvanized steel track conforming to ASTM C645, of gage and width to match respective stud sizes, or heavier gage per design requirements, having 1-1/4 inch leg, provided at tops and bottoms of all studs and at heads of all openings in stud partitions.
- Internal reinforcement for various stud conditions, and bracing as required: 10 gage, minimum, galvanized steel.
- Acoustical insulation: Mineral wool fiber insulation batts, conforming to ASTM C665 Type 1, and ASTM C553 with a nominal density of 2.5 pounds per cubic foot, nominally 3-1/2 inches thick.

C1010.20 Ceiling and soffit suspension system: Grid system for direct attachment of gypsum, drywall: Comprised of double web main furring tees, 1 1/2 inches high by 1-3/8 inches flange face by 0.020 inch thick; double web cross tees, 1 1/2 inches high by 15/16 inch flange face by 0.020 inch thick; 0.020 inch thick wall channels, with 1 1/2 inches interior web height; and all splices, clips, and related items. Provide Underwriters Laboratories Label fire-rated assemblies for locations requiring fire-rated ceilings and soffits.

- C1010.30 Corridor Walls: Smoke rated, full height partition from floor slab to slab above, with deflection track assembly at head of wall. Double framed wall construction with 3-5/8 inch deep metal studs 16 inches on center, acoustical insulation with one layer of 5/8 inch Type X gypsum board on both sides.
- Acoustical insulation: Mineral wool fiber insulation batts, conforming to ASTM C665 Type 1, and ASTM C553 with a nominal density of 2.5 pounds per cubic foot, nominally 3-1/2 inches thick
- C1010.40 Typical Interior Partition: Frame from floor slab to slab above. Partition construction: 3 5/8 inch metal studs 16 inches on center, with one layer of 5/8 inch gypsum wallboard each side.
- Acoustical insulation: Mineral wool fiber insulation batts, conforming to ASTM C665 Type 1, and ASTM C553 with a nominal density of 2.5 pounds per cubic foot, nominally 3-1/2 inches thick
- C1010.50 Partitions to receive tile finishes: Provide ½ inch thick cementitious tile backer board in lieu of gypsum wallboard.
- Acoustical insulation: Mineral wool fiber insulation batts, conforming to ASTM C665 Type 1, and ASTM C553 with a nominal density of 2.5 pounds per cubic foot, nominally 3-1/2 inches thick
- C1010.60 Partitions in Wet Areas: 5/8 inch thick moisture resistant (MR) gypsum board (green board). Provide Type X fire resistant board at demising partitions and partitions adjoining corridors.
- Acoustical insulation: Mineral wool fiber insulation batts, conforming to ASTM C665 Type 1, and ASTM C553 with a nominal density of 2.5 pounds per cubic foot, nominally 3-1/2 inches thick
- C1010.70 Gypsum Board Finish: Provide the minimum levels of gypsum board finishes as defined by the Gypsum Association recommended specifications GA-214 and GA-216, per the following:
- At areas hidden from view, except as otherwise specified: Level 1.
 - At areas hidden from view, requiring a fire resistance rating: Level 1.
 - At areas hidden from view, requiring smoke-resistance: Level 1.
 - At areas hidden from view, corridor side of all corridor partitions: Level 1.
 - At concealed plenum spaces above ceiling spaces: Level 1.
 - At non-occupied spaces: Level 1.
 - At surfaces scheduled to receive tile: Level 2.
 - At surfaces scheduled to receive painted finishes: Level 4.
- C1010.80 Masonry Partitions:

- Concrete Unit Masonry Partitions: 2 hour rated concrete masonry partitions, single wythe with all reinforcement, anchorage, and accessories, ASTM C90, Type 1, Class 1, normal weight, 2-core, 58 percent solid.

C1020 INTERIOR WINDOWS

C1020.10 Hollow metal frames for doors and for fixed-glazed window conditions: UL labeled and non-labeled, complete with internal reinforcing.

- Interior Frames: 16 gage, 0.053 inch thick, except as otherwise required for specific UL Label.

C1020.20 Pass Windows: Factory pre-assembled and fully glazed pass-through ticket window assembly, complete with installation hardware.

- Provide factory assembled unit including an aluminum extruded sliding track assembly, with an anti-lift design, security "H" bar, security lower track, interlocking panel retaining clips and associated accessories. Finish: exposed aluminum components to be satin anodized finish.
- Basis of Design Manufacturer: C.R. Laurence Co., Inc., Los Angeles, CA, product: "Aluminum Rolling Track Assembly".

C1030 INTERIOR DOORS

C1030.10 Interior Hollow Metal Doors 1-3/4 inch thick (44.4 mm): ANSI 250.8, Level 2, Model 1 (Full Flush), ANSI A250.4 Physical Performance Level B, (Heavy Duty) having 18-gage, minimum 0.042 inch (1.0 mm) steel faces, with a minimum STC rating of 32.

- Construction: Full flush commercial type, meeting or exceeding the materials, gages, construction, and testing requirements of the referenced ANSI and SDI publications.

C1030.20 Interior temperature-rise-rated door: ANSI 250.8, Level 3, Model 1 (Full Flush), ANSI A250.4 Physical Performance Level B, (Extra-Heavy Duty) having 16-gage steel faces, Temperature-rise-rated type door, UL Class A.

C1030.30 Flush solid core wood doors rated and non-rated, complete with necessary blocking, hardware cutouts; and provided with openings for glazing, where so indicated. Conform to the requirements set forth in the designated Sections of the (WDMA) Industry Standard IS 1-A-97, and the applicable requirements of U.S. Commercial Standard CS 171, as amended.

- Face veneer: Red Oak (*Quercus rubra*).

C1030.40 Sound Control Doors: 1-7/8 inch thick, of hollow metal construction, fabricated of two 18-gage, roller-leveled, prime quality cold-rolled steel sheets having internal construction matching tested assemblies. Doors shall have a sound transmission class rating (STC) of at least STC 49, tested in compliance with ASTM E90.

- Frames: 14 gage commercial grade cold-rolled steel conforming to ASTM A366 or commercial grade hot-rolled and pickled steel conforming to ASTM A569.

- Basis of Design Manufacturer: Overly Manufacturing Company, Greensburg, PA "Series SC, Model 5292185" or approved equal.

C1040 INTERIOR GRILLES AND GATES

C1040.10 Coiling Counter Doors:

- Coiling Counter Doors: Manually operated stainless steel coiling counter shutters, complete with guides, operating hardware and mechanisms, coil housings, and all related items.

Slats: Roll-formed interlocking flat-faced extruded 22 gage stainless steel sections, 1-1/2 inches high, 1/2 inch deep.

Bottom slat: Stainless steel angle minimum 1-3/4 by 1-3/4 inch by 12 gage. Provide extruded dual durometer polyvinyl chloride astragal.

Counterbalance: Oil tempered helical torsion springs, housed in structural steel pipe barrel. Deflection of pipe under full load shall not exceed 0.03 inches per foot of span. Fit end of barrel assembly with plug disc to facilitate access to counterbalance assembly.

Brackets: Minimum 16 gage hot-dipped formed galvanized steel, for supporting barrel, counterbalance mechanism, and hood, with a high factor of safety.

Hood: Formed 24 gage stainless steel.

Guides: Continuous, vertical mounted extruded alloy 6063-T5 aluminum. Provide guides with wool pile strip inserts on both sides of curtain to seal against interior and exterior faces of curtain. Attach to jambs with fasteners spaced not more than 12 inches apart.

Finish: Stainless steel components: No. 4 brushed finish.

Basis of Design Manufacturer: Cornell Iron Works, Inc., Mountaintop, PA, "ESC10" or approved equal.

C1040.20 Overhead Coiling Grilles:

- Overhead Coiling Grilles: Electrically-operated rolling grilles, complete with steel tube framing, aluminum guides, operating hardware and mechanisms, coil housings, and all related items.

Curtain: In line grille pattern, comprised of 5/16 inch (8mm) round ASI series 300 stainless steel bars spaced not more than 2 inch vertical centers, flexibly connected by eyeleted 3/4 inch stainless steel vertical links, equipped with tube spacers to maintain vertical link alignment.

Bottom bar: Stainless steel angles, of sizes recommended by manufacturer.

Counterbalance: Oil tempered helical torsion springs, housed in steel pipe barrel, supporting the curtain with a deflection not exceeding 0.03 inch per foot of width,

equipped with ball or roller bearings, and adjustable by means of external tension wheel.

Brackets: Minimum 5/16-inch thick steel plate, for supporting barrel, counterbalance mechanism with a high factor of safety.

Hood: 16 gage stainless steel with No. 4 satin finish, beaded, and flanged, with reinforced top and bottom edges to prevent deflection. Provide 1/4 inch (6 mm) steel intermediate support brackets to prevent excessive sag.

Guides: Heavy extruded aluminum shapes, of sizes indicated on the approved shop drawings, containing hard vinyl inserts to eliminate metal to metal contact, and equipped with double locking bars to engage end links and prevent grille from pulling out of guides under excessive pressure.

Operator and Bracket Mechanism Cover: Provide 24 gage stainless steel sheet metal cover to enclose exposed moving operating components at coil area of unit. Finish to match door hood.

Motor: 3/4 HP 208 VAC three phase, totally enclosed, instant reversing, with electric interlock to prevent operation when lock bolts are engaged in guides equal to Cornell DH/DJ series.

Finish: Stainless steel components: No. 4 brushed finish.

Basis of Design Manufacturer: Cornell Iron Works, Mountaintop, PA Model "Visionaire Series" or approved equal.

C1090 INTERIOR SPECIALTIES

C1090.10 Visual Display Surfaces:

- Markerboards: 4 feet high by width indicated on the Drawings having porcelain faced 24 gage cold rolled enameling steel over 7/16 inch thick fiberboard and backed with 22 gage steel sheet. Frame, extruded 6063-T5 alloy aluminum with clear anodized finish.
- Tackboards: 4 feet high by width indicated on the Drawings having Self-healing, mildew resistant vinyl embossed fabric covered 1/4 inch thick natural cork laminated to 1/4 inch thick fiberboard. Frame, extruded 6063-T5 alloy aluminum with clear anodized finish.

C1090.20 Safety Specialties:

- Fire extinguisher cabinets: Fully recessed, trimless cabinet with 5/8 inch thick, fully glazed door and concealed hinge.

Door and trim: Full Glass design with double-strength glazing. Door Type 304 Stainless steel with a Number 4 (satin) polished finish.

Vigilante alarm: Provide 9 volt, battery operated (battery included), plunger activated vigilante alarm.

- Fire extinguishers: Multi-purpose dry chemical type (mono ammonium phosphate), 10 pound capacity, multi-purpose rated '4A, 60B:C'; with metal valves and siphon tubes, replaceable molded valve stem seals, pressure gauges and hose discharge.

C1090.30 Lockers:

- Locker Types:

Locker Type 1 - Single tier, sloped-top, metal lockers at custodial suite.

Locker Type 2 - Double tier, sloped-top, ventilated metal lockers at team locker rooms.

Locker Type 3 - Four tier, sloped-top, ventilated metal lockers at student locker rooms.

Locker Type 4 - Single tier, sloped-top, metal lockers at kitchen.

- Components:

Sheet Steel: Mild cold-rolled and leveled 16 gage steel, free from buckle, scale, and surface imperfections.

Expanded Metal: 3/4 inch mesh flattened carbon steel, 13 gage minimum.

Fasteners: Cadmium, zinc, or nickel plated steel; exposed bolt heads, slotless type; self-locking nuts or locker washers for nuts on moving parts.

Equipment: Hooks and hang rods of cadmium-plated or zinc-plated steel or cast aluminum.

Sloping Tops: 20 gage steel minimum having a sloped rise approximately 18 to 25 degrees, finished to match lockers, in lengths as long as practicable but not less than 4 lockers. Provide closures at ends finish to match lockers.

Filler Panels: 18 gage steel minimum, factory-fabricated and finished to match locker units.

Locker Room Benches: Fixed-in-place benches (permanent), factory fabricated having varnished laminated maple seat and chromed steel pedestals.

Basis of Design Manufacturer: Republic Storage Systems Company, Inc., Canton OH; product: "Quiet Series Locker" or approved equal.

C1090.40 Toilet and Shower Accessories:

- Coat/robe hook: Surface mounted satin finish stainless steel double robe hook, fabricated from 22 gage type 304 stainless steel, protrudes from wall nominally 1-7/8 inches.
- Grab bars (of lengths and configurations as indicated on Drawings): Stainless steel, minimum wall thickness 18 gage (Stub's gage), with non-slip knurled, peened or striated surface.

- Grab bars at accessible showers: Stainless steel, minimum wall thickness 18 gage (Stub's gage), with non-slip knurled, peened or striated surface. 1-1/4 inch diameter with satin finished ends, concealed 1/8 inch thick mounting flange with snap on cover.
- Mirrors: One piece 3/4 by 3/4 inch type 304 18 gage stainless steel roll formed frame, with continuous integral stiffener on all sides. Corners shall be heliarc welded, ground and polished smooth corners. 1/4 inch thick safety glass, ASTM C 1048 FT, fully tempered, complying with Class 1 clear, quality q3 glazing select, conforming to ANSI Z97.1, with Class 1, standard commercial quality, electro-copper back-plating protected by a corrosion-resistant zinc-coating.
- Mop and broom holders: Surface mounted, nominal 44 inch long stainless steel unit with 18 gage 8 inch deep continuous shelf, 5 stainless hooks and 4 mop/broom holders, anti-slip spring loaded, rubber cam mop holders, capable of holding 7/8 to 1-1/4 inch diameter handles.
- Polyester shower curtain: white, 100 percent polyester mildew resistant, Teflon coated for water repellency and stain resistance. Fabricate curtain with hemmed edges and a fully weighted, anti-fungus, mildew resistant bottom hem and corrosion-resistant grommets along reinforced top edge every 6 inches (152 mm) on center through top hem.
- Shower seat: Folding type with cushion shall have a frame constructed of Type 304, satin finish stainless steel. Seat cushion shall be 1-1/2 inches thick foam padding mounted on 1/ inch thick plywood and covered in water-resistant reinforced vinyl fabric. Seat shall be able to lock in upright position when not in use and comply with ADA Accessibility Guidelines (ADAAG). Seat supports shall not come into contact with floor. Provide left or right hand seat.
- Shelving: Custodial shelf, stainless steel, 6 inches deep by 18 inches wide with 3/4 inch edge return. Mounting brackets, 16 gage welded to shelf.

C1090.50 Window Treatment:

- Chain driven, manually operated or motorized roller-screen system with vinyl-coated glass fiber fabric for interior shading, and AV blackout including all supplementary items required for shade installation.

Typical shade fabric: Glass-fiber yarn coated with vinyl, woven in a 2 by 2 basketweave. Draper Series: PW4800 or approved equal meeting the following minimal requirements:

Blackout shade fabric: Glass-fiber yarn coated with vinyl, close woven. Draper Series: SB9100 or approved equal.

Motor: 110 VAC, single phase, 60 HZ, instantly reversible, lifetime lubricated, and equipped with internal thermal overload protector, electric brake, and pre-set accessible

limit switches. Tubular motor concealed inside each shade roller tube.

Mounting: Wall, jamb, or overhead mounted as indicated, brackets made of 1/8 inch sheet steel to which drive assembly, idle end assembly and center support systems are attached.

Black out side and sill channels; extruded aluminum with polybond edge seals, and snap-lock mounting brackets.

- Basis of Design Manufacturer: Draper Shade and Screen Co., Spiceland IN; product: "FlexShade" and "Lightbloc" or approved equal.

C20 INTERIOR FINISHES

C2010 WALL FINISHES

C2010.10 Standard grade glazed ceramic tile, conforming to ANSI A137.1, nominal 4-1/4 by 4-1/4 inch by 5/16 inch thick, porcelain body, square-edges as manufactured by Dal-Tile, in colors selected from the full range of glazed wall tile, including "Dal-Tile "Semi-Gloss", and "Matte" or approved equal.

- Field Tile: Dal-Tile Matte or Semi-Gloss, Color Group 1 and 2 or approved equal.
- Accent Tile: Dal-Tile Matte or Semi-gloss, Color Group 3 and 4 or approved equal.

C2010.20 Porcelain wall tile: Dal-Tile Corporation, "Glazed Porcelain – Colour Scheme" or approved equal nominal 6 by 6 by 5/16 inch thick, 6 by 12 by 5/16 inch thick, 6 by 18 by 5/16 inch thick.

- Field and accent colors shall be selected from full range of Solid Field Tile - Group 1 and 2 and full range of Speckled Field Tile or approved equal.

C2010.30 Paint Finishes: Painted finishes includes coating systems materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials specified herein, whether used as prime, intermediate or finish coats.

- Interior Paint requirements regarding volatile chemicals (VOC's):

C2010.40 Flat Paints and Coatings: VOC not more than 50 g/L.

- Non-Flat Paints and Coatings: VOC not more than 150 g/L.
- Anti-Corrosive Coatings: VOC not more than 250 g/L.
- Clear wood finishes, varnishes: VOC not more than 350 g/L.
- Clear wood finishes, lacquer: VOC not more than 550 g/L
- Clear wood finishes, floor coatings: VOC not more than 100 g/L
- Sealers, waterproofing sealers: VOC not more than 250 g/L.
- Sealers, sanding sealers: VOC not more than 275 g/L.
- Sealers, all other sealers: VOC not more than 200 g/L.

- Stains: VOC not more than 250 g/L.

C2020 INTERIOR FABRICATIONS

C2020.10 Finish Carpentry:

- Stage flooring including vented wall base.

Stage Floor: Double (service) tempered hardboard fabricated from inter-felted lingo-cellulosic fibers consolidated under heat and pressure complying with ANSI A135.4, minimum ¼ inch thick fabricated in sheets 4 feet by 8 feet factory primed and finished complying with the following requirements:

Density: 58 lbs/ft³ when testing in accordance with ASTM D 1037.

Modulus of rupture: 5,000 lbs/in² when testing in accordance with ASTM D 1037.

Water absorption: 28 percent when testing in accordance with ASTM D 1037.

Basis of Design Manufacturer: Georgia Pacific Building Products, Atlanta, GA or approved equal.

Framing lumber for stage floor sleepers: No. 2 Spruce/Pine/Fir (SPF), or No. 2 Southern Pine, Grade-stamped S-Dry or other surface dried wood species, Number 2 grade or better having a minimum bending stress Fb of 775 PSI (890 PSI repetitive) and modulus of elasticity E not less than 1100 KSI.

Stage floor subflooring: ¾ inch (19.1 mm) thick having a minimum span rating 48/24, APA rated sheathing, structural 1, exposure durability classified, Exposure 1, touch-sanded.

- Plastic laminate countertops
- Install the following furnished under the designated Sections:

Wood trim including standing and running trim, pilasters, plinths, handrails, with shop applied transparent finish furnished by Section 06 40 00 - Architectural Woodwork.

Shop milled interior wood paneling designated with shop applied transparent finish furnished by Section 06 40 00 - Architectural Woodwork.

Steel doors furnished by Section 08 11 13 - Hollow Metal Doors and Frames.

Wood doors furnished by Section 08 14 16 - Flush Wood Doors.

Door hardware, thresholds, weatherstripping, seals and gaskets furnished by Section 08 71 00 - Door Hardware.

C2020.20 Architectural Woodwork:

- Wood veneer casework:
Circulation desk at Library.

Desks at Administration offices.

Reception desk at HS Guidance Office.

Career Center desk.

Library computer tables and bookcases.

Recycling centers.

Wood veneer: Veneered panels for transparent finish: The face veneer for transparent finishes shall be minimum 1/28 inch thick on doors, shelves, panels and other exposed surfaces meeting AWI Premium Grade Standards (installed). Each exposed face shall be of tight smooth veneer with joints parallel to vertical edges with no sharp contrasts. Wood Species: Red Oak (*Quercus rubra*), Plain Sliced, Grade A.

- Plastic laminate countertops
- Built-in display cases at areas indicated on Drawings

Fabric faced tackboard at display cases.

Glass and glazing of display cases including sliding and swinging door hardware.

Shelf standards.

- Furnish the following products to be installed under the designated Sections:

Wood trim including standing and running trim, pilasters, plinths, handrails, with shop applied transparent finish to Section 06 20 00 – Finish Carpentry for field installation.

Shop milled interior wood paneling, and recycling center doors with shop applied transparent finish to Section 06 20 00 – Finish Carpentry for field installation.

C2030 FLOORING

C2030.10 Sealed Concrete: Transparent non-yellowing water based acrylic sealer having a minimum of 10 percent solids, complying with California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda with a maximum VOC limit of 100 g/L.

- Basis of Design Manufacturer: Dayton-Superior, Miamisburg OH, product "Ultra Seal 30 EF" or approved equal.

C2030.20 Polished Concrete: Hardener, sealer, densifier shall be water based, odorless liquid, VOC compliant, environmentally safe chemical hardening solution leaving no surface film. Fast-drying dye packaged in premeasured units ready for mixing with VOC exempt solvent; formulated for application to polished cementitious surfaces. Finish shall be standard high gloss (HG-1), 1500 grit

- Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on L & M Construction Chemicals, Inc., Omaha, NE Product: "FGS Permashine."

C2030.30 Ceramic Mosaic Tile: Standard Grade unglazed ceramic mosaic tile, conforming to ANSI A137.1, nominal 2 x 2 inch by 1/4 inch thick, porcelain body, cushion-edges. Floor tiles shall be non-slip, containing not less than 7-1/2% by weight of silicone carbide or other rustproof abrasive of equal hardness.

- Field Tile: Dal-Tile Keystones, Color Group 1 and 2 or approved equal.
- Accent Tile: Dal-Tile Keystones, Color Group 3, 4, and 5 or approved equal.

C2030.40 Marble Thresholds: Comply with Class "A" of the Marble Institute of America, in color selected by the Architect from standard colors of the approved fabricator, shaped to provide a comfortable transition between tile and other floor finishes, with smooth matte surface finish

C2030.50 Porcelain paver tile: Dal-Tile Corporation, "Glazed Porcelain Colour Scheme" or approved equal nominal 6 by 6 by 5/16 inch thick, 12 by 12 by 5/16 inch thick, and 18 by 18 by 5/16 inch thick.

- Field and accent colors shall be selected from full range of Solid Field Tile - Group 1 and 2 and full range of Speckled Field Tile or approved equal.

C2030.60 Wood Strip Flooring: Nominal 3/4 inch (25/32 inch) thick by 2-1/4 inches wide kiln-dried plain sawn White Hard Maple (*Acer Saccharum*), MFMA grade-marked, tongue and grooved and end-matched, and delivered to the project in bundles bearing the specified grade marking.

- Grade: MFMA Standard grade.
- Individual strip length: Random lengths, ranging from a minimum of 9 inches to a maximum of 102 inches. Proportion of board lengths shall be in accordance with specified MFMA grade.

C2030.70 Wood Athletic Flooring: Nominal 3/4 inch (25/32 inch) thick by 2-1/4 inches wide kiln-dried plain sawn Northern Hard Maple (*Acer Saccharum*), MFMA grade-marked, tongue and grooved, and delivered to the project in bundles bearing the specified grade marking.

- Grade: MFMA Second and Better Grade, Mixed Grain, TGEM, KN.
- Flooring channels: 1-1/2 inch by 2-5/8 inch by 8 feet wood engineered wood sleeper with EPDM cushion attached, factory encased in a steel channel. Sleeper must be free to move vertically within steel channel confines to assure proper uniformity of resiliency and function.
- Subflooring (one layer): Fir or southern pine plywood, Exposure 1 APA rated CD sheathing 23/32 inch (18 mm) thickness, touch-sanded.
- Basis of Design Manufacturer: Robbins, Inc., Wausau, WI, product "Bio-Channel Star" or approved equal.

- C2030.80 Resilient Sheet Flooring: 0.080 inch (2.03mm) thick homogeneous composition sheet vinyl flooring, non backed, non-layered; complying with FS L-F-475A, Type II, Grade A, and ASTM F1303, Type II, Grade 1, without backing.
- Prepare substrates to receive resilient sheet flooring to ensure specified tolerance level for finish surface of flooring. Preparation work includes patching, smoothing and leveling substrate.
 - Field areas shall consist of 2 colors in configuration indicated on the Drawings.
 - Accent colors shall consist of 2 colors. Provide striping and accent areas as indicated on the Drawings.
 - Basis of Design Manufacturer: Armstrong World Industries, Inc., Flooring Division, Lancaster PA, product "Meditech" or approved equal.
- C2030.90 Resilient Tile Flooring: 12 inch by 12 inch by 1/8 inch thick with solid color extending through thickness of tile; composed of vinyl resins, non-asbestos inorganic mineral fillers, and colorfast pigments complying with FS SS-T-312B(1), Type IV, Composition 1 and ASTM F1066 Composition 1, Class 2.
- Prepare substrates to receive resilient tile flooring to ensure specified tolerance level for finish surface of flooring. Preparation work includes patching, smoothing and leveling substrate.
 - Field areas shall consist of 1 color as indicated on the Drawings. As multiple patterns are required the field color for each pattern will vary by location as determined by the Architect.
 - Floor accent tile: In patterns as indicated on the Drawings. In addition to the selected field color tile flooring shall require a minimum of 12 separate colors for striping, borders, accent bands, dots, and other accent patterns.
 - Basis of Design Manufacturer: Armstrong World Industries, Inc., Flooring Division, Lancaster PA, product "Standard Excelon, Imperial Texture" or approved equal.
- C2030.100 Rubber Flooring: 39-3/8 inch by 39-3/8 inch by 0.14 inch thick hammered rubber floor tile comprised of natural fillers and environmentally compatible color pigments with a smooth double sanded back and a ASTM D 2240, Shore A, hardness of not less than 85.
- Prepare substrates to receive rubber flooring to ensure specified tolerance level for finish surface of flooring. Preparation work includes patching, smoothing and leveling substrate.
 - Field areas shall consist of 1 color as indicated on the Drawings. As multiple patterns are required the field color for each pattern will vary by location as determined by the Architect.

- Floor accent tile: In patterns as indicated on the Drawings. In addition to the selected field color tile flooring shall require a minimum of 5 separate colors for striping, borders, accent bands, dots, and other accent patterns.
- Basis of Design Manufacturer: Freudenberg Building Systems Inc., Lawrence MA: product "Norament Grano" or approved equal.

C2030.110 Static Dissipative Resilient Tile Flooring: 24 inch by 24 inch by 0.080 inch thick with an electrical resistance of 2.5×10^4 to 10^6 ohms meeting NFPA Bulletin 99.

- Prepare substrates to receive resilient tile flooring to ensure specified tolerance level for finish surface of flooring. Preparation work includes patching, smoothing and leveling substrate.
- Basis of Design Manufacturer: Forbo Industries, Inc., Hazleton, PA, Product: "Colorex EL 5000" or approved equal.

C2030.120 Carpeting: Provide broadloom carpeting with a minimum yarn weight of 22 ounces per square yard having the specified characteristics and performance requirements.

- CRI – Green Label Plus.
- ASTM D-2859 (Methenamine Reagent Pill Test).
- ASTM E-648 (Flooring Radiant Panel Test): Class I (Minimum Average CRF of 0.48).
- NBS Smoke Chamber Test: Maximum average of 450.
- AATCC-134 (Electrostatic Propensity): Maximum electrostatic generation below level of human sensitivity.
- Prepare substrates to receive carpeting to ensure specified tolerance level for finish surface of flooring. Preparation work includes patching, smoothing and leveling substrate.
- Basis of Design Manufacturer: Collins and Aikman Floor Coverings, Dalton, GA: product "Calypso" or approved equal.

C2030.130 Recessed Aluminum Foot Grilles: Foot grille shall be constructed from 40% post-industrial recycled aluminum alloy type 6061-T6, fabricated to sizes indicated on the Drawings with mechanically fastened rails (swedge or key lock fastening of rails is not acceptable).

- Tread: T-shaped blades; 3/8 by 1/8 by 1 inch size; spacing between blades not to exceed 3/16 inch.
- Recessed Frame: Frames shall be a "Z" shape equal to model "TT" by Mats Inc., anchoring the foot grille structure into concrete. All aluminum frames shall be pre-assembled at factory incorporating welded construction for all joints with mitred corners. Multiple grille sections shall incorporate an invisible section divider integrated and welded within the frame.
- Recessed Frame: Frames frames shall be an inverted "T" shape such as model "VV" by Mats Inc., anchoring the foot

grille structure into concrete. All aluminum frames shall be pre-assembled at factory incorporating welded construction for all joints with mitred corners. Multiple grille sections shall incorporate an invisible section divider integrated and welded within the frame.

- Basis of Design Manufacturer: Mats, Inc., Stoughton, MA, Product: "Safe Track Grille" or approved equal.

C2030.140 Entrance Floor Mats: Polypropylene modular matting tiles, 100 percent heavy denier, solution dyed, needle punched polypropylene 19-11/16 by 19-11/16 by 7/16 inch thick tiles, with bitumen backing, total weight 169 ounces per square yard.

- Prepare substrates to receive floor mats to ensure specified tolerance level for finish surface of flooring. Preparation work includes patching, smoothing and leveling substrate.
- Basis of Design Manufacturer: Mats, Inc., Stoughton, MA, product: "Slip Not 2000 Tile" or approved equal.

C2040 STAIR FINISHES

C2040.10 Landings and Stair Treads: One piece nosing-tread-riser combination with raised stud surface design, 4.5 mm (0.18 inches) overall thickness with smooth double sanded back.

- Prepare substrates to receive rubber flooring to ensure specified tolerance level for finish surface of flooring. Preparation work includes patching, smoothing and leveling substrate.
- Field areas shall consist of 1 color as indicated on the Drawings. As multiple patterns are required the field color for each pattern will vary by location as determined by the Architect.
- Floor accent tile: In patterns as indicated on the Drawings. In addition to the selected field color tile flooring shall require a minimum of 5 separate colors for striping, borders, accent bands, dots, and other accent patterns.
- Basis of Design Manufacturer: Freudenberg Building Systems Inc., Lawrence MA: product "Norament Round Stair Treads, Article 465/466/467" or approved equal.

C2050 CEILING FINISHES

C2050.10 Type ACT-1 ceiling panel (Typical Tile): ASTM E-1264 Type III, Form 2, Pattern EI, Class A flame spread, wet formed mineral fiber non-directional fissured, medium textured panel, non-combustible, vinyl latex paint finish.

- Panel size: 24 by 48 inch by 5/8 inch thick.
- Minimum light reflectance range: LR 0.82 to 0.86.
- Acoustical characteristics: NRC range: 0.70.
- Basis of Design Manufacturer: Armstrong World Industries, Inc., Lancaster, PA, product "Cirrus, Tegular product number 535" or approved equal.

- C2050.20 Type ACT-2 ceiling panel (Accent Tile): ASTM E-1264 Type III, Form 2, Pattern EI, Class A flame spread, wet formed mineral fiber non-directional fissured, medium textured panel, non-combustible, vinyl latex paint finish.
- Panel size: 24 by 24 inch by 5/8 inch thick.
 - Minimum light reflectance range: LR 0.82 to 0.86.
 - Acoustical characteristics: NRC range: 0.70.
 - Basis of Design Manufacturer: Armstrong World Industries, Inc., Lancaster, PA, product "Cirrus, Tegular product number 584" or approved equal.
- C2050.30 Type ACT-3 ceiling panel (Kitchen, Locker Rooms and similar spaces): ASTM E-1264 Type IV Form 2, Pattern E, or Type X, Pattern GI UL Fire Resistance Labeled, wet formed mineral fiber non-directional non-perforated impervious white vinyl faced panel, non-combustible.
- Panel size: 24 by 48 inch by 5/8 inch thick.
 - Minimum light reflectance range: LR 0.80.
 - Acoustical characteristics: CAC range: 0.40.
 - Basis of Design Manufacturer: Armstrong World Industries, Inc., Lancaster, PA, product "Clean Room VL Unperforated product number 870" or approved equal.
- C2050.40 Ceiling Grids: 15/16 inch exposed grid in white color matching ceiling panel, furnished with hemmed edge wall molding.
- Basis of Design Manufacturer: Armstrong World Industries, Inc., Lancaster, PA, product "AL Prelude Plus Exposed Tee System" or approved equal.

D SERVICES

D10 CONVEYING

D1010 VERTICAL CONVEYING SYSTEMS

D1010.10 General Design: The elevators will be designed in accordance with applicable provisions of the National Safety Code for Elevators and Escalators (ANSI/ASME A17.1), the American National Standard for Physically Handicapped People (ANSI A117.1), Americans with Disability Act (ADA), applicable local codes and project requirements.

- General Characteristics Elevator 1:

Load (rated capacity):	3,500 pounds.
Car Speed:	150 feet per minute.
Drive:	Regenerative.
Operation:	Simplex
Total Rise:	As indicated on the Drawings
Number of Stops:	3
Number of Openings:	Front entrances: 3
Height under car top:	8'-0"
Height under ceiling:	7'-7"

Beverly Middle School
Beverly, MA

Clear car inside:	6'-8" wide by 5'-6-3/16" deep.
Car door type:	Single speed side opening.
Hoistway entrance:	3'-6" wide by 7'-0" high.
Machine location:	Inside hoistway mounted on guide rail.
Control location:	Integral closet at top landing.
Power supply:	480 volts, 3 phase, 60 hertz Plus or minus 5 percent of normal with separate equipment conductor.
Lighting supply:	120 volts, 1 phase, 15 amps, 60 hertz
Signal supply:	120 volts, 1 phase, 60 hertz
Control space location:	Adjacent space at first floor landing as indicated on the Drawings.

- General Characteristics Elevator 2:

Load (rated capacity):	3,500 pounds.
Car Speed:	150 feet per minute.
Drive:	Regenerative.
Operation:	Simplex
Total Rise:	As indicated on the Drawings
Number of Stops:	3
Number of Openings:	Front entrances: 3
Height under car top:	8'-0"
Height under ceiling:	7'-7"
Clear car inside:	6'-8" wide by 5'-6-3/16" deep.
Car door type:	Single speed side opening.
Hoistway entrance:	3'-6" wide by 7'-0" high.
Machine location:	Inside hoistway mounted on guide rail.
Control location:	Integral closet at top landing.
Power supply:	480 volts, 3 phase, 60 hertz Plus or minus 5 percent of normal with separate equipment conductor.
Lighting supply:	120 volts, 1 phase, 15 amps, 60 hertz
Signal supply:	120 volts, 1 phase, 60 hertz
Control space location:	Adjacent space at first floor landing as indicated on the Drawings.

- General characteristics Elevator 3:

Load (rated capacity):	3,500 pounds.
Car Speed:	150 feet per minute.
Drive:	Regenerative.
Operation:	Simplex
Total Rise:	As indicated on the Drawings
Number of Stops:	3
Number of Openings:	Front entrances: 3
Height under car top:	8'-0"
Height under ceiling:	7'-7"

Beverly Middle School
Beverly, MA

Clear car inside:	6'-8" wide by 5'-6-3/16" deep.
Car door type:	Single speed side opening.
Hoistway entrance:	3'-6" wide by 7'-0" high.
Machine location:	Inside hoistway mounted on guide rail.
Control location:	Integral closet at top landing.
Power supply:	480 volts, 3 phase, 60 hertz Plus or minus 5 percent of normal with separate equipment conductor.
Lighting supply:	120 volts, 1 phase, 15 amps, 60 hertz
Signal supply:	120 volts, 1 phase, 60 hertz
Control space location:	Adjacent space at first floor landing as indicated on the Drawings.

D20 PLUMBING

D2010 PLUMBING FIXTURES

D2010.10 Furnish and install all fixtures, including supports, connections, fittings, and any incidentals to take a complete installation.

Fixtures shall bear the manufacturer's guaranteed label trademark indicating first quality. All acid resisting enameled ware shall bear the manufacturer's symbol signifying acid resisting material.

Vitreous china and acid resisting enameled fixtures, including stops, supplies and traps shall be of one manufacturer by Toto, Kohler, American Standard, or equal. Supports shall be Zurn, Smith, Josam, or equal. All fixtures shall be white. Faucets shall be Toto, Speakman, Symmons, Chicago, or equal.

Fixtures shall be as scheduled on drawings and as follows:

Water Closet: Toto, complete HET system with regenerating battery sensor operated water conserving Flush Valve designed for 1.28 gal./flush max and vitreous china wall hung water closet.

Urinal: Toto, complete HEU system with regenerating battery sensor urinal flush valve for 0.5 gal. flush and vitreous china wall hung urinal.

Student Lavatory: Bradley Wash Fountain Model SS-3/IR/WH TMA, express lavatory system three (3) station wall hung, Terrion, ADA compliant, color selected by Architect, complete with heavy duty wall hanger support, skirt. Include a plug in transformer for providing power to the thermostatically mixed electronic faucet. Unit to be pre-set for 30 second run time.

Staff Lavatory: American Standard MURRO 0955.000, wall mounted 22" x 21-1/4" vitreous china lavatory, single hole, punched for concealed armchair carrier. Toto, regenerating battery powered, single hole, sensor faucet, 0.5 GPM rose spray, adjustable thermostatic mixing valve located under lavatory complete with in-line check stops.

Mop Receptor: Stern-Williams Model MTB-2424, 24" x 24" x 10", mop service basin with stainless steel rim guard on exposed sides, 3" caulk connection, stainless steel strainer. Include caulking and sealant to seal between unit and finished wall and floor. Chicago 897-CP service sink fitting.

Electric Water Cooler: Halsey Taylor OVL-II SER-Q Barrier Free Hi-Lo Electric Water Cooler, 8.0 GPH capacity, tandem mounting, #4 satin finish stainless steel bowls, flex-guard bubbler, push button actuator, ADA compliant. Furnish and install cane touch skirt.

Stainless Steel Staff Sinks: Just SL-ADA-1921-A-GR single bowl, 19" x 21" x 5-1/2" deep self rimming countertop mounted, 18 GA type 304 stainless steel sink with offset rear outlet; three (3) hole punched faucet ledge & quick clip

mounting system, sound deadening underside. Chicago #201A-GN8A-E2805-5CP-317 concealed deck faucet with 8" swing gooseneck spout, 4" wrist blade handles, E-2805 0.5 GPM aerator.

Stainless Steel Classroom Sinks: Just CRA-ADA-1725-A-GR single bowl, 17" x " x 5-1/2" deep self rimming countertop mounted, 18 GA type 304 stainless steel sink with offset rear outlet; three (3) hole punched faucet ledge & quick clip mounting system, sound deadening underside. Chicago #201A-GN8A-E2805-5CP-317 concealed deck faucet with 8" swing gooseneck spout on right ledge, Chicago 748-665 bubbler on left ledge, 4" wrist blade handles, E-2805 0.5 GPM aerator

D2020 DOMESTIC WATER SUPPLY

- D2020.10 Piping and Fitting: 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, Aquatherm PPR.
- D2020.20 Valves: Locate all valves so as to isolate all parts of the system. Shutoff valves 3" and smaller shall be ball valves, solder end or screwed. Valves shall be by Apollo, Nibco, Watts, or equal.
- D2020.30 Insulation: Insulation for all water piping and all horizontal roof leaders whether concealed or exposed shall be 1 in. thick, heavy density, preformed snap-on insulation equal to Johns Manville Micro-Lok HP, 850 degrees snap-on system, or by Owens Corning, Knauf or equal. Insulation for cold water piping shall have a factory applied vapor barrier with ends and butts sealed with overlapping 4 in. 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 in locker room or gymnasium cover jacket with continuous P.V.C. jacket.
- D2020.40 Wall Hydrant & Hose Bibb: Wall hydrants shall be Zurn Series Z-1310-PB Ecolotrol, or by JR Smith, Wade, or equal, cast brass 3/4 in. non-freeze wall hydrant with integral backflow preventer, 3/4 in. hose connections, polished nickel bronze face, loose key handle, brass wall sleeve, and fitted with brass locknut. Hose bibb shall be T & S Brass model #B-720, or by Chicago, Speakman, or equal, chrome plated, 3/4 in. hose end, integral stop, vacuum breaker, modified with lock shield and loose tee handle
- D2020.50 Domestic Water Sub-meter: Furnish and install water flow meter with 24VDC power supply with plug connection. Coordinate power wiring with Section 260000. Unit shall be capable of providing BACnet output. All BACnet control wiring shall be by Section 230000.
- D2020.60 Domestic Water Heating: Furnish and install tank type condensing gas water heater. The water heater will have an efficiency of at least 97 percent. The complete water heating system will comply with all current ASHRAE 90.1 requirements for thermal efficiency and standby heat losses.

D2030 SANITARY WASTE

- D2030.10 Piping and Fitting: Soil, Waste and Vent, Kitchen Waste and Vent, and Storm drainage piping to 10' outside shall be hubless cast iron pipe and fittings for 2" and above and shall be Type 'L' copper with cast D.W.V. type fittings for 1-1/2" and smaller.
- D2030.20 Drains: Drains shall be cast iron, caulked outlets, nickaloy strainers, and in waterproofed areas and roofs shall have galvanized iron clamping rings with 6 lb. lead flashings to bond 9" in all directions. Drains shall be Smith, Zurn, or Josam, or equal.
- D2030.30 Cleanouts: Cleanouts shall be full size up to 4"; threaded bronze plugs located as indicated on the drawings and/or where required in soil, waste and storm pipes.

D2040 OTHER PLUMBING SYSTEMS

- D2040.10 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, be parallel to each other. Utilize gang hangers wherever feasible. Group all valves together where feasible.
- D2040.20 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.
- D2040.30 Sleeves and Escutcheons: Furnish and install in masonry walls and floors, galvanized steel sleeves as required.
- D2040.40 Testing: Test all work in the presence of the Architect and/or Engineer and as required by local codes.
- D2040.50 Chlorination: Upon completion of the plumbing work, thoroughly chlorinate the entire domestic water system before putting same in service.
- D2040.60 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.
- D2040.70 Fuel Gas System: Furnish and install a complete Natural Gas Supply System including pipe, fittings, valves, connections to all gas fired equipment requiring gas, and all accessories and incidentals as indicated or specified. Installation shall be made in accordance with the State Gas Code requirements. Piping shall be installed with an 8 in. long sediment leg at the base of all risers. All changes in direction shall be made with plugged tees for cleaning piping out. Gas piping shall be black steel pipe and STM A-53 Schedule 40.
- Fuel gas valves shall be ball valves with tee handle, screwed end for 2-1/2" and smaller, and lubricated iron body plug cocks for 3" and larger.
 - Valves shall be by Apollo, Nibco, Watts, Rockwell, or equal.
- D2040.80 Natural Gas Sub-Meter: Furnish and install thermal mass flow meter with 24VDC power supply with plug connection. Coordinate power wiring with Section 260000. Unit shall be capable of providing BACnet output. All BACnet control wiring shall be by Section 230000.
- D2040.90 Rainwater Harvesting System (Alternate): The Plumbing design will incorporate a rainwater collection system which will collect rain water from roof areas. This water will then be stored in a

20,000 gallon underground storage cistern where it will be used for both flushing water closets and urinals. Storm drainage from flat roofs and sloped roofs will be collected in a piped drainage system installed by the Plumbing Subcontractor. The water to be used for flushing will be pumped from the cistern into the building and then through a treatment system. At the discharge of storage, the gray water system will be pressurized by a duplex booster pump system which will maintain the pressure required to operate the fixtures on the system. This system will also have an automated city water back-up in the case of insufficient rainfall.

- **Sequence of Operation**

Storage of Water: Raw water is stored in an underground precast cistern storage tank system. The water in the cistern is to be used for the supply to the gray-water flushing system. The cistern is estimated at having a capacity of 20,000 gallons. Treated water is stored in a 3,000 gallon capacity, atmospherically vented storage tank which is the suction tank for the gray-water booster pump system. The tank level control system is set to provide water from the cistern, or when no raw water is available city water will be provided to the storage tank. The storage tank will only store fully treated water which has been pumped from the cistern and has been chlorinated, softened and adjusted for pH. City water, when used for make-up, will not be treated. The water in the storage tank, whether from the cistern, from the Municipal supply or a combination thereof, will be continuously re-circulated and sanitized with a UV light.

Booster Pump System: The booster pump system is totally independent of the raw water treatment system except that it will receive a signal from the storage tank to signal low suction. The pump controller will shut down and remain down for 5 minutes when low suction is sensed. If suction is not restored in 5 minutes an alarm shall sound locally. Provide dry contacts for a remote signal. The booster pump control system will respond only to system pressure on the gray water distribution system maintaining the system pressure at 65 P.S.I. The pumps are variable frequency drive designed to maintain system pressure, by varying the flow and thereby conserving energy

D30 HEATING, VENTILATION AND AIR CONDITIONING (HVAC) [REFER TO SCHEMATIC DESIGN NARRATIVE]

D40 FIRE PROTECTION [REFER TO SCHEMATIC DESIGN NARRATIVE]

D50 ELECTRICAL [REFER TO SCHEMATIC DESIGN NARRATIVE]

D60 COMMUNICATIONS [REFER TO SCHEMATIC DESIGN NARRATIVE]

D70 ELECTRONIC SAFETY AND SECURITY [REFER TO SCHEMATIC DESIGN NARRATIVE]

E EQUIPMENT AND FURNISHINGS

E10 EQUIPMENT

E1060 RESIDENTIAL EQUIPMENT

E1060.10 Appliances:

- Front loading automatic washer: GE Model No. WCVH4800KWW.
- Front loading electric dryer: GE Model No. GFDN240ELWW.
- Refrigerator: GE Model No. GTH18IBDWWwith IM4A icemaker kit.
- Refrigerator under-counter: SUMMIT Model No. CT66ADA.
- Dishwasher under-counter: GE Model No. GLDA690PWW.
- Built-in electric wall oven: GE Model No. JTP70DPWW.
- Range hood: 30 inch range hood, GE Model No. JVE40ST with recirculating kit.
- Electric cooktop: In-counter stove GE Model No. PP945WMWW .
- Under counter ice cube machine (typical): Scotsman Model No. CU1526 with KPUFM26 under counter floor mount kit.
- Under counter ice cube machine at (Science Prep rooms): Scotsman Model No. CU2026 with KPUFM26 under counter floor mount kit.
- Ice cube machine (Trainer's Room): Scotsman Model No. CO522 with KLP85 legs and B222S modular bin.
- Garbage disposal: ½ horsepower, continuous feed GE Model No. GFC535V.

E1090 OTHER EQUIPMENT

E1090.10 Projection Screens:

- Electrically-operated, ceiling recessed, front projection screens:

Motor: Instant reversing motor in size and capacity recommended by screen manufacturer, with permanently lubricated bearings, automatic thermal overload protection, preset limit switches to automatically stop screen in "up" and "down" position.

Screen Characteristics: Mildew-resistant and flame-resistant glass fiber fabric mounted on rigid roller, with vinyl-coated viewing surfaces. Matte white, textile backed, 16:10 format.

Screen Control: Single station control with low voltage control system consisting of a single control unit, directionally lighted, single button control stations of number and at locations indicated, with metal device boxes and flush cover plates.

Case: Extruded aluminum case, UL approved "suitable for use in environmental air space." Case size 9-3/4 inches (248 mm) deep and 9-1/8 inches (232 mm) wide for screen sizes up 144 inches wide; 11 inches (279 mm) x 9-1/8 inches (232 mm) for larger screen sizes. Bottom of case shall be fully enclosed by aluminum panels and motorized aluminum trap door with concealed hinges.

Basis of Design Manufacturer: Draper, Inc. Spiceland, IN,
Product: "Signature/Series E" (Type 1 screen),
"Paragon/Series E" (Type 3 screen), Access XL/Series E
(Types 2 and 4 screens) or approved equal.

E1090.20 Laboratory Equipment:

- Acid storage cabinets:

Cabinet Type 1 (Central Chemical Storage Room): OSHA compliant cabinet for secondary containment fabricated from 3/8 inch thick polypropylene with welded interior seams, liquid tight with 2 inch troughs and fixed lipped shelves, locking double doors.

Basis of Design Manufacturer: Scientific Materials Company, Inc., Batavia, IL, product, Polypropylene Acid Cabinet Model SC5040 or approved equal.

Cabinet Type 2 (Science Prep Rooms): 4 gallon bench top cabinet fabricated from polypropylene with adjustable shelves, 2 inch vents with caps, door storage for smaller containers and lockable.

Basis of Design Manufacturer: Eagle Manufacturing Company, Wellsburg, WV, product, EAGLE Poly Acid/Corrosive Safety Cabinet Model CRA-P04 or approved equal.

- Flammable storage cabinets:

Cabinet Type 1 (Central Chemical Storage Room): NFPA and OSHA compliant 30 gallon cabinet fabricated from 18 gauge steel with double wall construction incorporating a 1-1/2 inch air space, two vents with 2 inch threaded fittings, fire baffle and caps and double doors with 3 point locks, 2 inch raised leak proof sill. Shelves shall be capable of supporting up to 350 pounds each.

- Basis of Design Manufacturer: Eagle Manufacturing Company, Wellsburg, WV, Product, EAGLE Safety Cabinet Model 1932 or approved equal.

- Autoclave Sterilizer (Central Storage):

Basis of Design Tuttnauer, Hauppauge, NY, product, "Model 3870ELV" or approved equal.

- Autoclave Sterilizer (Prep Rooms):

Basis of Design Tuttnauer, Hauppauge, NY, product, "Model 3850E" or approved equal.

- Incubator:

Basis of Design Manufacturer: Revolutionary Science, Shafer, MN, product, "Incufridge 529510" or approved equal.

- Distiller:

Basis of Design Manufacturer: H2O Labs, Inc., Muskegon, MI, product, "1500110V-5G" or approved equal.

- Glassware Pegboard:

Basis of Design Manufacturer: Thermo Fisher Scientific, Two Rivers, WI, product, "Model No. 52L82000" or approved equal.

- Safety Glass Goggle Cabinet:

Basis of Design Manufacturer: Thermo Fisher Scientific, Two Rivers, WI, product, "Model No. 58L02110" or approved equal.

E1090.30 Laboratory Fume Hoods:

- Provide laboratory fume hoods, related component fittings, fixtures, and accessories required for a fully piped and wired unit ready for attachment to building mechanical, plumbing and electrical systems.

Hoods shall be of the bypass type. The fume hood design shall allow for automatic air bypass above the sash opening. The bypass shall limit the maximum air velocity through the face of the hood and provide for a constant volume of air through the hood regardless of sash position. The bypass shall control the increase in face velocity as the sash is lowered to limit the maximum velocity to not more than three and one-half, times the velocity with the sash full open.

Fume hood lining: Epoxy resin for exposed interior surfaces. Use stainless steel for fasteners and other exposed metal. Furnish end panels, back panel, and top of not less than 1/4-inch-thick material, screwed together with cleats or steel angles to form a completely rigid assembly to which exterior cold-rolled steel panels are mounted.

- Basis of Design Manufacturer: Kewaunee Scientific Corporation, product: "Supreme Air TruView Teaching Hood ADA Configuration [double sided, open back]" (Type 1) and "Supreme Air TruView Teaching Hood ADA Configuration [single sided with back panel]" (Type 2).

E20 FURNISHINGS

E2010 FIXED FURNISHINGS

E2010.10 Wood veneer base and wall cabinets including wiring troughs, aluminum linear bar grilles, filler panels, rigid insulation, and blank electrical boxes and other accessories as needed for a complete and proper installation.

- General: Solid hardwood framed construction with solid hardwood and hardwood plywood panels as specified for particular cabinet types.

Drawer fronts and hinged doors are to overlay the cabinet body. Maintain a maximum 1/8 inch reveal between pairs of doors, between door and drawer front, or between multiple drawer fronts within the cabinet.

Exposed Surfaces: All exterior casework surfaces exposed to view after installation, and the exposed interior ends, top and bottom of open cases shall be plain sliced Red Oak. Backs shall be printed hardboard finished to match interior. The solid woods used for all surfaces exposed to view after

completion of installation shall be clear, with color and graining in conformance with the normally accepted standards required of the Scientific Laboratory Equipment Industry. The finished installation must provide an attractive and harmonious appearance.

- Basis of Design Manufacturer: Thermo Fisher Hamilton, Two Rivers, WI, or approved equal.

E2010.20 Epoxy Resin Countertops And Integral Sinks

- Countertops: 1 inch thick molded modified epoxy resin tops that has been especially compounded, oven cured and possess high resistance to mechanical and thermal shock.

Integrally molded curbs: 4 inches high and 1 inch thick, and the junction between top and curb to be coved to a 5/8 inch radius. End curbs shall be provided at end of runs to maintain continuity of the integral curb.

Sinks: Molded of same material as countertops, size as indicated on Drawings, with all inside corners coved and bottom pitched to drain outlet.

- Basis of Design Manufacturer: The Durcon Company, Inc., Plymouth MI, or approved equal.

E2010.30 Plastic Laminate Countertops:

- Laminate: Chemical resistant laminate Ralph Wilson Plastics Co. (Wilsonart), product "Chemsurf" Type 690-90 laminate with "crystal finish" or approved equal.

Loose curbs: 4 inches high and 1 inch thick, and the junction between top and curb to be coved to a 5/8 inch radius. End curbs shall be provided at end of runs to maintain continuity of curb.

Countertop backing: EWA C-C PLUGGED EXT, fir plywood, sanded.

E2010.40 Fixed Audience Seating:

- Steel standards and back wings: All steel shall have smooth surfaces and be of sufficient gauge thickness and designed to withstand strains of normal use and abuse.
- Padding material: Seat and back padding material shall be of new (prime manufacture) polyurethane foam. Padding material shall comply with the flammability requirements outlined in California Technical Information Bulletin No. 117, Resilient Cellular Materials, Section A and D, dated February 1975, when tested in accordance with Federal Test Method Standard 191, Method 5903.2.
- Upholstery Fabric: Fabric shall meet Class 1 flammability requirements of US Department of Commerce Commercial Standard 191 per California Technical Bulletin No. 117.
- Injection molded plastic: One-piece high-impact, linear polyethylene with built-in ultraviolet light inhibitors to retard fading. Plastic shall have a burn rate of 1 inch per minute when tested in accordance with ASTM D635 or the

Department of Transportation Motor Vehicle Safety Standard No. 302.

- Basis of Design Manufacturer: Irwin Seating Company, Grand Rapids MI product: "Citation 41286" or approved equal.

E2010.50 Telescoping Audience Seating:

- Chair System: Beam-mounted design, consisting of chairs independently mounted and armrests independently mounted to transverse beam. Top of support arms shall be designed to capture and secure the beam in place. Support arms articulate from manual assist operating mechanism.
- Chairs must be designed with two independent return springs which position seat pan in 3/4 fold position with 100 percent (100%) fold position available for added aisle passage. Seat action shall be dampened for a constant velocity return and no final oscillations to the rest position
- Padding material: Seat and back padding material shall be of new (prime manufacture) polyurethane foam. Padding material shall comply with the flammability requirements outlined in California Technical Information Bulletin No. 117, Resilient Cellular Materials, Section A and D, dated February 1975, when tested in accordance with Federal Test Method Standard 191, Method 5903.2.
- Upholstery Fabric: Fabric shall meet Class 1 flammability requirements of US Department of Commerce Commercial Standard 191 per California Technical Bulletin No. 117.
- Injection molded plastic: One-piece high-impact, linear polyethylene with built-in ultraviolet light inhibitors to retard fading. Plastic shall have a burn rate of 1 inch per minute when tested in accordance with ASTM D635 or the Department of Transportation Motor Vehicle Safety Standard No. 302.
- Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Hussey Seating Company, North Berwick ME, Product "MAXAM+ Telescopic Platform System with Metro Seating" or approved equal.

F SPECIAL CONSTRUCTION AND DEMOLITION

F10 SPECIAL CONSTRUCTION

F1060 ATHLETIC AND RECREATIONAL SPECIAL CONSTRUCTION

F1060.10 Gymnasium Equipment:

- Wall padding wainscot: Prefabricated wall-mounted panels, equal to Porter Nos. 90348-326, 90350-226 and 90350-326, in compliance with Class A flame spread and smoke in accordance with ASTM E84.
- Corner wall pad: Prefabricated L-shaped foam corner pads equal to Porter No. 00355-600, in compliance with Class A

flame spread and smoke in accordance with ASTM E84, and the following requirements.

- Volleyball sleeves: 3-1/2" diameter floor sleeves equal to Porter No. 00870-100 for each standard.
- Mat hoist: Stationary factory wired, preset, programmable overhead supported mat hoist, equal to Porter No. 91102-200.

F1060.20 Motorized backstops, control devices, backboards and goals:

- Backstops: Forward folding, adjustable ceiling-mounted backstops, each with single mast drop frame, electrically operated, shall conform to latest NCAA and NFSHSA recommendations and be in compliance with the following requirements:
- Support framing: ASTM A500 steel tubing, 6 inch diameter, 11 gauge single mast with 4 inch diameter, 11 gauge top member and 2-1/4 inch diameter, 14 gauge diagonal side bracing.
- Folding front brace: Jackknife type, fully adjustable, self-locking in down position constructed from 2-1/2 inch diameter, 13 gauge outer tube and 2-1/4 inch diameter, 14 gauge inner tube.
- Winch: Electric 1 horsepower worm gear-type winch with heavy formed steel main frame designed to hold backstop at any position during raising and lowering
- Backboard: Extruded aluminum frame rectangular glass backboard, Official size 72 by 48 inches, equal to Draper "Model A00136". Glass: 1/2 inch thick safety glass, ASTM C 1048 FT, fully tempered, complying with Class 1 clear, quality q3 glazing select, conforming to ANSI Z97.1.
- Goal: Breakaway goal designed to withstand shock loads from player slam dunking or hanging on rim conforming to NCAA and NFSHSA specifications for movable rims, high quality enamel finish, furnish with nylon net, equal to Draper "Model A0576".
- Basis of Design Manufacturer: Draper, Inc., Spiceland IN, Product: "EZ Fold TF-20-B" or approved equal.

F1060.30 Motorized assisted telescoping gymnasium bleacher seating with custom painted graphics on bleacher risers:

- Bleacher Seat Assembly; Designed to support and resist it's own weight and the following forces:
- Live load of 120 lbs per linear foot [162.69 N/m] on seats and decking.
- Uniformly distributed live load of not less than 100 lbs per sq. ft. [135.58N/m] of gross horizontal projection.
- Parallel sway load of 24 lbs. [32.53 N/m] per linear foot of row.

- Perpendicular sway load of 10 lbs. [13.56 N-m] per linear foot of row.
- Hand Railings, Guardrails, Posts and Supports: Engineered to withstand the following forces applied separately:
- Concentrated load of 200 lbs. [90.72 kg] applied at any point and in any direction.
- Uniform load of 50 lbs. per foot [.344 N/mm²] applied in any direction.
- Basis of Design Manufacturer: Hussey Seating Company, North Berwick ME, Product: "Maxam26 Classic Wood Seating" or approved equal.

F1060.40 Gymnasium dividers including all supporting channels and suspension rods, motorized lift unit, and remote control devices:

- Roll-fold divider, overhead supported, lift-type divider curtain meeting the following requirements:
- Motor: Drive pipe power mechanism shall consist of a compensating type winch, 115 volt 60 cycle single phase reversible capacitor start motor capable of providing 20 feet/minute curtain operation, lubed-for life bearings, reversing magnetic contactor for remote control.
- Uniformly distributed live load of not less than 100 lbs per sq. ft. [135.58N/m] of gross horizontal projection.
- Cables: 1/8 inch diameter galvanized steel aircraft cables which terminate in individual storage drums.
- Bottom half of curtain is 18 ounce per square yard nylon or polyester reinforced vinyl, equal to Porter "Flexivide", with edge hems double welds, seams 1-1/2 inch full contact sealed seam. Sewn construction will not be permitted. Fabric shall be rot and mildew resistant and show minimum results of 300 pounds per inch tensile strength when tested in accordance with FS 191 and, have 100 pounds inch tear strength. Fabric shall have a Class I flame spread rating when tested in accordance with ASTM E84.
- Upper curtain: Vinyl coated polyester mesh approximately 50 percent open weave and weighing 9 ounces per square yard, equal to Porter "Fleximesh". Fabric shall have a minimum tensile strength of 100 pounds/inch and be fire retardent.
- Basis of Design Manufacturer: Porter Athletic Equipment Company, Schiller Park, IL, product: "Model Number 90208-400" or approved equal.

F30 DEMOLITION

F3010 STRUCTURE DEMOLITION

F3010.10 Building demolition, clearing, removal and legal disposal, including, but not limited to the following:

- Existing designated structures, foundations and slabs on grade.

- Removal of unsuitable or extraneous materials not marked for salvage, such as abandoned furnishings and equipment (including but not limited to all loose and fixed furniture, tables, chairs, stools, desks, file cabinets, lockers, fixed and loose gym equipment, auditorium curtains/lighting and associated rigging, bleachers, computers, printers, copiers, shop machinery, kitchen equipment), and debris such as rotted wood, rusted materials and deteriorated concrete. Construction Manager shall assume all existing furnishings and equipment will be required to be removed and legally disposed of. Any and all costs associated with the demolition, removal and disposal shall be included within the Construction Manager's base bid. The Owner will not accept any additional costs associated with the demolition, removal and disposal scope of work.
- Cut, cap and seal-off abandoned utility lines at property line.
- Salvage removed indicated materials for re-use as shown in the Drawings.
- Identify locations of utilities for work of other sections.

G SITEWORK

G10 SITE PREPARATION

G1010 SITE CLEARING

G1010.10 Section includes the following but is not limited to:

- Removing existing trees, shrubs, groundcovers, plants and grass.
- Clearing and grubbing.
- Stripping and stockpiling topsoil.
- Removing above- and below-grade site improvements.

G1010.20 Clearing and Grubbing:

- Remove completely all stones or surface boulders within the topsoil zone, and stumps, roots, matted roots and brush. Exposed boulders or other materials may be removed contiguous with stumps and matted roots. However, this shall be done in such a manner as not to remove topsoil in the same operation such as using a toothed blade to "rake" stones and stumps from topsoil.
- Prior to the start of General Excavation, strip all topsoil and subsoil from within areas to be regraded, as shown on the Drawings and stockpile where indicated on the Drawings or remove from the site and stockpile off-site if there is not adequate space in the location indicated on the Drawings. No stripping shall be done without clear understanding of the existing soil, planting and site conditions to be preserved and limits of existing topsoil stockpile and stripped areas.
- The Construction Manager shall be responsible for the protection of all existing trees and plants designated to remain for the length of the construction period, including

liability for all damages as specified herein. The placement of protection devices additional to those specified shall, however, be at the Construction Manager's discretion and with no additional cost to the Architect.

- Protect and maintain benchmarks and survey control points from disturbance during construction.
- The Construction Manager shall protect existing utility poles, overhead wires, and other electrical or communications elements within and adjacent to the property.
- Any damage to these utilities or structures resulting from the construction operation shall be repaired to meet or exceed the existing condition at the Construction Manager's expense.
- Any losses to the property or any other utility company resulting from the interruption of service from construction or blasting activity, both directly or indirectly, shall be the responsibility of the Construction Manager, and shall result in no additional cost to the Architect.
- The Construction Manager shall make every effort to protect existing utilities including electrical and communications conduits and structures during construction. Any damage to utilities designated to remain shall be repaired immediately at the Construction Manager's expense.

G1010.30 Tree and Shrub Removal and Trimming:

- General: Remove trees, shrubs, grass and other vegetation, improvements, or obstructions, except for those indicated on the Contract Drawings to remain, interfering with installation of new construction. Remove such items elsewhere on site or premises as specifically indicated. Removal shall include digging out stumps in their entirety and grubbing roots to at least 30 inches below existing or proposed grades, whichever is deeper, as shown on the Contract Drawings.
- Clearing shall consist of the felling and disposal of standing trees, and the removal and disposal of all brush, down timber, fences and rubbish. Trees, brush and down timber may be chipped and a portion of the chipped material shall be stockpiled on site in a location selected by the Architect and for dispersion into wooded areas in locations selected by Architect.
- In all areas that are to be cleared, all brush, grass and other vegetation, except trees, shall be cut off flush with or below the original ground surface.
- All lines and grade work required for this contract at the site shall be laid out by a Registered Land Surveyor or Professional Engineer employed by the Construction Manager, in accordance with the Drawings and Specifications.
- Earth Stripping and Stockpiling:

- Prior to the start of General Excavation, strip all topsoil and subsoil from within areas to be regraded, as shown on the Drawings and stockpile where indicated on the Drawings or remove from the site and stockpile off-site if there is not adequate space in the location indicated on the Drawings. No stripping shall be done without clear understanding of the existing soil, planting and site conditions to be preserved and limits of existing topsoil stockpile and stripped areas.
- The Construction Manager shall control his topsoil stripping operation so that it does not become contaminated with subsoil or other earth materials; the Construction Manager shall use machinery suitable for achieving this result.
- All excess subsoil encountered in earthwork operations shall be removed from the site and legally disposed of. Topsoil shall be stockpiled as described hereinabove.
- Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
- Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
- The Construction Manager is responsible for all construction, protection, movement and maintenance of stockpiles. Stockpiles shall be neatly trimmed and graded to provide proper drainage from their surfaces and maintained so as not to erode or pollute their surroundings.

G1020 SITE ELEMENTS DEMOLITION

G1020.10 The Construction Manager shall perform all work and supply all labor, material, tools and equipment necessary to:

- Demolish, remove, and dispose of items not required for reuse on site and as indicated on Drawings. This shall include, but is not limited to buildings, bleachers, benches, pavements, walkways, steps, posts, concrete pads, fences, trees, shrubs, utilities, drainage systems including piping and structures, sewage disposal systems including tanks, pipe, stone, filter sand liners, and associated chambers, tanks, and manholes, irrigation lines, water mains and water system features including hydrants, valves, and gate boxes.
- Any portion of the site soils anticipated by the Construction Manager for reuse on the project shall be stockpiled and tested by the Construction Manager for source investigation of potential reuse of material. Soil materials to be reused onsite may require amendment including blending of onsite and imported soil materials.
- Disposal of items to an approved off-site disposal facility.
- Cleaning of catch basins and drain manholes.
- Filling voids and excavations resulting from the work.
- Removing above- and below-grade site features.

- Take inventory of, remove, store and relocate or turn over all memorial plaques and trees as specified on the demolition plans.
- Removal of existing utility structures (including but not limited to underground tanks, catch basins, manholes) and piping (sewer, water and drainage) as indicated on the Site Demolition Plan.
- Removal from the site and legal disposal of all materials resulting from the demolition and construction operations except those specified to be stockpiled or reused.
- Removal of all additional site items required to complete the work, as shown on the plans.
- Stockpiling of materials for reuse by the Owner.
- Temporary collection and removal of sanitary waste from the existing school.
- The Construction Manager shall procure and pay for all permits and licenses required for work under this Section.
- Construction Manager is responsible for all construction phase permits including but not limited to: NPDES Construction General Permit, Construction Phase Storm Water Pollution Prevention Plan, Beverly DPW Trench Permit, and all other applicable permits, registrations, notifications, and applications.

G1020.20 Utility Demolition:

- Active utilities existing on the site shall be carefully protected from damage and relocated or removed within limits of the work. When an active utility line is exposed during construction, its location and elevation shall be recorded and both the Architect and the Owner notified in writing.
- Active utilities to be abandoned once new utility is installed shall be removed and disposed once Construction Manager has completed the proposed work. Construction Manager is responsible for maintaining existing utility performance throughout construction.
- Inactive or abandoned utilities encountered during construction operations shall be removed. The location of such utilities shall be noted and reported in writing to the Architect.
- Utility Locator Service: Notify utility locator service for area where Project is located before commencing any site work.
- Construction Manager is responsible for legal removal and off-site disposal of all components of the existing sewage disposal systems, including but not limited to pipe, stone, filter sand liners, and associated chambers, tanks, and manholes for the existing septic systems. Structures may contain sewage. All structures to be disposed of legally.
- Provide hoses and water connections. Spray water onto demolition to prevent dust.

- Grade site and stockpile material to prevent runoff from leaving the site.
- Clean neighboring properties and improvements of dust, dirt, and debris caused by demolition operations. Return properties to conditions prior to start of work.
- Demolition limits of existing pavement shall be saw-cut along straight lines resulting in clean vertical edges.
- Protect existing site improvements to remain from damage during construction.
- Restore damaged improvements to their original condition, as acceptable to Architect.
- The Construction Manager shall mark locations of underground utilities prior to initiating site work; Dig-Safe clearance shall be obtained.

G1020.30 Infrastructure Demolition:

- All pavements, base course, sidewalks, curbs, gutters, of whatever nature designated to be removed shall be so-removed and legally disposed of. When specified, ballast, gravel, bituminous material or other surfacing or pavement materials shall be removed and stockpiled. Otherwise, such material shall be legally disposed. Where the remainder of the existing pavement or sidewalks is to remain undisturbed, a clean saw cut shall be made to separate the remaining pavement from that being removed.
- Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
- Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
- Disposal: Remove surplus soil material, unsuitable topsoil, unsuitable soils, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off site.
- Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

G1070 SITE EARTHWORK

G1070.10 Geotechnical testing including soil boring and test pits have been made by qualified Contractors for this site. This information is attached as the Geotechnical Report entitled "Preliminary Geotechnical Report Proposed Middle School, Beverly, Massachusetts" Prepared by Lahlaf Geotechnical Consulting, Inc., dated November 4, 2014.

G1070.20 Work covered by this specification includes the following but is not limited to:

- Proofrolling of exposed subgrade for fill, footings, foundations, slabs, walks, pavements, lawns and grasses, and exterior plants
- Excavation for structures and utilities
- Backfilling of excavations for walls and utilities with specified onsite and imported materials
- Placement of bedding, sub-base and base course layers
- Stabilization of saturated or otherwise disturbed materials
- Final grading
- Excavation support, shoring or bracing as necessary
- Required materials testing frequency
- Refer to the Geotechnical report for earthwork within the building area.

G1070.30 Refer to the Geotechnical Report for methods for building area preparation

- Over-excavate to remove onsite Fill within the entire pad and under foundations to a depth of 1'.
- Foundation recommendations are identified in Section 6.1 of the "Phase I Geotechnical Schematic Design Report, Proposed Beverly Middle /High School, Beverly, MA" Prepared by Pare Corporation, dated April, 2014. (attached)
- Remove the in-situ organic material (Stratum 2) and in-situ fill material (Stratum 1) encountered.
- 12" of structural fill shall be placed beneath footings.

G1070.40 The Construction Manager shall furnish all labor, material, tools and equipment necessary to excavate materials; segregate, track, handle, sample, analyze, and test excavated materials, backfill, and re-grade as indicated on the Drawings.

G1070.50 The Construction Manager shall use suitable on-site soils and fill, and soil from off-site sources, as needed. Please note that not all on-site materials will be suitable for reuse, nor will all required material gradations be present on the site. Imported materials are anticipated for this project.

G1070.60 Grading:

- The Construction Manager shall make excavations in such a manner and to such widths that will give suitable room for performing the Work and shall furnish and place all sheeting, bracing, and supports, if necessary.
- The Construction Manager shall provide labor and material for all pumping and draining, if necessary; and shall render the bottom of excavation firm and dry and in all respects acceptable. The Construction Manager shall collect and properly dispose of all discharge water from dewatering

systems in accordance with local and State requirements and permits.

- The Construction Manager shall raise the Site to final grades and compact the subgrade and intermediate layers to the required criteria set forth within the Section.
- Construction Manager shall protect and moisture condition all on site and imported materials for proper installation, compaction and use. This includes covering, drying, and adding moisture as required to maintain suitable workability of the soil materials. Please note onsite and imported materials will not necessarily be encountered, or delivered in a suitable moisture condition as environmental factors prevalent at the time of construction will impact soil materials.
- The Owner will retain a Soils Representative to perform on-site observations and testing during the construction operations. The service of the Soils Representative may include, but not be limited to the following:

Observation during excavation and dewatering of building areas, parking areas and controlled fill areas.

Observation during placement and compaction of fills within the building area, parking area, and controlled fill areas.

Observation, construction and performance of water content, gradation, and compaction tests at a frequency and at locations to assure conformance of this Specification. The results of these tests will be submitted to the Architect, and copied to the Construction Manager, on a timely basis so that the Construction Manager can take such action as is required to remedy indicated deficiencies. During the course of construction, the Soils Representative will advise the Architect, in writing, with copy to Construction Manager if, at any time, in his opinion, the work is not insubstantial conformity with the Contract Documents

- Shoring and bracing of trenches and other excavations shall, at a minimum, be in accordance with the latest requirements of the Department of Labor and Industries Bulletin No. 12, Section 10, and all subsequent amendments, and OSHA excavation safety standards.
- Shoring and sheeting shall be designed by a Registered Professional Engineer hired by and paid for by the Construction Manager.
- The Construction Manager shall excavate interceptor swales and ditches, as necessary, prior to the start of major earthmoving operations to insure minimal erosion and to keep areas as free from surface water as possible.
- Should surface, rain or ground water be encountered during the operations, the Construction Manager shall furnish and operate pumps or other equipment, and provide all necessary piping to keep all excavations clear of water at all times and shall be responsible for any damage to work or adjacent properties for such water. All piping exposed

above ground surface for this use, shall be properly covered to allow foot traffic and vehicles to pass without obstruction.

G1070.70 Excavation and Fill:

- Common Borrow:

Material shall be soil containing no stone larger than 8 inches and shall be substantially free of organic loam, wood, trash, or other objectionable materials which may be decomposable, compressible or which cannot be properly compacted. Common Borrow materials shall not contain more than 30 percent by weight of silt and clay.

No Common Borrow shall be imported until all available onsite Common Borrow has been utilized.

Common Borrow material from off-site borrow sources shall contain no detectable concentrations of asbestos.

- Granular Fill:

Shall be onsite or imported material conforming to Item M1.03.0 type a or b of the State Standards.

- Sand Gravel Fill:

Shall be onsite or imported material conforming to Item M1.03.0 type b of the State Standards.

- Gravel Borrow:

Materials may be anticipated to be present onsite in limited quantities.

- Gravel Borrow Bedding Material:

Shall be imported material conforming to Item M1.03.0 type c of the State Standards.

- Crushed Stone Bedding Material:

Shall be imported material conforming to Item M2.01.3 of the State Standards.

- Coarse Sand Bedding Material:

Shall be imported material conforming to Item M1.04.0 type A of the State Standards.

- Dense Grade Crushed Stone:

Shall be imported material conforming to Item M2.01.7 of the State Standards.

- Crushed Stone:

Shall be impacted durable material with maximum of 1 ½" or 2" as specified in the Drawings. Stone used for drainage components shall be double washed. For all other applications fines shall be <1% unless otherwise noted. Crushed stone shall meet the following gradation:

Size (inches)	Percent Finer
1 ½" – 2"	100%

1 ¼"	85% - 100%
¾"	10% - 40%
½"	0% - 8%
#200	<1%

¾" Crushed Stone shall comply with State Standards M2.01.4.

¼" to ¾" Crushed Stone shall comply with State Standards M2.01.6.

Clean naturally rounded aggregate with particle sizes no larger than ¾ of an inch with no more than 5% passing the #8 sieve. The dry density shall be a minimum of 95 pounds per cubic foot.

- Geotextile No. 1:

Geotextile Fabric for erosion control/slope protection shall conform to Item M9.50.0 type IV of the State Standards. Geotextile No. 1 is a nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that fibers retain their relative position. The product is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.

- Geotextile No. 2:

Geotextile No. 2 is a nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that fibers retain their relative position. The product is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.

- Drainage Aggregate:

Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

- Filter Material:

Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.

- Fine Aggregate:

ASTM C 33; fine aggregate, natural, or manufactured sand.

River Stone:

River stone shall be 1 ½" – 3" rounded, smooth stone, color shall be tan-beige range. Construction Manager to submit 5 gallon container sample with source indicated.

- Riprap:

Sound, durable, angular rock conforming to Section M2.02.0 of the MHD Specifications. Minimum lateral dimension 6-inches. Maximum lateral dimension 12-inches. The width or thickness of any single stone is not to be less than 1/3 its length.

- Stonedust:

Stone dust shall be a byproduct of a rock crushing operation with 90% passing the No. 4 sieve and no particle greater than 0.50 inches.2.10

- Detectable Warning Tape:

Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

Red: Electric.

Yellow: Gas, oil, steam, and dangerous materials.

Orange: Telephone and other communications.

Blue: Water systems.

Green: Sewer systems.

- Crushed Stone:

Crushed stone shall consist only of durable crushed rock consisting of the angular fragments obtained by breaking and crushing solid or shattered natural rock, and free from a detrimental quantity of thin, flat or elongated or other objectionable pieces, thin stones are stones whose average width exceeds four times their average thickness, elongated stones are those stones whose average length exceeds four (4) times their average width or durable, crushed gravel stone obtained by artificial crushing of gravel boulders or field stone with a minimum diameter before crushing of eight (8") inches. All crushed stone shall be washed, graded, and free of organic and vegetable matter, wood, brick, debris, trash, ice, snow, frozen materials, and any other materials that are deemed to be unacceptable by the Engineer. Not more than 0.5% of satisfactory material passing a No. 200 sieve shall be allowed to adhere to the crushed stone.

All crushed stone shall be uniformly blend stone to meet the following gradation:

1-1/2" Crushed Stone (Support Stone for Chambers).

<u>U.S. SIEVE NO.</u> <u>BY WEIGHT</u>	<u>% PASSING</u>
2"	100
1-1/2"	95-100

Beverly Middle School
Beverly, MA

1-1/4"	85-100
1"	35-70
3/4"	0-25
#200	<0.5

The Construction Manager shall excavate soil and fill to the limits necessary to achieve the required grades. The limits of excavation may not coincide with those areas indicated on the Drawings. The excavation areas shown on the Drawings are estimated areas only.

If unanticipated bearing soils are encountered beyond the limits of excavation as specified on the Drawings and in the Specifications and at the specified subgrade depth, the Construction Manager shall notify the Owner's Representative in writing. The Construction Manager shall carry the excavation deeper and replace the excavated material with appropriate specified material or concrete.

Removal of topsoil, subsoil, rock, boulder, fill, and silty clay, as specified herein and in the Geotechnical Report will not be considered as unanticipated, unsuitable soil conditions at an elevation above specified subgrade elevations. Similarly removal of these materials within paved areas as specified herein will not be considered unanticipated unsuitable soil conditions.

Backfill materials shall be placed in the areas as indicated in the table below:

Fill below pavement subgrade elevation	Granular Fill
Fill below sidewalk subgrade elevation	Granular Fill
Fill within utility trenches below pavement and sidewalk subgrade	Granular Fill
Fill below utility bedding	Granular Fill
Fill placed in landscaped areas outside the Influence Area	Common Borrow
Fill placed 1 foot below athletic playing fields	Sand Gravel Fill

Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

Bulk Fill Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 500 sq. ft. or less of bulk fill area, but in no case fewer than 3 tests per lift, per area.

Trench Backfill: At each compacted backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 2 tests per lift, per operation.

When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth

required; recompact and retest until specified compaction is obtained.

The following table lists minimum compactive efforts, which are required for all, fill materials. Compaction of each lift shall be completed before placement and compaction of the next lift is started. The compaction equipment shall make an equal numbers of transverse and longitudinal coverages of each lift. The degree of compaction for fill placed in various areas shall be as follows:

Under concrete slabs and footings 95%

In paved areas:

Within aggregate base course 95%

Within aggregate subbase course 95%

Below subbase course 92%

In landscaped areas 90%

Around and Above Utilities below:

Below Pavement subbase in paved areas 92%

*Percentage of maximum dry density of the materials at optimum moisture content as determined by methods or tests for ASTM designation D1551 Method D.

G1070.80 Erosion and Sedimentation Controls:

- This Section specifies requirements for control of erosion from the Limits Work onto adjacent down gradient areas as shown on the Drawings, as specified herein and as necessary for applicable construction activities.
- Furnish and install straw bales, silt fence, swales, soil berms, mulches, grasses, channels, crushed stone, rip-rap, grading to control runoff, dewatering filter basins, and all other devices required to control erosion. Continually maintain all erosion control devices within the limits of the contract areas. Remove and clean up of all erosion control devices within the limits of the contract areas.
- In order to prevent erosion and sedimentation from construction activities related to the performance of this project, the Construction Manager and his subcontractors shall comply with permits issued for the project, all applicable federal, state and local laws and regulations concerning erosion and sediment control, as well as the specific requirements stated in this Section and elsewhere in the Specifications.

Commonwealth of Massachusetts, Department of Public Works, Standard Specifications for Highways and Bridges, latest edition, herein referred to as the "Standard Specifications" and related articles.

Massachusetts "Erosion and Sedimentation Control Guidelines for Urban and Suburban Areas, A Guide for Planners, Designers, and Municipal Officials" prepared by

Department of Environmental Protection (DEP), Reprinted
May 2003.

- Hay Bales:

Bales shall be made of straw or hay with forty pounds minimum weight and one hundred and twenty pounds maximum weight. They should be either wire or nylon bound. Wood stakes shall be a minimum of 2 inch by 2-inch nominal size by a minimum of 3 feet long. As an alternate, No. 4 size steel reinforcing bars may be used with rubber safety tops.

- Silt Fence:

Silt fences or sedimentation barriers shall consist of wood posts with industrial support netting and sediment control filter fabric attached.

Wood post shall be standard 2"x2"x4.5' long hardwood stakes commonly used to support filter fabric. Silt fence shall be furnished standard with filter fabric attached to hardwood posts and spaced at a maximum distance of 8 feet.

Provide suitable heavy nylon cord for securing abutting silt fence posts.

The filter fabric material shall be needle punched non-woven polypropylene geotextile.

- Catch Basin Inserts:

Siltsack®, Basin bag, Ultra-BasinGuard or equal shall be manufactured from a specially designed woven polypropylene geotextile. The insert will be manufactured to fit the opening of the catch basin or drop inlet.

- Filter Socks:

Filter Socks are biodegradable sediment-trapping devices. Manufacturers include SiltSoxx, Corr Logs, Straw Wattles, or equivalent.

- Stone Stabilization Pad:

To ensure no offsite tracking of soil.

- Dewatering:

The objective of this Section is to remove standing water from excavations to perform the work as specified and collect water which may enter the excavation during Construction Manager's excavation activity.

Furnish, install, operate, monitor, maintain and remove temporary dewatering and drainage systems as necessary to lower and maintain groundwater levels below subgrades of excavations. Prevent surface water runoff from entering or accumulating in excavations.

Remove temporary dewatering and drainage systems when no longer needed. Restore all disturbed areas

G2010.10 Items to be installed:

- Granite curbing
- Paving
- Pavement markings

G2010.20 Roadway Pavement:

- Roadway Pavement shall consist of the following:
Bituminous Concrete Pavement shall conform to the applicable subsections of Section 460, Class I Bituminous Concrete Pavement, Type 1 of the "Standard Specifications."
- Top Course shall be 1.5"
- Base Course shall be 2.0"
- Subbase shall be 8" thick and conform to MassDOT M1.03.1
- The subbase to be placed under pavement shall consist of at least 8 inches of base material as specified in Section G1070, Earthwork, evenly spread and thoroughly compacted.

Compaction of the subbase shall be in accordance with Section G1070, Earthwork

All thicknesses are measured after rolling. The permanent surface course shall be evenly spread and rolled with a power roller having a minimum weight of 5 tons.

- Thickness: Test in-place asphalt concrete courses for compliance with requirements for thickness. Repair or remove and replace unacceptable paving. In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness.

- Compaction:

The Bituminous mixture shall be compacted to at least 95% of the density achieved on the laboratory testing of the design mix for the project.

Density will be checked by the Nuclear Density gage Method, ASTM 2950.

G2010.30 Roadway Curbs and Gutters:

- Granite curbs shall be in accordance to MHD Standard Specifications M9.04.1 Type VA4 and installed in accordance to MHD Std. Spec. Section 500. Granite curbing shall be light gray in color and free from veins of other colors of granite.
- Granite curb inlets shall conform to M9.04.5 and the Town of Beverly standards.

G2010.40 Roadway Appurtenances:

- Pavement Markings:

Final Pavement Markings onsite shall be epoxy resin, conforming to Beverly and Massachusetts Standard Specifications.

Pavement markings shall be “white” or “yellow” in color, unless otherwise noted on Drawings.

General pavement marking delineation for parking stalls shall measure 4 inches in width. All other pavement-marking widths are shown in detail on the plans.

- Guardrail:

Guardrail shall be steel backed timber guardrail and conform to MA Std. E401.10.0

G2020 PARKING LOTS

G2020.10 Parking Lot Pavement:

- Pavement for parking lots shall conform to specifications outlined in G2010.10 – Roadway Pavement.

G2020.20 Parking Lot Curbs and Gutters:

- Curbing for parking lots shall conform to specifications outlined in G2010.20 – Roadway Curbs and Gutters.

G2020.30 Parking Lot Appurtenances:

- Pavement Markings:

Final Pavement Markings onsite shall be epoxy resin, conforming to Beverly and Massachusetts Standard Specifications.

Pavement markings shall be “white” or “yellow” in color, unless otherwise noted on Drawings.

General pavement marking delineation for parking stalls shall measure 4 inches in width. All other pavement-marking widths are shown in detail on the plans.

- Pavement for parking lots shall conform to specifications outlined in G2010.10 – Roadway Pavement

G2020.40 Parking Lot Lighting:

G2030 PEDESTRIAN PLAZAS AND WALKWAYS:

G2030.10 Pedestrian Pavement:

- Portland Cement: ASTM C-150 Type 1: All cement shall be from a single source.
- Concrete shall be 4” thick and the sub base shall be 12” thick.
- Natural Aggregates:

Fine Aggregate for Concrete: Shall be natural sand consisting of clean, hard, durable, uncoated particles, conforming to ASTM C33. Organic content shall be determined according to ASTM C40. Allow no frozen or partially frozen aggregate in the mix.

Course Aggregate for Concrete: For regular weight concrete use crushed stone or gravel from approved source conforming to ASTM C33. Coarse aggregate shall not

contain greater amounts of deleterious material than specified in table III, ASTM C33.

- Water from approved source, potable, clean and free of oils, salt, alkali, organic matter and other deleterious material.
- Ready-mixed concrete shall be mixed and transported in accordance with specification for Ready-Mixed Concrete” ASTM C94, Alt. No. 3 and ACI Standard 304, “Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- Concrete shall be deposited continuously, in horizontal layers of such thickness (not deeper than 18 inches) that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the Section. Placing shall be carried out at such a rate that the concrete, which is being integrated, with fresh concrete is still plastic. Concrete which has partially hardened or which has been contaminated with foreign materials shall not be deposited.

G2030.20 Exterior Steps and Ramps:

- Ramps:

All ramps to comply with ADA Accessibility Guidelines and MAAB.

All ramps shall be sloped no greater than 1:12.

Ramps shall have level landings at bottom and top of each ramp and each ramp run. Landings shall have the following features:

The landing shall be at least as wide as the ramp run leading to it.

The landing length shall be a minimum of 60 in (1525 mm) clear.

If ramps change direction at landings, the minimum landing size shall be 60 in by 60 in (1525 mm by 1525 mm).

G2030.30 Pedestrian Pavement Appurtenances:

- Detectable Warning Mats:

Detectable warning mats shall conform with MassDOT Standard Detail E 107.6.5R

Curb cuts shall comply with all requirements established by the Architectural Access Board, Commonwealth of Massachusetts, CMR 521.

Curb cuts shall not exceed:

Cross-slopes at front and back of curb cuts: 1.5% max.

Curb cuts: 7.5% max

All planes of the finished curb cuts shall be field checked for slopes using a two-foot electronic “smart” level.

Curb cuts that do not comply with the slope requirements shall be cut out in their entirety and completely rebuilt.

G2060 SITE DEVELOPMENT

G2060.10 Exterior Signage:

- This Section shall include: Labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

Furnishing and installing appropriate signs, of the type specified and at the locations shown on the Drawings or as indicated by the Architect in conformity with these specifications.

Install handicap-parking signs as indicated on the drawing and all other parking instructional signs and gates as specified by the manufacturer's installation instructions.

- Traffic Sign work under this item shall conform to the relevant provisions of the MHD Standard Specifications, and the Manual on Uniform Traffic Control Devices.
- Traffic Signs:

Materials for all sign panels shall be aluminum panels Type A-1 with high intensity Type III reflective sheeting in accordance with the relevant provisions of Section 828 Traffic Signs of the "Standard Specifications" and MUTCD.

Sign supports and foundations shall be in accordance with the details and MUTCD as indicated on the Contract Drawings and Section 840 of the "Standard Specifications." Signs shall be mounted on one 2-inch square, 14 gauge galvanized steel breakaway post. Each post shall have 7/16-inch-diameter die punched knockout/holes on all four sides for the entire length of the post. Knockout/holes shall be on the centerline of each side, 1 inch on center, in true alignment and opposite each other.

Sign fabrication and erection shall be in accordance with the relevant requirements of Sections 828 and 840 of the "Standard Specifications" and the "Construction Standards."

Post foundations, except in ledge, shall be excavated by an auger to the next lines of the outside diameter of the footing without disturbing the soil around or below the excavation.

G2060.20 Covers and Shelters:

- Relocatable Storage Containers:

Any manufacturer's names and/or model numbers identified herein are intended to assist in establishing a general level of quality, configuration, functionality, and appearance required. This is NOT a proprietary specification and it should be noted that "Or approved equal" applies to all products denoted herein. It is understood that all manufactures will have minor variations in configuration, appearance, and product specifications and such minor variations shall not eliminate such manufacturers as an

approved equal". It is the intent of this specification to encourage open and competitive involvement from multiple manufacturers that are able to supply similar products.

Construction Manager will furnish and install the relocatable storage containers.

Construction Manager to provide crane for lifting the buildings off the delivery truck and placing units on level concrete pads.

Design load certification by Professional Structural Engineer including seismic zone, wind loads and snow loads must be confirmed in writing with local code authorization by Construction Manager prior to manufacture of the building.

Relocatable storage building shall be Miller Relocatable Storage Buildings, Rite-Away by US Door B Building Components, Mini-Storage Outlet Relocatable/Portable Storage Building system Model 10101 or equivalent.

G2060.30 Retaining Walls:

- Segmental Retaining Walls:

Any manufacturer's names and/or model numbers identified herein are intended to assist in establishing a general level of quality, configuration, functionality, and appearance required. This is NOT a proprietary specification and it should be noted that "Or approved equal" applies to all products denoted herein. It is understood that all manufacturers will have minor variations in configuration, appearance, and product specifications and such minor variations shall not eliminate such manufacturers as an "approved equal". It is the intent of this specification to encourage open and competitive involvement from multiple manufacturers that are able to supply similar products.

Work includes furnishing and installing segmental retaining wall (SRW) units to the lines and grades designated on the construction drawings. Also included is furnishing and installing appurtenant and incidental materials required for construction of the retaining walls as shown on the Drawings.

Where specifications and reference documents conflict, the Architect shall make the final determination of the applicable document.

Wall units shall be Re-Con, Redi-Rock, Strong Stone LLC or equivalent.

Exterior block dimensions shall be uniform and consistent. Maximum dimensional deviations shall be 1% excluding the architectural surface. Maximum width (face to back) deviation including the architectural surface shall be 1.0 inch.

Exposed face shall be finished as specified. Other surfaces to be smooth form type. Dime-size bug holes on the block face may be patched and/or shake-on color stain can be used to blend into the remainder of the block face.

SRW units shall be machine formed, Portland Cement concrete blocks specifically designed for retaining wall applications.

Color of SRW units to be selected by the Architect. See Materials submittal requirements for further information in selection of applicable color(s).

SRW units shall be solid through the full depth of the unit.

SRW units shall be capable of providing a split face, textured surface for all vertical surfaces that will be exposed after completion of wall, including any exposed sides and backs of units.

SRW units shall be interlocked with connection pins, of the material, size, and dimension as recommended and by the wall system manufacturer.

Geosynthetic reinforcement shall consist of geogrid or geotextile manufactured as a soil reinforcement element. The manufacturers/suppliers of the geosynthetic reinforcement shall have demonstrated construction of similar size and types of segmental retaining walls on previous projects.

The type, strength, and placement location of the reinforcing geosynthetic shall be determined by the Wall Design Engineer, and shown on the design submittal.

Material for leveling pad shall consist of compacted granular fill and shall be a minimum of 6 inches in depth. Lean concrete with a 28 day compressive strength of 200-300 psi and three inches thick maximum may also be used as a leveling pad material. The leveling pad should extend laterally at least a distance of six inches from the toe and heel of the lowermost SRW unit.

Free Draining Backfill material shall be washed stone and shall be placed to a minimum of one foot width behind the back of the wall and shall extend vertically from the leveling pad to an elevation six inches below the top of wall.

Drainage aggregate shall be angular, clean stone as specified by the Wall Design Engineer.

The drainage collection pipe shall be a perforated or slotted PVC, or corrugated HDPE pipe. The drainage pipe shall be wrapped with a geotextile to function as a filter.

Drainage pipe shall be manufactured in accordance with ASTM D 3034 and/or ASTM D 1248.

The reinforced soil material shall be free of debris. Reinforced material shall consist of the Granular Fill as indicated in Section G1070 Earthwork.

Leveling pad shall be compacted to 95% of standard proctor or 90% of modified proctor to ensure a level, hard surface on which to place the first course blocks. Pad shall be constructed to the proper elevation to ensure the final elevation shown on the plans.

Leveling pad shall have a six inch minimum depth for walls under eight feet in height and a 12 inch minimum depth for walls over eight feet. Pad dimensions shall extend beyond the blocks in all directions to a distance at least equal to the depth of the pad or as designed by the Engineer.

For steps and pavers, a minimum of 1 - 1½ inch of free draining sand shall be screened smooth to act as a placement bed for the steps or pavers.

G2080 LANDSCAPING

G2080.10 Trees, Shrubs and Ground Covers:

- Tree Protection and Trimming:

Trees that are to remain and must be protected.

Work includes trimming and protection of trees that are indicated to remain but interfere with or are in close proximity to new construction, as herein specified. All tree work shall be performed with the approval of the Landscape Architect and under the direction of a qualified Arborist.

Temporary Protections: Provide temporary fencing, barricades or guards to protect trees and other plants, which are to remain, from damage.

Protect Root Systems: The Construction Manager shall not store construction materials, debris or excavated material within drip line (outer perimeter of branches). The Construction Manager shall not permit vehicles within drip line. The Construction Manager shall restrict foot traffic to prevent.

G2080.20 Soil Preparation for Lawn Establishment:

- The principal work of this section includes, but may not be limited to, the following:

Grading and Spreading Loam.

Preparations of Areas for Seeding.

Application of Limestone.

Application of Lawn Starter Fertilizer.

Application of Turf Maintenance Fertilizer.

Applying Jute Mesh.

- Clean Screened Loam

Loam shall consist of screened fertile, loose, friable fine sandy loam or sandy loam free of subsoil, refuse, stumps, roots, rocks, cobbles, stones, brush, noxious weeds, litter and other materials which are larger than one inch (1") in any dimension and which will prevent healthy plant growth. Organic matter shall constitute not less than five percent (5%) nor more than twenty percent (20%) as determined by wet combustion method (Chromic acid reduction). The Construction Manager shall notify the Owner or Owner's Representative of the intended source of loam to be

employed at least two (2) weeks prior to the intended time of use to allow time for sampling.

Loam shall possess good filtration and permeability rates, and shall possess a mechanical analysis where: N 85% of sand size is 0.5 to 1.0 mm and N 95% of sand mix is between 0.5 and 2.0 mm and no more than 5% of mix is less than 0.5 mm

Acidity range of approximately pH 5.5 to 7.5 when tested according to methods of testing or A.O.A.C. and organic content not less than 5% nor more than 20% as determined by wet combustion method (Chromic acid reduction).

- Limestone

Dolomitic limestone contain up to 50% magnesium carbonate in a dry, granular form. Limestone shall be ground to such a fineness that at least 50% will pass through a 100-mesh sieve and 90% to 100% will pass through a 20-mesh sieve.

- Lawn Starter And Maintenance Fertilizer

Fertilizer shall be Organic-based and be OMRI (Organic Materials Review Institute) Certified

Complete fertilizer in granular form, from commercial sources bearing manufacturer's analysis; 2-3-3 ratio of N-P-K.

Total Nitrogen (N) – 2.0%

0.8% - Water Soluble Nitrogen

1.2% - Water Insoluble Nitrogen

Available Phosphate (P₂O₅) – 3.0%

Soluble Phosphate (K₂O) – 3.0%

Application Rate: Apply 2-3 pounds per 100 square feet

- Jute Mesh

Jute mesh shall be uniform, open, plain weave of undyed and unbleached single jute yarn, a minimum of four (4) feet in width plus or minus one (1) inch. There shall be 78 warp ends per width and 41 weft ends per yard. Weight shall average 1.22 pounds per linear yard, plus or minus 5%.

Staples for Erosion Control Materials: 9 gauge staples shall be used with jute mesh: 11 gauge with woven paper.

G2080.30 Soil Preparation for Planting Beds:

- The principal work of this section includes, but may not be limited to, the following:

Mixing of Loam and Compost.

Grading and Spreading of Loam/Compost Mix.

Application of Limestone.

- Screened Loam

Screened fertile, friable, medium textured sandy loam with no admixture of refuse or any natural or introduced materials toxic to plant growth and free from subsoil and stumps, roots, brush, stones, clay lumps or other extraneous matter over one inch (1") in any diameter and which will prevent the healthy development of plant material.

Sandy loam shall possess good filtration and permeability rates, and shall possess a mechanical analysis where: N 85% of sand size is 0.5 to 1.0 mm and N 95% of sand mix is between 0.5 and 2.0 mm and no more than 3% of mix is less than 0.5 mm.

Acidity range of approximately pH 5.5 to 7.5 when tested according to methods of testing or A.O.A.C. and organic content not less than 5% nor more than 20% as determined by wet combustion method (Chromic acid reduction). Topsoil may be amended to meet such requirements. Provide analysis prior to delivering topsoil to site, including recommended rates and types of soil additives to achieve desired mix.

- Compost

Shall be made from aged organic materials, free from sticks, stones and/or other substances which would be injurious to health plant growth.

The compost shall be screened to remove all materials one half inch ($\frac{1}{2}$ ") and larger.

- Limestone

Dolomitic limestone contain up to 50% magnesium carbonate in a dry, granular form. Limestone shall be ground to such a fineness that at least 50% will pass through a 100-mesh sieve and 90% to 100% will pass through a 20-mesh sieve.

G2080.40 Soil Preparation for Rain Gardens:

- The principal work of this section includes, but may not be limited to, the following:

Mixing of Sand, Loam and Compost

Grading and Spreading of Soil Mix

- Screened Loam

Screened fertile, friable, medium textured sandy loam or loamy sand with no admixture of refuse or any natural or introduced materials toxic to plant growth and free from subsoil and stumps, roots, brush, stones, clay lumps or other extraneous matter over one inch (1") in any diameter and which will prevent the healthy development of plant material.

Sandy loam shall possess good filtration and permeability rates, and shall possess a mechanical analysis where: N 85% of sand size is 0.5 to 1.0 mm and N 95% of sand mix is between 0.5 and 2.0 mm and no more than 3% of mix is less than 0.5 mm.

Acidity range of approximately pH 5.5 to 7.5 when tested according to methods of testing or A.O.A.C. and organic content not less than 5% nor more than 20% as determined by wet combustion method (Chromic acid reduction). Topsoil may be amended to meet such requirements. Provide analysis prior to delivering topsoil to site, including recommended rates and types of soil additives to achieve desired mix.

- Compost

Shall be made from aged organic materials, free from sticks, stones and/or other substances which would be injurious to health plant growth

The compost shall be screened to remove all materials one half inch ($\frac{1}{2}$ ") and larger.

- Sand

Sand shall be a gravelly sand meeting ASTM D 422.

Sieve size Percent passing

2"	100%
$\frac{3}{4}$ "	70-100%
$\frac{1}{4}$ "	50-80%
No. 40	15-40%
No. 200	0-3%

- Thoroughly mix the Loam, Sand and Compost at the following percentages:

40% Sand

20-30% Loam

30-40% Compost

Percentages are by volume.

- The Loam/Compost mix shall be fully and thoroughly blended.
- Remove all debris and other inorganic materials on any prepared subgrades, and reshape and dress any damaged or eroded slopes, swales, and other areas. Scarify and loosen subgrade to a friable condition in any areas where compaction may have occurred. Loam/Compost shall not be placed until subgrade is in suitable condition and free of excessive moisture or frozen materials. Loam/Compost mix shall be spread to produce a total depth of 18 inches or as otherwise shown on the plan. Fill all depressions in existing grades with suitable fill material prior to spreading of loam/compost mix, then shape and finish grade to depth required.

G2080.50 Seeding for Lawn Areas:

- The principal work of this section includes, but may not be limited to, the following:

Application of seed.

Application of weed control.

Acceptance of seeding.

- In general, seeded areas shall, at a minimum, include all areas of site within project limit lines that have been disturbed or are barren unless otherwise noted on the plans. Overseeding of established lawn areas, if required on plans, shall also extend to the limit of disturbance (LOD), unless otherwise noted.

- Maintenance of seeding to be performed by the installer includes:

Watering.

Regrading and replanting eroded areas.

Seeding or patching sparse or bare areas.

- Maintain seeded areas immediately after placement until grass is accepted.

- Seed

General: Pure, live, fresh seed from commercial sources meeting and labeled in accordance with State and Federal laws, rules and regulations. All seed to have minimum germination rate of 85%.

Seed mix for all general lawn areas shall conform to the following grass types and percentages:

Improved Perennial Rye	25%
Improved Annual	25%
Creeping Red Fescue	25%
Turf Type Tall Fescue	18.5%
Kentucky Bluegrass 98/85	5%

Red Top 1%

Colonial Bentgrass 0.5%

Sowing Rate: 5 to 7 pounds per 1,000 sq. ft.

Overseed Sowing Rate: 2 to 3 pounds for 1,000 sq. ft.

- Seed mix for athletic fields shall conform to the following grass types and percentages:

Improved Perennial Rye	30%
Improved Kentucky Bluegrass CGT	25%
Improved Kentucky Bluegrass CBT	25%
Chewing Fescue	20%

Sowing Rate: 4 to 6 pounds per 1,000 sq.ft.

Overseed Sowing Rate: 2 to 3 pounds for 1,000 sq. ft.

- Weed Control

Pre-emergent weed control for Loam and Seed Areas shall be Treflan 5-G or approved equal. Deliver in manufacturer's fully identified containers and apply according to manufacturer's directions.

G2080.60 Seeding for Non-Lawn Areas:

- The principal work of this section includes, but may not be limited to the following:
 - Application of seed.
 - Acceptance of seeding.
- Seed:
 - General: Pure, live, fresh seed from commercial sources, meeting and labeled in accordance with State and Federal laws, rules, and regulations. All seed to have minimum germination rate of 85% unless otherwise noted.
- Rain Garden Seed Mix shall be "New England Conservation / Wildlife Mix" as supplied by New England Wetland Plants, Inc. or approved equivalent. Percentages of species shall be per New England Wetland Plants specifications.
- Seed Botanical Type:
 - Elymus virginicus
 - Schizachyrium scoparium
 - Andropogon gerardii
 - Festuca rubra
 - Panicum virgatum
 - Chamaecrista fasciculata
 - Panicum clandestinum
 - Sorghastrum nutans
 - Asclepias syriaca
 - Heliopsis helianthoides
 - Eupatorium purpureum
 - Euthamia graminifolia
 - Verbena hastate
 - Zizia aurea
 - Solidago juncea
- Seeding Rate: 25lbs/acre
- Cover Crop Seeding:
 - Cover crop seeding shall be applied to all areas designated as Rain Garden Seed Mix as shown on the Plans.
- Cover Crop Seed Mix shall be Grain Rye.
- Grain Rye Cover Crop shall be applied at 30 lbs./acre.

- Care Of Seeded Areas:

Watering: Construction Manager shall water all seeded areas within 72 hours of seeding operation. One additional watering may be required and will be at discretion of owner.

Mowing: Rain Garden Seed Mixes shall be mowed using a weed-eater to a height of 8" whenever height reaches 18". Trimming lower than 4" will kill many species in the mixes. Problem weeds such as thistle and burdock should be spot treated or hand-pulled each year, including the establishment year. Following the first growing season the site can be mown close to 4 inches height each Spring prior to onset of new growth.

Each cutting shall result in a stand of evenly mowed grass, three inches (3 inches) tall immediately following the cutting. Neat trimming shall be necessary around all poles, trees, ledges, delineators, cubs, piers, abutments and other structures falling within the seeded areas; this trimming will be conducted simultaneously with the mowing during each cutting operation. All curbs shall be trimmed and exposed; all gutters will be left free of all grass clippings.

- Grading And Spreading Of Loam/Compost Mix:

Remove all debris and other inorganic materials on any prepared subgrades, and reshape and dress any damaged or eroded slopes, swales, and other areas. Scarify and loosen subgrade to a friable condition in any areas where compaction may have occurred. Loam/Compost shall not be placed until subgrade is in suitable condition and free of excessive moisture or frozen materials. Loam/Compost mix shall be spread to produce a total depth of **12"** as shown on the plan. Fill all depressions in existing grades with suitable fill material prior to spreading of loam/compost mix, then shape and finish grade to depth required.

G2080.70 Trees, Shrubs and Groundcovers:

- The principal work of this section includes, but may not be limited to, the following:
- Layout and Excavation of Plant Hole
- Planting and Backfilling
- Watering.
- Mulching.
- Fertilizing.
- Staking and Guying.
- Antidessicant Application.
- Tags and Labels.
- Maintenance.
- Plant Replacement Guarantee.
- Loam Compost Mix:

- Loam shall consist of screened fertile, loose, friable fine sandy loam or sandy loam free of subsoil, refuse, stumps, roots, rocks, cobbles, stones, brush, noxious weeds, litter and other materials which are larger than one inch (1") in any dimension and which will prevent healthy plant growth. Organic matter shall constitute not less than five percent (5%) nor more than twenty percent (20%) as determined by wet combustion method (Chromic acid reduction). The Construction Manager shall notify the Owner or Owner's Representative of the intended source of loam to be employed at least two (2) weeks prior to the intended time of use to allow time for sampling.
- Loam shall possess good filtration and permeability rates, and shall possess a mechanical analysis where: N 85% of sand size is 0.5 to 1.0 mm and N 95% of sand mix is between 0.5 and 2.0 mm and no more than 5% of mix is less than 0.5 mm.
- Acidity range of approximately pH 5.5 to 7.5 when tested according to methods of testing or A.O.A.C. and organic content not less than 5% nor more than 20% as determined by wet combustion method (Chromic acid reduction).
- Antidessicant
- Emulsion which permits transpiration while retarding excessive loss of moisture from plants. Deliver in manufacturer's fully identified containers and mix according to manufacturer's direction. Use "Wiltproof" or equal approved.
- Tree And Shrub Fertilizer
- Fertilizer shall be Organic-based and be OMRI (Organic Materials Review Institute) Certified
- Complete fertilizer in granular form, from commercial sources bearing manufacturer's analysis; 2-3-3 ratio of N-P-K.
- Total Nitrogen (N) – 2.0%
- 0.8% - Water Soluble Nitrogen
- 1.2% - Water Insoluble Nitrogen
- Available Phosphate (P₂O₅) – 3.0%
- Soluble Phosphate (K₂O) – 3.0%
- Application Rate: Apply 2-3 pounds per 100 square feet
- Stake And Guying Materials
 - Guy web: Shall be a low abrasion woven fiber webbing with a break strength of 900 pounds or better. The width of the webbing shall be no less than 5/8 inch nor greater than 3/4 inch. The length shall be sufficient enough to be attached to the tree trunk and stake.
 - Stakes: Shall be on a hardwood source, free of knots, insects and fungi. Stakes shall be of uniform size and shape

and shall be a minimum of two inches (2") square. Stakes shall be pointed with a taper of no less than four inches (4").

The above ground stake height shall be eight inches (8") above the point of attachment. The type of stakes shall be uniform throughout the job.

- **Mulch**

Pine Bark Mulch shall be derived from evergreen tree bark aged to a minimum of six months and no more than eighteen months. The bark shall be shredded so that the resulting pieces are no more than ¼ inch thick and no longer than three inches (3"). The mulch shall be free of stringy material and shall not contain an excess of fine particles. The mulch shall be brown in color, free of leaves, twigs, sod, weeds, shavings and other foreign materials which are injurious to health plant growth.

- **Plant Materials**

Plant materials shall conform in size, grade and quality to the "American Association of Nurserymen Standards for Nursery Stock" as amended by the United States of America standards institute, in effect at the time of bidding.

All plants shall be nursery-grown in accordance with good horticultural practices and shall have been grown under climatic conditions similar to those in the locality of the project for at least two (2) years. They shall have been transplanted or root pruned at least nine (9) months previous to moving to the site.

All plant material shall comply with the state and federal law with respect to inspection for plant disease and insect infestation.

G2080.80 Tennis Court Paving:

- This work shall consist of all work necessary and required for the construction of tennis courts. Such work includes, but is not limited to, the following:

Gravel base

Bituminous concrete courses

Colored filler coats

Acrylic line paint

- Warranty from the manufacturer stating that all work executed under this section will be free from defects of material for a period of five (5) years from the date of project completion and that any defects will be remedied upon written notice at no additional cost to the Owner.
- Subgrade: The Construction Manager shall prepare a suitable subgrade at an elevation that shall accommodate the gravel base, bituminous concrete, and color system, meeting the required proposed grades. The subgrade shall be thoroughly dry and compacted to 95% Standard Proctor.

Slope shall be established in sub-grade and shall be all in one direction as indicated on the plans.

- Gravel Base: Provide a minimum depth of eight (8) inches of gravel and a four (4) inch lift of $\frac{3}{4}$ " dense graded aggregate, thoroughly rolled and compacted, and shall conform to the grades and cross sections specified. Maintain pitch with gravel fill.
- Bituminous Concrete Base Course: A bituminous concrete base over the gravel base course shall be applied at a $1\frac{1}{2}$ " thickness. This course shall be laid to obtain required slope, pitch and grade with no variations greater than $\frac{1}{4}$ " along a 10' straight edge in any direction.
- Bituminous Concrete Wearing Course: A final bituminous concrete surface course shall be applied at a $1\frac{1}{2}$ " thickness. Application shall be made to attain final required slope, pitch, and grade with no variations greater than $\frac{1}{8}$ " along a 10' straight edge in any direction.
- Nova Color System:
Apply two coats of "Novafil"
Apply one coat of "Novacoat"
Apply 2 inch wide white line markings conforming to U.S. Lawn Tennis Association Specifications.

G2080.90 Synthetic Turf System:

- Provide equipment and materials, and do work necessary to construct the filled synthetic turf field surfacing, with permeable base, drainage, field markings. Work shall include but shall not be limited to:

Subgrade preparation, crushed stone base, finishing stone, geotextile fabric and required drainage.

Synthetic turf surface, infill, field marking, graphics and related finish work.
- Synthetic Turf Cast-In-Place Concrete Anchor Curb
Cast-In-Place Concrete.

The cast-in-place concrete anchor curb for the synthetic turf field shall be in accordance with details provided in the construction documents.

The anchor curb shall be formed by hand.

The anchor curb shall be in strict accordance with the grading plan and shall be inspected and approved by the Turf Installer. Repairs shall be made to the satisfaction of the Turf Installer at no additional cost to the Town.

Drain system shall be installed as per the contract documents and any modifications from the Turf Manufacturer based on comments from Section 1.6 C of this specification.
- Requirements Of The Subgrade:

A soil test is required on the intended surface to be covered by the synthetic turf. These tests shall provide the following information:

Permeability and/or hydraulic conductivity.

Percolation rate.

Moisture content at the time of the test.

Sieve analysis and plasticity limits determination test.

Depth to the water table.

In situ compaction, estimated or measured.

Any external features that could affect the drainage characteristics of the field.

Surrounding slopes and conditions that could bring additional water to the field in question.

Pictures or video of the site on DVD.

- Geotextile Fabric

Geotextile fabric shall be Geotextile 1.

- Crushed Stone Base

Crushed stone base shall be a graded, granular, non-frost susceptible, free-drainage material, consisting of either durable stone and coarse sand or of blast furnace slag, stone, and gravel blends practically free from loam and clay, and which can be readily compacted to form a stable, permeable, foundation, graded as follows:

<u>Sieve Size</u>	<u>% Passing by Weight</u>
1 in.	100
3/4 in.	85-100
3/8 in.	50-80
No. 4	35-60
No. 10	25-50
No. 40	15-30
No. 200	0-3

The specified crushed stone base supplied shall conform to the Turf Manufacturer's recommended specifications.

The crushed stone base supplied shall be stable and sufficiently permeable to ensure all-weather availability of the field.

- Finishing Stone

The finishing stone shall be clean, free-drainage material free from loam and clay and which can be readily compacted to form a stable, permeable base and shall meet the following gradation requirements:

<u>Sieve Size</u>	<u>% Passing by Weight</u>
1/2"	100

3/8"	85-100
No. 8	35-75
No. 16	10-55
No. 30	0-40
No. 50/60	0-15
No. 100	0-8
No. 200	0-2

- Synthetic Turf Components

Carpet Fiber: A synthetic turf carpet consisting of nominal 2½" long low friction blended polyethylene fiber, of monofilament design. Color shall be green.

The lead content of the yarn must adhere to the maximum standards and comply with applicable requirements of the following standards. Where these standards conflict with other requirements in this specification, the most restrictive requirement shall govern.

American Society for Testing and Materials (ASTM):

F2765-09 Standard Specification for Total Lead Content in Synthetic Turf Fibers

The carpet fiber shall have the following properties:

<u>ASTM</u>	<u>Property</u>	<u>Specifications</u>
D1577	Denier (min.)	10,000 nominal
D5823	Pile Height (min.)	2 ½" nominal
D5848	Pile Weight (min.)	36 oz./sq. yd.

Backing: A minimum of two backings are required. One backing shall include a UV-treated woven polypropylene, weighing approximately 8 oz./sq yd. The other backing shall be a permeable application of moisture cure urethane to lock the fiber tufts into the backing.

Infill: A two (2) inch thick infill system consisting of a mixture comprised of selected and graded dust-free silica sand and cryogenically processed rubber granules. The infill is installed so as to leave approximately 1/2" of the tufts clear of the top of the infill.

Silica Sand and shall consist of uniform, sub-angular to rounded, single grains. It shall be dust free, and un-ground. Crusher fines are unacceptable. Silica sand within the infill mix shall meet the following size distribution:

U.S. (Mesh)	Metric (mm)	% Retained per sieve
16	1.190	0
20	0.840	0-3
25	0.710	10-30

30	0.590	30-50
35	0.500	15-35
40	0.420	5-15
50	0.297	<5
70	0.210	Trace

- Cryogenically processed rubber granules within the infill mix shall meet the following size distribution:

U.S. (Mesh)	Metric (mm)	% Passing	% Retained per sieve
12	1.680	100	0
14	1.410	96-100	0-5
16	1.190	82-100	0-15
20	0.840	30-66	30-80
30	0.590	0-24	20-50
40	0.420	0-4	5-20
50	0.297	0	0-5
60	0.250	0	0

The mixture shall be a maximum of 50% silica sand and minimum of 50% cryogenically processed rubber granules OR a minimum of 30% silica sand and maximum of 70% cryogenically processed rubber granules. Mix shall be by weight and homogeneously mixed.

Sand and rubber mixture shall meet the specified design criteria for the specified G-max rating for the full warrantee period.

- **Field Equipment**

Football pylons and soccer corner posts shall not require sleeves or penetration through the surface. Provide quantity of four (4) football pylons and sixteen (16) soccer corner posts.

- **Maintenance Equipment**

The Turf Installer shall provide the Owner with a hydraulic sweeper and a hydraulic groomer to maintain the synthetic turf field. Instructions and manuals shall accompany the equipment.

G2080.100 Special Surfaces:

- The principle work of this section includes, but may not be limited to:

Stone Sand Surface

- **Soil Additives:**

Pre-emergent weed control for skinned infield areas. Incorporate Simazine (Trade names Princept, Simazine, Sim-trol) or equivalent in top two (2) inches of skinned infield mix according to manufacturer's recommendation for local soil conditions.

Surface, a calcined clay sports field conditioner shall be added as a top dressing to the skinned infield areas, or equivalent. Application shall be done to manufacturer's recommendations.

- **Stone Sand Surface:**

Stone Sand - Blue-gray, granite-type coarse stone sand conforming to the following gradation requirements:

<u>Sieve Size</u>	<u>Percent Passing</u>
3/8"	100%
#4	96 - 100
#8	80 - 100
#16	50 - 80
#30	20 - 60
#50	10 - 30
#100	0 - 10

Steel Edging: Steel edging shall be 1/4"x5" in 16 foot sections with 0.25 Average thickness. Color shall be powder

coated Black. Edging shall be manufactured with an interlocking system with stake punch-outs fabricated in each strip. Stakes shall be steel and 15 inches in length.

Geotextile fabric shall be Geotextile 1

Sand Gravel Base: Sound, crushed stone or grave

- Soil Additives:

Pre-emergent weed control for skinned infield areas. Incorporate Simazine (Trade names Princept, Simazine, Sim-trol) or equivalent in top two (2) inches of skinned infield mix according to manufacturer's recommendation for local soil conditions.

Turface, a calcined clay sports field conditioner shall be added as a top dressing to the skinned infield areas, or equivalent.

G2080.110 Playfield Equipment and Structures:

- The principal work of this section includes, but may not be limited to the following:

Tennis Equipment.

Goal Posts

Scoreboards

Single-Post Football Goal Post, quantity four (4): shall be Model #FBGP-600 as provided by Jaypro Sports, or equivalent. Color shall be yellow. Pro-Style Round Protector Pads for 4-1/2" O.D. Post, quantity two (2): shall be Model # PPP-500 as provided by Jaypro Sports, or equivalent. Color shall be dark green and shall be approved by Owner from standard manufacturer's colors. Construction Manager to coordinate with owner regarding custom pad lettering.

- Field Scoreboards

Field Scoreboard: Scoreboard shall be based on design and components similar or equivalent to Model No. 3534 as manufactured by Nevco including wireless controls. Color shall be dark green and shall be approved by Owner from standard manufacturer's colors.

Acceptable manufacturers include:

Electro-Mech

Daktronics

Sportable Scoreboards

- Ground Sleeve Model BallStopper System shall be manufactured by Aluminum Athletic Equipment, or equivalent. This equipment is located at the multi-use stadium provide 200 feet.

Model # HBS-1:

Posts: Straight Uprights 2-3/8"O.D. x 3/16" wall x 12'-6"lg, 6063T6 aluminum extrusion with three predrilled heights at 9'-6"H, 10'-0", and 10'-6"H. Posts to be spaced evenly approximately every 20'-0" or less. As net expands over time, customer can utilize the higher holes by moving hardware. Predrilled hole at bottom of posts for net attachment with hardware.

Ground Sleeves: 2-7/8"O.D. (2-1/2"l.D.) x 3/16" wall x 24"lg, 6063T6 aluminum extrusion, includes LD polyethylene plug with removal tab.

Net: 9'-6" high, #N361, 1-3/4"sq. black UV-treated knotted nylon net, 360# tensile strength, 1/4" MFP rope border all 4 sides, plus a 1/4" MFP rope border 6" offset from bottom of net for additional net to stop balls from going under, pre-attached sewn in 3/16"dia. galvanized clear coated cable.

Hardware: All stainless steel, galvanized and brass hardware, an eyebolt for top/bottom of post to secure net.

Model # GSP-2.50:

Tamper-proof Ground Sleeve Plug: UHMW tapered plug with removal slot, accessory plug for use when system is removed at end of season.

Model # GSP-RT:

Ground Sleeve Plug Removal Tool: Stainless steel removal tool to be used with GSP-2.50 Plug.

Model # HBS-USC-3X3X13 (Quantity 1):

Storage Cart: Welded structural aluminum frame.

- Tennis Equipment

Tennis Court Post: shall be Round, 2 7/8" O.D. minimum, 8 gauge minimum steel with removable handle. Color shall be black. Posts shall be installed with ground sleeves as recommended and provided by the manufacturers. Posts shall accommodate for internal winding of net with locking mechanism.

Acceptable manufacturers include the following:

Douglas Industries – Model No. 63051 and Ground Sleeve Model No. GS-24PVC

Jaypro Sports Equipment – Model No. RTP-300 and Ground Sleeve Model No. RTPGS-3

Gamma – Model No. CGPTP-11

Tennis Court Net: shall be from same manufacturer as Tennis Court Post manufacturer.

Acceptable manufacturers include the following:

Douglas Industries – Model No. TN-28DM

Jaypro Sports Equipment – Model No. TPL-5

Gamma – Model No. CCN-00

Adjustable Center Strap & anchor shall be from the same manufacturer as Tennis Court Post and Tennis Court Net.

Acceptable Manufacturers include the following:

Douglas Industries

Jaypro Sports Equipment

Gamma

- Tennis Backboard: Tennis Backboard shall be 10'x16'. Interior frame shall be heavy, reinforced metal with sound deadening matrix interior and wheel attachments and steel channel horizontal supports. Color shall be Green. Construction Manager shall use manufacturer's recommended support devices.

Acceptable manufacturers include the following:

Douglas Industries – Model No. Bollettieri Professional 34837B

Rally Master – Backboard 10'x16'

- Tennis Windscreen: Tennis windscreen shall be 9' in height. The fabric shall be PVC coated with a minimum fabric weight of 8 oz. per square yard. Fabric shall be UV/Mildew resistant. There shall be a minimum manufacturer's warranty of 3 years. Color shall be Green. Construction Manager shall use manufacturer's recommended support and attachment devices.

Acceptable manufacturers include the following:

All Court Fabrics, Inc.- Model Permascreen 70

AmCraft Manufacturing, Inc. – Model PVC Coated Windscreen

Revere Plastics, Inc.

G2080.120 Site Furnishings:

- The principal work of this section includes, but may not be limited to, the following:

Bike Rack – Type A and B

Flag Poles – Type A and B

Ornamental Bench

Ornamental Litter and Recycle Receptacles

Players' Benches for Athletic Facility

Litter and Recycling Containers for Athletic Facility

Outdoor Dining Tables

- Bike Rack Type A:

Bike Rack shall be steel and the color and finish shall be Black Powder-coat. Bike Rack shall be surface-mounted and all mounting hardware shall be tamper-proof. Bike rack shall have a minimum 3-year warranty. Bike rack shall have a

capacity of no less than 2 bikes per unit. See plans for location and quantity.

Acceptable manufacturers include the following:

Landscape Forms – Model No. "Emerson"

Maglin – Model No. MBR972

Victor Stanley, Inc. – Model No. BKR-35

- Bike Rack Type B

Bike Rack B shall be 1 ½" diameter stainless steel schedule 40 pipe. Dimensions shall be as indicated on the Plans. Bike rack shall be surface mounted with ½"x2" stainless steel studs welded to bottom of 3/8" base plate. High strength adhesive epoxy shall be used.

- Flag Pole – Type A

Flag Pole Type A shall be aluminum with a powder-coat finish, color shall be white. Height shall be 45'. Flagpole shall be fitted with an internal halyard. Flagpole shall be able to withstand a minimum wind speed of 80 MPH. Pole shall have a seamless joint.

Acceptable manufacturers include the following:

Concord Industries – Model No. I45080188

American Flagpole – Model No. IWW45D82-02

The Flagpole Company – Model No. IW4581882

- Flag Pole – Type B

Flag Pole Type B shall be aluminum with a powder-coat finish, color shall be white. Height shall be 30'. Flagpole shall be fitted with an internal halyard. Flagpole shall be able to withstand a minimum wind speed of 90 MPH. Pole shall be manufactured as a single piece.

Acceptable manufacturers include the following:

Concord Industries – Model No. I30060188

American Flagpole – Model No. IWW30D61-02

The Flagpole Company – Model No. IW306156

- Ornamental Bench

- Bench shall be 6-foot steel bench with back. Color and finish shall be a Black powder-coated. Bench shall be surface mounted and all mounting hardware shall be tamper-proof. Bench shall have a minimum 20 year limited warranty.

Acceptable manufacturers include the following:

Dumor, Inc. - Model No. 58-60

Victory Stanley - Model No. RB-28

SiteScapes Furnishings - Model No. CV1-1010-PF

Ornamental Litter Receptacle

- Litter Receptacle shall be steel with minimum 32 gallon capacity, with hinged side door, and bonnet top. Color and finish shall be Black powder-coated. Receptacle shall be surface-mounted and all mounting hardware shall be tamper-proof. Ornamental Litter and Recycling Receptacles shall be from the same manufacturer.

Acceptable manufacturers include the following:

Dumor Inc. – Model No. 157-32-25BT

Victor Stanley, Inc. – Model No. SD-42 with Rain Bonnet Lid

SiteScapes Furnishings – Model No. CV2-3101PF

- Ornamental Recycling Receptacle

Recycling Receptacle shall be steel with minimum 32 gallon capacity with hinged side door. Color and finish shall be Black powder-coated. Recycling receptacles shall be surface-mounted and all mounting hardware shall be tamper-proof. Ornamental Litter and Recycling Receptacles shall be from the same manufacturer.

Acceptable manufacturers include the following:

Dumor Inc. – Model No. 157-32-25BT – with circle plaque reading “Recycling” as produced by the manufacturer, to be approved by Landscape Architect.

Victor Stanley, Inc. – Model No. SD-42 with Rain Bonnet and S-42 Band Decal denoting Recycling.

Sitescapes Furnishings – Model No. CV2-3101PF – Cast aluminum plaque reading “Recycling” shall be furnished by manufacturer and applied as recommended by manufacturer.

- Players’ Bench For Athletic Facilities

Players’ Benches shall range from 7.5’ to 8’ in length with backs. Color of seat, back and frame shall be selected by Owner from standard colors available. A total quantity of twelve (12) shall be portable. Surface mounted players benches are as shown on the Plans.

Acceptable manufacturers include the following:

Wabash Valley – Model No. SG315P

Urbanscape – Model No. P00126I

SportsEdge – Standard bench with back

- Litter And Recycling Container Containers For Athletic Facilities:

Litter and Recycling Receptacle shall be minimum 32 Gallon. Receptacle lid for litter shall be a bonnet top by same manufacturer and Receptacle lid for recycling shall be specific recycling lid by same manufacturer. Receptacles shall be perforated powder-coated steel. Color of receptacle shall be selected by Owner from standard colors available. Receptacles shall have heavy-duty plastic liner. Receptacles shall be surface mounted and tamper-proof. Litter and

Recycling Receptacles shall be produced by the same manufacturer.

Acceptable manufacturers include the following:

Wabash Valley – Model No. LR300-P

Urbanscape – Model No. TE3F36P

DuMor Inc. – 170-32-FTO

- Dining Tables:

Dining Tables shall have steel tubing table frame with steel or aluminum seat frames. The table top shall be a minimum of 42" in diameter and the tables' overall diameter including seat-backs shall not be less than 82". All seats shall be perforated steel and have backs. All table tops shall be solid steel with stainless steel. Tables shall be surface-mounted. All tables shall have a minimum of 6 seats except for ADA accessible tables which shall seat 5. Clear knee space for ADA accessible tables must extend 19" from table edge and center pedestal. ADA accessible seating must accompany for a minimum of 5% of available seats. Total quantity of tables with 6 seats is 3. Total quantity of ADA accessible tables with 5 seats is 2. Grand total of tables is 5.

Acceptable Manufacturers include the following:

Forms & Surfaces – Model No. Vista (Table Top Finish: Stainless Steel Random Finish)

Landscape Forms – Model No. Mingle (Table Top Finish: Stainless Steel Catena Finish)

Urban Park Site Furnishings – Model No. Fairmont

G2080.130 Black Vinyl Chain Link Fencing:

- The principal work of this section includes, but may not be limited to, the following:

Installation of fences, gates, framework, fabric, and accessories.

Excavation for post bases.

- Framework and Posts

Framework and posts shall be Type 2 round post, steel pipe cold-formed and welded per ASTM F1043, Group IC, with a minimum yield strength of 50,000 psi. The external zinc coating shall be Type B, zinc with polymer film, 0.90 oz/sq. ft. minimum zinc coating with a chromate conversion and a verifiable polymer film. The internal coating shall be Type B, zinc 0.90 oz./sq.ft. minimum or Type D, zinc pigmented, 81% nominal coating with 0.30 mils minimum thickness. Gate framework joints shall be welded and coated in accordance with Practice A780, employing zinc-rich paint.

Framework and posts shall be sized as follows:

End, Corner, and Pull Post. Galvanized steel, minimum pipe sizes and weights as follows:

Up to 6-foot fabric height: 2.375 – inch OD pipe, 3.12 lbs/lin. Ft. minimum.

7 and 8-foot fabric heights: 2.875-inch OD pipe, 4.64-lbs/lin. Ft. minimum.

Maximum spacing 10'-0" On Center.

10-foot to 12-foot heights: 4-inch OD pipe, 6.56 lb/linear foot.

Line Posts. Galvanized steel, minimum pipe sizes and weights as follows:

Up to 6-foot fabric height: 1.90-inch OD steel pipe, 2.28-lbs./lin. Ft. minimum.

7 and 8- foot fabric height: 2.375-inch OD steel pipe, 3.12 lbs./lin. Ft. minimum

Maximum Spacing 10'-0" On Center.

10-foot to 12-foot heights: 2.875-inch OD pipe, 4.64 lb/linear foot.

Gate Posts. Galvanized steel, nominal gate widths, minimum pipe sizes and weights as follows:

Up to and including 6 feet height with up to 4 foot gate leaves: 2.375 OD pipe minimum.

Up to and including 6 feet height with over 4 foot up to 10 foot gate leaves: 2.875 inch OD pipe minimum.

Up to and including 6 feet height with over 10 feet up to 18 foot gate leaves: 4" OD pipe minimum.

Over 6 feet up to 12 feet height with up to 6 foot gate leaves: 2.875" OD pipe minimum.

Over 6 feet up to 12 feet height with over 6 feet up to 12 foot gate leaves: 4" OD pipe minimum.

Over 6 feet up to 12 feet height with over 12 feet up to 18 foot gate leaves: 6.625" OD pipe minimum.

Rails (Top, middle, and bottom rails): galvanized steel, manufacturer's longest lengths joined by seven (7") long sleeves, rail shall run continuously along top of fence. Bottom rail shall be joined at line posts with boulevard clamps. Minimum pipe sizes and weights as follows:

1.66-inch OD pipe, 1.84 lbs. /lin. Ft. minimum.

Fittings: All fittings to be PVC thermally fused color coated having a minimum thickness of 0.006" per ASTM F626. PVC color to match fabric and framework. Moveable parts, nuts and bolts to be field coated with PVC liquid touch up after installation.

1. Couplings: Expansion type, approximately six inches (6") long, install one sleeve for each 500 foot run. Standard couplings are installed at each rail end to form one continuous top rail.

Attaching Devices: Provide fittings for attaching top rail securely to each gate corner pull and end post.

Sleeves: Galvanized steel pipe not less than six inches (6") long and with inside diameter not less than ½ inch greater than outside diameter of the post pipe. Provide steel plate closure welded to bottom of sleeve of width and length not less than one inch (1") greater than outside diameter of sleeve.

Post Brace assembly: Manufacturer's standard adjustable braces at end of gateposts and at both sides of corner and pull posts. Provide horizontal brace located at mid-height of fabric. Use same material as top rail for brace and truss to line posts with 3/8 inch diameter galvanized steel truss rods and adjustable tightener.

Post Caps: Galvanized steel, weather-tight closure cap for each tubular post. Furnish caps with openings to permit passages of top rail.

Rail ends: Galvanized pressed steel per ASTM F626, for connection of rails to post using a brace band.

Tension Bars: galvanized steel, one-piece lengths equal to full height of fabric, with minimum cross-section of 3/16 inch x ¾ inch per ASTM F626. Provide tension bar for each gate and end post, and two for each corner and pull post. Stretcher Bar Bands shall be manufacturer's standards.

Gate Cross-Bracing: 3/8 inch diameter galvanized steel truss rods and adjustable tightener.

Wire ties: 9 gauge galvanized steel tie wire for attachment of fabric to line posts and rails. Pre-formed hog ring ties to be 9 gauge galvanized steel or aluminum for attachment of fabric to tension wire. Tie wire and hog rings PVC coated and in compliance with ASTM F626. Color to match fabric color.

Truss rod assembly: Galvanized steel minimum 5/16" diameter truss rod with pressed steel tightener, in accordance with ASTM F626.

Carriage bolts and nuts: Galvanized of commercial quality

- Fabric : All general site fence fabric shall consist of No. 9 gauge (0.148 inch core), 2-inch diamond mesh except for the following: Six (6) gauge wire for backstop fencing; Eleven (11) gauge wire, 1 ¾" diamond mesh for Tennis Court Fencing. 1" diamond mesh for fence along western property line. All fabric shall receive top and bottom knuckled selvage. Tennis fabric shall be installed on the court side. The height of the fabric shall be one piece.

Galvanized/Aluminum Coated Fabric: All materials used shall conform to the requirements of ASTM A 392 Class 2, or ASTM A491. Except aluminum alloy items, shall conform to ASTM-B211, B221 and B429.

Polyvinyl Chloride (PVC) Coated Fabric: fence fabric shall be zinc coated in accordance ASTM A392 Class 1 or

aluminum-coated in accordance with ASTM A 491 (Table 3). PVC coating shall be applied in accordance with ASTM F668 Class 2a. The color of the fabric shall be black and in accordance with ASTM F934.

- Swing Gate: Fabricate chain link swing gates in accordance with ASTM F900. Gate frame to be of welded construction. Weld areas to be protected with zinc-rich paint per ASTM A780 then over coated with liquid PVC to match frame. The gate frame members are to be spaced no greater than 8' 0" apart horizontally or vertically. Exterior members to be 1.900" OD pipe, interior members when required shall be 1.660" OD pipe. Framing and chain link fabric shall match specification of fence system. Fabric shall be stretched tightly and secured to vertical outer frame members using tension bar and tension bands spaced 12" on center and tied to the horizontal and interior members using 9 gauge galvanized steel ties.

Hinges, hot dip galvanized pressed steel or malleable iron, structurally capable of supporting gate leaf and allow opening and closing without binding. Non-lift-off type hinge design shall permit gate to swing 180 degrees.

Latch: Galvanized forked type capable of retaining gate in closed position and have provision for padlock. Latch shall permit operation from either side of gate.

Double gates: Provide galvanized drop rod with center gate stop pipe or receiver to secure inactive leaf in the closed position. Provide galvanized pressed steel locking latch, requiring one padlock for locking both gate leaves, accessible from either side.

Keeper to secure open leaves: Provide galvanized gate hold back keeper for each gate leaf over 5' wide. Gate keeper shall consist of mechanical device for securing free end of gate when in full open position.

Latch, hinges, moveable parts may be field coated with liquid PVC.

G2080.140 Chain Link Internal Track Aluminum Cantilever Slide Gate:

- Aluminum cantilever slide gates shall be of the internal roller design per ASTM F1184 Type II Class 2. Cantilever slide gate to be constructed of PVC color coated ASTM B221 aluminum members welded and designed for maximum structural integrity. Vertical external and internal members minimum 2" square spaced maximum 8'-0" on center. Gates having fabric greater than 8'-0" in height require a horizontal member. The top horizontal member shall be a one-piece precision extruded structural member having an integral enclosed track. Bottom horizontal member to be minimum 2" x 4". Adjustable diagonal trusses shall be installed in each gate panel to transfer the alternating forces as the gate slides. The gate opening portion shall be filled with chain link fabric stretched taut and secured to the frame members. Chain link fabric shall match the fence system specification.

The overall gate structure shall be a minimum of 40% larger than the gate opening to support the cantilevered portion of the gate in the closed position with minimum deflection per ASTM F1184. The minimum 40% back frame does not require fence fabric. Single leaf cantilever design for openings larger than 30'-0" up to 40'-0" shall be fabricated by welding together two horizontal top structural/track members creating a dual track system. Single track gates up to 30'-0" opening require two support posts and two internal truck assemblies. Dual track gates over 30'-0" up to 40'-0" require two sets of dual posts and four internal truck assemblies.

- Internal truck assemblies shall be capable of swiveling to accommodate gate movement and ensure full contact of the four support wheels and two guide wheels to the internal track surface. The galvanized steel truck assembly post bracket, truck assembly vertical support axle as well as the support wheels shall be designed to handle static and dynamic forces required to support and operate the gate. The truck assembly, support axle and internal wheels shall be comprised of stainless steel or galvanized steel components.

Galvanized steel bottom guide roller brackets containing two 3" rubber wheels shall be supplied to keep the bottom of the gate plumb and in proper alignment.

Single gates shall be supplied with a galvanized steel latch mechanism capable of securing the gate with a padlock accessible from either side. Double gates to have galvanized drop rod to hold inactive leaf and a latch mechanism capable of securing the gate with a padlock accessible from either side. Provide drop rod stop pipe or receiver to engage center drop rod.

Cantilever gate posts shall be 4" OD PVC coated. Single leaf cantilevers up to 30'-0" require three 4" OD posts, dual track single leaf cantilevers over 30'-0" up to 40'-0" require two sets of pre-fabricated dual 4" OD support posts and a 4" OD latch post. The gate is supported in the center of the dual posts.

- Post Setting Materials

Concrete

Drive Anchors: Galvanized ASTM A36 steel drive anchor angle blades, 1.25" x 1.25" x 30" long secured to post with a pressed steel galvanized shoe clamp.

G2080.150 Ornamental Wire Fence and Gates:

- Furnish labor, materials and equipment to include ornamental wire fencing and gates for the referenced project.
- Ornamental Wire Fence and Gates shall be similar to Patriot Ornamental Wire Fence, 2-gauge, 6' height, six foot gates as manufactured by Jerith Manufacturing Co., Inc. Fence

system shall withstand a 550 pound load without any permanent deformation.

- Structural Components: All posts and rails used in the fence system shall be manufactured from coil steel having a minimum yield strength of 55,000 psi. The steel shall be galvanized to meet the requirements of ASTM A525 with a zinc coating weight of 0.60-1.0 ounces per square foot.
- Infill: Section infill wires shall be steel with a minimum yield strength of 50,000 psi. The steel shall be galvanized to meet the designation of "regular coating" in accordance with requirements of ASTM A641.
- Pretreatment: A five stage non-chrome pretreatment shall be applied. The final stage shall be a dry-in-place activator which produces a uniform chemical conversion coating for superior adhesion.
- Coating: Fence materials shall be coated with a TGIC polyester powder-coat finish system. Epoxy powder coatings, baked enamel or acrylic paint finishes are not acceptable. The finish shall have a cured film thickness of at least 2.0 mils.
- Warranty shall be a minimum of 8 years.

G2080.160 Ornamental Fence:

- Furnish labor, materials and equipment to include ornamental fencing for the referenced project.
- Ornamental Fence shall be powder coated black steel and shall have 3 (three) rails at a minimum 1 3/8" sq. Pickets shall be a minimum of 3/4" sq. Posts shall be a minimum of 2" sq. Post caps shall be flat style and constructed of aluminum or steel to form a weather-tight closure. All posts, caps, and fence panels shall be polyester coated individually after fabrication to thoroughly coat all surfaces for additional corrosion protection. All components shall enter a 5 stage in line cleaning process to prepare the galvanized surfaces for complete adhesion of the finish coat. Components shall be given a TGIC polyester resin powder coating applied by the electrostatic spray process to 3.0 mil thickness. The finish shall be baked in an oven for 15-20 minutes at a temperature ranging from 400°F. Warranty shall be a minimum of 15 years.

G2080.170 Exposed Aggregate Concrete:

- This Section includes exterior exposed aggregate concrete paving for the following:
- Exposed Aggregate walkways and accents at the locations shown on the plans and specified herein.
- Portland Cement: ASTM C 150, Type I for resistance to salt and ice melt chemicals.
- Aggregate: Shall be hard, sound, durable, native, rounded and free of all deleterious materials and staining qualities.

- Aggregate - Aggregate size shall be 1/2" – 3/4" nominal.
- Aggregate shall be in a color range of warm tones: tan, brown, buff.
- Sealer shall be a water-based acrylic low sheen product that is non-yellowing and has good blush resistance such as Everclear VOX by Euclid Chemicals.

G2080.180 Unit Pavers:

- This Section includes the following:
Unit Paver Type A – at Vehicular Zones
Unit Paver Type B and C – at Pedestrian Zones
Unit Paver Type A – At Vehicular Zones:
 - Unit Paver Type A shall be molded to produce a dense, wire cut, extruded brick. Brick shall conform to ASTM C1272. Brick shall be class SX, Type F. The average comprehensive strength shall be a minimum of 8000 psi and an average water absorption of no more than 6% (24 hour submersion at room temperature). The radius of rupture shall not be less than 1,000 pounds per square inch. Size shall be approximately 4"x8"x2 3/4" deep. Color shall be a red to red full range.
- Unit Paver Type B – At Pedestrian Zones:
Unit Paver Type B shall be molded to produce a dense, wire cut, extruded brick. Brick shall conform to ASTM C1272. Brick shall be class SX, Type F. The average comprehensive strength shall be a minimum of 8000 psi and an average water absorption of no more than 6% (24 hour submersion at room temperature). The radius of rupture shall not be less than 1,000 pounds per square inch. Size shall be approximately 4"x8"x2 3/4" deep. Color shall be a red to red full range.
- Unit Paver Type C – At Crosswalks And Accent Band:
Unit Paver Type C shall be a 4"x5"x9" granite cobble paver. Color shall be a salt and pepper medium grain gray similar to Stanstead or Woodbury. Granite cobble pavers shall be to the dimensions shown on the Plans.
- Granite Masonry:
General: All granite shall be of good quality certified by the National Building Granite Quarries Association, Inc., free of cracks, seams, or starts which may impair its structural integrity or function. Color or other visual characteristics indigenous to the particular material and adequately demonstrated in the sampling or mock-up phases will be accepted provided they do not compromise the structural or durability capabilities of the material. A mixture of different stone shall **not** be acceptable.
- Granite provided for all exterior cut stone paving band elements shall be of the following.

Color/Grain: Paving Bands shall be a medium to dark gray, fine grained granite similar to Jet Mist, or approved equivalent.

Size: Granite paving bands shall be fabricated and installed to the dimensions shown on the Plans for the various sizes and depths.

Finish: Thermal finish for all exposed sides. Sawn on all non-exposed edges.

- Granite provided for all exterior cut stone wall cap elements shall be of the following.

Color/Grain: Granite caps shall be a medium to dark gray, fine grained granite similar to Jet Mist, or approved equivalent.

Size: Granite caps shall be fabricated and installed to the dimensions shown on the Plans.

Finish: Honed finish for all exposed sides. Sawn on all non-exposed edges.

- Finishes: the National Building Granite Quarries Association, Inc shall define Finishes listed in the above schedule. FINISHES commonly available are defined as follows:

Polished: Mirror gloss, with sharp reflections.

Honed: Dull sheen, without reflections.

Fine rubbed: Smooth and free from scratches; no sheen.

Rubbed: Plane surface with occasional slight "trails" or scratches.

Shot ground: Plane surface with pronounced circular markings or trails having no regular pattern.

Thermal: Finish produced by application of high temperature flame to the surface. Large surfaces may have shadow lines caused by overlapping of the torch.

Sand blasted, coarse stippled: Coarse plane surface produced by blasting with an abrasive; coarseness varies with type of preparatory finish and grain structure of the granite.

Sand blasted, fine stippled: Plane surface, slightly pebbled, with occasional slight trails or scratches.

8-cut: Fine bush-hammered; interrupted parallel markings not over 3/32" apart; a corrugated finish, smoother near arris lines and on small surfaces. 6-cut: Medium bush-hammered finish, similar to but coarser than 8cut, with markings not more than 1/8" apart.

4-cut: Coarse bush-hammered finish with same characteristics as 6-cut, but with markings not more than 7/32" apart.

Split Face, Rock Faced, Pointed, Rough Cut: A rough and uneven surface resulting from splitting pointing and/or rough cutting the granite.

- Dimensional Tolerance

Face variation from rectangular: 1/8"

- Flatness Tolerances

A 4' dimension in any direction on the surface shall determine variation from true plane, or flat surfaces. Such variations on polish, hone, and fine rubbed surfaces shall not exceed tolerances listed below or 1/3 of the specified joint width, whichever is greater. On surfaces having other finishes, the maximum variation from true plane shall not exceed the tolerance listed below or 1/2 of the specified joint width, whichever is greater.

Polished, honed or fine rubbed finishes.....1/16"

Sawn, 4-cut, 6-cut, and 8-cut finishes.....1/8"

Thermal and coarse stippled finishes.....3/16"

Split face, Rock Face or other rough-cut finishes.....1"

- Related Materials

Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

Joint-Filler Strips: ASTM D 1752, cork or self-expanding cork.

Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

- Epoxy Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Shore A hardness of 80 per ASTM D 2240.

Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

- Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:

Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.

Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

All exposed joints: Color shall be approved by the Landscape Architect and shall match the color of the adjacent stone.

G2080.190 Stone Masonry:

- The principal work of this section includes, but may not be limited to the following:

Stone veneer, mortar, anchors and accessories necessary to complete the work.

- Provide sound natural stone as follows:

Products: Subject to compliance with requirements, Veneer Stone shall be a fieldstone cut veneer to the minimum dimensions shown on the Plan. Stone shall be mortared and joints raked $\frac{1}{2}$ " to $\frac{3}{4}$ ". Color: Stone color shall be in the warm tones of beige, tan, brown, with light or golden highlights.

- Mortar Materials:

1. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicate.

Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.

Hydrated Lime: ASTM C 207, Type S.

Mortar Cement: ASTM C 1329.

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

Lafarge North America; Lafarge Mortar Cementm or Magnolia Superbond Mortar Cement.

Masonry Cement: ASTM C 91.

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

Essroc, Italcementi Group; Brixment or Velvet.

Holcim (US) Inc.; Mortamix Masonry Cement

Lafarge North America; Magnolia Masonry Cement Lafarge Masonry Cement.

Lehigh Cement Company; [Lehigh Masonry Cement

Aggregate: ASTM C 144 and as follows:

For pointing mortar, use aggregate graded with 100 percent passing No. 16 sieve.

White Aggregates: Natural white sand or ground white stone.

Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.

Match Architect's sample.

Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement mortar bed, and not containing a retarder.

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

Boiardi Products Corporation.

Bonsal.

Bostik Findley Inc.

C-Cure.

Custom Building Products.

DAP Inc.

Laticrete International, Inc.

MAPEI Corp.

Summitville Tiles, Inc.

TEC Specialty Construction Brands; H. B. Fuller Company.

Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

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

Euclid Chemical Company (The); Accelguard 80.

Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Morset.

Sonneborn, Div. of Degussa Building Systems; Trimix-NCA.

- Veneer Anchors:

Materials:

Hot-Dip Galvanized-Steel Wire: ASTM A 82, with ASTM A 153/A 153M, Class B-2.

Stainless-Steel Wire: ASTM A 580/A 580M, Type 304.

Hot-Dip Galvanized-Steel Sheet: ASTM A 1008/A 1008M, cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M, Class B-2.

Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.

Size: Sufficient to extend at least halfway, but not less than 1-1/2 inches, through stone masonry and with at least 5/8-inch cover on outside face.

Wire Veneer Anchors: Wire ties formed from W1.7 or 0.148-inch-diameter, hot-dip galvanized-steel wire.

Ties are bent in the form of loops with legs not less than 15 inches in length and with last 2 inches bent at 90 degrees.

Ties are bent in the form of rectangular loops with ends bent downward for inserting into eyes projecting from masonry joint reinforcement specified in Division 04 Section "Unit Masonry."

Ties are bent in the form of triangular loops designed to be attached to masonry joint reinforcement specified in Division 04 Section "Unit Masonry" with vertical wires passing through ties and through eyes projecting from masonry joint reinforcement.

- Corrugated-Metal Veneer Anchors: Not less than 0.030-inch-thick by 7/8-inch-wide galvanized-steel sheet with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch.

- Stone Trim Anchor:

Stone Trim Anchors: Units fabricated with tabs or dowels designed to engage kerfs or holes in stone trim units and holes for fasteners or postinstalled anchor bolts for fastening to substrates or framing as indicated.

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

Halfen Anchoring Systems; Meadow Burke.

Heckmann Building Products Inc.

Hohmann & Barnard, Inc.

Materials: Fabricate anchors from stainless steel, ASTM A 240/A 240M, Type 304. Fabricate dowels from stainless steel, ASTM A 276, Type 304.

Fasteners for Stone Trim Anchors: Annealed stainless-steel bolts, nuts, and washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.

- Miscellaneous Masonry Accessories

Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

Cementitious Dampproofing: Cementitious formulations that are recommended by ILI and that are nonstaining to stone, compatible with joint sealants, and noncorrosive to veneer anchors and attachments.

Weep Hole/Vent Products: Use the following unless otherwise indicated:

Round Plastic Tubing: Medium-density Black polyethylene, 2-inch OD by thickness of stone masonry.

- **Masonry Cleaners**

Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar and grout stains, efflorescence, and other new construction stains from stone masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cleaner manufacturer and stone producer.

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

Diedrich Technologies, Inc.

Dominion Restoration Products.

EaCo Chem, Inc.

Hydrochemical Techniques, Inc.

Prosoco, Inc.

- **Mortar Mixes**

General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

Do not use calcium chloride.

Limit cementitious materials in mortar to portland cement, mortar cement, and lime.

Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

Prehydrating mortar allows most of initial shrinkage to occur before mortar is placed in joint.

Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

Mortar for Stone Masonry: Comply with ASTM C 270, Specification.

Mortar for Setting Stone: Type N.

Latex-Modified Portland Cement Setting Mortar: Proportion and mix portland cement, aggregate, and latex additive to comply with latex-additive manufacturer's written instructions.

Cement-Paste Bond Coat: Mix either neat cement and water or cement, sand, and water to a consistency similar to that of thick cream.

For latex-modified portland cement setting-bed mortar, substitute latex admixture for part or all of water, according to latex-additive manufacturer's written instructions.

Mortar for Scratch Coat over Unit Masonry: 1 part portland cement, 1 part lime, 7 parts loose damp sand, and enough water to produce a workable consistency.

Fabrication:

Fabricate stone to comply with sizes, shapes, and tolerances recommended by applicable stone association or, if none, by stone source, for faces, edges, beds, and backs.

For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."

Select stone to produce pieces of thickness, size, and shape indicated, including details on Drawings. Recess joints (bed and vertical) straight and at right angle to face unless otherwise indicated.

Cut and drill sinkages and holes in stone for anchors and supports.

Carefully inspect stone at quarry or fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units before shipment.

Clean sawed backs of stone to remove rust stains and iron particles.

Gage backs of stones for adhered veneer if more than 81 sq. in. (522 sq. cm) in area.

Thickness: 6 inches plus or minus 1/2 inch

Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match approved samples and mockups.

G2080.200 TREES, SHRUBS, AND GROUND COVERS

G2080.210 Tree Protection and Trimming

- Trees, which are to remain and must be protected.
- Work includes trimming and protection of trees that are indicated to remain but interfere with or are in close proximity to new construction, as herein specified. All tree work shall be performed with the approval of the Landscape Architect and under the direction of a qualified Arborist.

- Temporary Protections: Provide temporary fencing, barricades or guards to protect trees and other plants, which are to remain, from damage.
- Protect Root Systems: The Construction Manager shall not store construction materials, debris or excavated material within drip line (outer perimeter of branches). The Construction Manager shall not permit vehicles within drip line. The Construction Manager shall restrict foot traffic to prevent excessive compaction of soil over root systems.

G2080.220 Soil Preparation for Lawn Establishment:

- The principal work of this section includes, but may not be limited to, the following:

1. Grading and Spreading Loam.
2. Preparations of Areas for Seeding.
3. Application of Limestone.
4. Application of Lawn Starter Fertilizer.
5. Application of Turf Maintenance Fertilizer.
6. Applying Jute Mesh.

- Clean Screened Loam

Loam shall consist of screened fertile, loose, friable fine sandy loam or sandy loam free of subsoil, refuse, stumps, roots, rocks, cobbles, stones, brush, noxious weeds, litter and other materials which are larger than one inch (1") in any dimension and which will prevent healthy plant growth. Organic matter shall constitute not less than five percent (5%) nor more than twenty percent (20%) as determined by wet combustion method (Chromic acid reduction). The Construction Manager shall notify the Owner or Owner's Representative of the intended source of loam to be employed at least two (2) weeks prior to the intended time of use to allow time for sampling.

Loam shall possess good filtration and permeability rates, and shall possess a mechanical analysis where: N 85% of sand size is 0.5 to 1.0 mm and N 95% of sand mix is between 0.5 and 2.0 mm and no more than 5% of mix is less than 0.5 mm

Acidity range of approximately pH 5.5 to 7.5 when tested according to methods of testing or A.O.A.C. and organic content not less than 5% nor more than 20% as determined by wet combustion method (Chromic acid reduction).

- Limestone

Dolomitic limestone contain up to 50% magnesium carbonate in a dry, granular form. Limestone shall be ground to such a fineness that at least 50% will pass through a 100-mesh sieve and 90% to 100% will pass through a 20-mesh sieve.

- Lawn Starter And Maintenance Fertilizer

Fertilizer shall be Organic-based and be OMRI (Organic Materials Review Institute) Certified

Complete fertilizer in granular form, from commercial sources bearing manufacturer's analysis; 2-3-3 ratio of N-P-K.

Total Nitrogen (N) – 2.0%

0.8% - Water Soluble Nitrogen

1.2% - Water Insoluble Nitrogen

Available Phosphate (P₂O₅) – 3.0%

Soluble Phosphate (K₂O) – 3.0%

Application Rate: Apply 2-3 pounds per 100 square feet

- Jute Mesh

Jute mesh shall be uniform, open, plain weave of undyed and unbleached single jute yarn, a minimum of four (4) feet in width plus or minus one (1) inch. There shall be 78 warp ends per width and 41 weft ends per yard. Weight shall average 1.22 pounds per linear yard, plus or minus 5%.

Staples for Erosion Control Materials: 9 gauge staples shall be used with jute mesh: 11 gauge with woven paper.

G30 LIQUID AND GAS UTILITIES

G3010 WATER UTILITIES

G3010.10 Site Domestic Water Distribution:

- Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

Installation of ductile iron pipe, fittings, accessories, and appurtenant work, at the location and to the lines and grades indicated in the Contract Drawings

The installation of hydrants, gate valves and boxes, and concrete thrust blocks.

Furnishing and installation of all materials required to connect to existing water mains, replace existing services, new gate valves, tapping sleeves, removal of existing gate valves, corporation cocks, saddles, curb stops, services boxes, and abandoning of the existing water system (if applicable), all as shown on the Contract Drawings. All abandoned pipes shall be plugged and capped with concrete.

Construction Manager is responsible for maintaining domestic and fire service to both the existing high school throughout construction.

Testing and disinfections of underground potable water and fire service pipelines, including but not limited to:

Leakage tests

Disinfections

Hydrostatic

Alignment

All work shall be in compliance with the Rules and Regulations governing the Subdivision of Land in the Town of Beverly, Massachusetts.

- Ductile Iron Pipe:

Ductile iron pipe shall be cement-lined, Class 52, and shall conform to AWWA specifications C150 and C151, latest revision. Ductile iron pipe shall have push-on type joints with the exception that mechanical joints shall be used at all fitting and along straight pipe Sections where mechanical joint restraint is required. All pipes shall have a bituminous seal coating on all exterior surfaces.

Testing of ductile iron pipe shall be done in accordance with AWWA C151, latest revision.

Manufacturer Testing:

Certified test reports shall be submitted by the Pipe manufacturer.

The Engineer shall be notified at least ten (10) days in advance of the date and location of the testing in order to witness the tests.

The Construction Manager shall furnish to the Engineer notarized test reports by an independent testing laboratory, which show compliance of all materials furnished to the requirements specified herein. The test reports shall indicate results and methods employed.

Field Testing:

Field testing of ductile iron pipe installed for water service shall be performed according to the requirements as specified in this section.

- Fittings:

Fittings and plugs for use with the ductile iron pipe specified shall be ductile iron, cement lined, bituminous coated with a working pressure rating of not less than 200 psi, conforming to AWWA C153, latest revision, and shall have mechanical joints.

The exterior of all fittings, plugs, bolts, and nuts shall be coated with two (2) coats of heavy-duty epoxy protective asphaltic coating after assembly.

Bolts and nuts shall be rustproofed steel.

Gaskets are to be stored out of direct sunlight in their original packaging and protected from temperature extremes.

Lubrication Material is to be food grade quality, kept in original container, and stored according to manufacturer's recommendations.

The Construction Manager shall, at all times, be solely responsible for the safe storage of all materials.

Testing of ductile iron fittings shall be done in accordance with AWWA C153, latest revision.

- Joints:

Push-on and mechanical type joints for pipe as specified above shall conform to AWWA C111, latest revision. Gasket material for all jointing requirements shall be styrene butadiene (SBR).

Testing of jointing material shall be done in accordance with AWWA C111, latest revision.

- Cement Mortar Lining:

Interior pipe and fitting surfaces shall be covered with a double cement-mortar continuous lining not less than 1/16" thick, of materials, and applied in accordance with AWWA/ANSI C104/A21.4, latest revision.

Testing of the interior coating shall be done in accordance with AWWA C104, latest revision.

- Joint Restraint:

Thrust Blocks are to be designed appropriately for the soils, pipe sizes, and pressures encountered at the job site and are to be installed square and plumb against undisturbed soil so that the joint itself, including any bolts, is accessible. Concrete is to be a minimum compressive strength of 2,000 psi and installed to industry standards.

Restraining devices shall be utilized on all mains under the following conditions:

Pipeline direction changes (tees, bends).

Dead end lines (caps, plugs, valves).

Transition pieces (reducers).

Thrust restraint may be provided via restrained joint, ductile iron pipe meeting ANSI/AWWA C153, AWWA C151/A21.512, AWWA C111/A21.11, and be approved for use by the Town of Beverly. Restrained joint pipe lengths (restrained length) shall be sufficient to restrain thrust imparted by 1½ times the anticipated working pressure but not less than 200 psi and may be more than one full length of pipe.

Thrust restraint utilizing tie-rods may be used alone or in combination with other restraint systems and are to be installed as directed by the Town of Beverly authorized field staff. All rods shall be protected from corrosion with two coats of bituminous paint or epoxy prior to backfilling.

- Tapping Sleeves and Tapping Valves:

All tapping sleeves shall comply in all respects to AWWA Standard C-110 and the following design standards:

Tapping sleeve shall be installed at the location of the existing water main as shown on the plans and details.

The tapping sleeve shall be a mechanical type joint to provide pressure - tight installation and be suitable for use with the existing pressurized pipe material. Outlet flange shall be Class 125C, ANSI B16.1.

Mechanical joint tapping sleeves shall have totally confined end gaskets and be designed to withstand a minimum of 200 p.s.i. working pressure.

Tapping valves shall comply with the requirements for Gate Valves except one end shall be flanged and the other mechanical.

Tapping valves shall be provided with an oversized opening to allow the use of full size cutters.

- Gate Valves:

Resilient seated gate valves shall meet AWWA C-509 and be UL listed and FM approved. This valve shall be iron-body, bronze mounted, nonrising stem, 4 inch through 12 inch in diameter as shown on plans. All valves to open as designated by the Town of Beverly Water Department. All valves to be mechanical joint.

Sizes 4 inch through 12 inch shall be suitable for a test pressure of 200-psi. Size 16 inch shall be suitable for 200-psig maximum working pressure.

Valves greater than 12 inches in size shall be butterfly valves. Valves less than 12" shall be gate valves of the resilient wedge type.

Maximum spacing between valves shall be 600 feet.

- Straight and Transition Pipe Couplings:

The center sleeve and end rings of couplings shall be made of ductile iron, meeting or exceeding ASTM A536. The coupling shall accommodate the entire O.D. range in the specified size by use of interchangeable color-coded end rings and gaskets.

The coupling gasket shall be made of virgin rubber compound for water use. The SBR shall meet or exceed ASTM D2000-3-BA715. The gasket shall have raised lettering, sizing, and state the proper color code for the appropriate end ring.

The coupling shall be equipped with stainless steel bolts, washed, and nuts and conform to the latest edition of the AWWA specification designation C-111 and C-219-06.

Straight couplings shall be as manufactured by Ford Model FC1-SH, Smith Blair Model 441, Romac Model 501, Cascade Waterworks Model CDC, or equal.

Transitional couplings shall be as manufactured by Ford Model FC2A-SH, Smith Blair Model 441, Romac Model 501, Cascade Waterworks Model CTC, or equal.

Straight connections between two ductile iron pipe Sections shall be made by ductile iron solid sleeves.

- Valve Boxes and Covers:

Cast iron valve boxes shall be two-piece adjustable style, sliding type. Barrel inside diameter shall be 5¼ inches with 26-inch top Section and 48 inch bottom Section lengths adjusted to finish grade.

Covers shall be cast iron, 5¼ inch, with the word "WATER" and a direction to open arrow imprinted thereon. Covers shall be the heavy, non-tilting 2" drop style recessed in the top to prevent plow breakage. The boxes and covers shall be compatible with the valves to which they attach.

Indicator post and valve shall be Underwriter's Laboratories, Inc. (UL) listed and Factory Mutual Research (FM) approved.

- Indicator Post:

Indicator post shall be equipped with an angle-type operating wrench, which shall be locked to the post thus preventing unauthorized valve operation.

Indicator post and valve shall be the two-piece type manufactured by US Pipe or equal.

Indicator posts shall be supplied on all buried gate valves for full operation of opening and closing of valves.

Targets shall be set in the indicator posts to indicate "open" and "shut" position and shall be in full view.

Provide stem and coupling of adequate length for valve operation, along with adjustable setting box and base with a flange having sufficient bearing area to prevent under settlement. The lower base shall be designed to enclose the operating nut and stuffing box of the valve and fit over the valve bonnet.

- Fire Hydrants:

All fire hydrants shall comply with the Town of Beverly requirements in all respects to AWWA C-502.

All hydrants shall be equipped with a 6" gate valve, and be fully restrained as shown on the drawings. Restrained joints shall be by Megalug Thrust Restraint Wedge manufactured and sold by EBAA Iron Sales Inc. or equal.

- Backflow Preventer:

Backflow prevention device for any connection between the existing water system and new water pipes prior to acceptance of pressure test, disinfections and flushing, shall be of the appropriate size and shall be double check-reduced pressure type as manufactured by Watts, Febco, Hersey or equivalent.

G3020 SANITARY SEWERAGE UTILITIES

G3020.10 Sanitary Sewerage Utilities:

- The work of this section includes furnishing all labor, materials, tools and equipment necessary to furnish and install the submersible pump station, controls, and wiring as specified herein and as shown on the drawings.
- This Section includes gravity-flow, non-pressure and pressurized sanitary sewerage outside the buildings, with the following components:

Manholes

SDR-35 PVC Gravity Sewer Pipe

Cleanouts

- Interruption of Existing Sanitary Sewage Service: Do not interrupt service to facilities occupied by Owner or others anytime. Construction Manager is responsible for the disposal of all sanitary waste collected in the tanks throughout construction. Disposal by pumping and trucking will be required until the wastewater treatment plant is online.

- Testing Gravity Sewers

Gravity Sewers shall be tested in the following manner. Construction Manager shall be responsible for correcting any deficiencies as a result of a failed test:

Low Pressure Air Test

Infiltration Test

Pipe Deflection

Leakage Tests

G3020.20 Sanitary Sewerage Piping:

- PVC: Polyvinyl chloride plastic.
- SDR: Standard Dimension Ratio.
- Pipe used for gravity flow sanitary sewers shall be SDR-35 PVC unless specified otherwise on the Drawings.

G3020.30 Sanitary Sewerage Structures:

- Manholes: Sewer Manholes shall be precast concrete, conform to MA Std. 202.4.0, and be 4' in diameter unless otherwise noted. All manholes shall be hydrostatically tested for leakage.
- Flexible Couplings: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end as manufactured by Fernco, Inc or equivalent.
- Force Main Pressure Cleanouts: Force Main cleanouts and valves shall be ductile iron as shown on the Drawings, and conform to the specification Section G3010 Water Distribution.
- Gravity Sewer Cleanouts: PVC body with PVC threaded cap and cast-iron frame and cover. Include cast-iron ferrule with

inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.

- Frame and cover shall be Cast-Iron and shall be able to withstand H20-44 loading criteria.

G3030 STORM DRAINAGE UTILITIES

G3030.10 Work under this Section includes furnishing all plant labor, equipment, appliances and materials, and performing all operations in connection with the construction of stormwater collection systems at the locations and to the lines and grades indicated on the Drawings and/or directed.

- Any manufacturer's names and/or model numbers identified herein are intended to assist in establishing a general level of quality, configuration, functionality, and appearance required. This is NOT a proprietary specification and it should be noted that "Or equal" applies to all products denoted herein. It is understood that all manufactures will have minor variations in configuration, appearance, and product specifications and such minor variations shall not eliminate such manufacturers as an equal". It is the intent of this specification to encourage open and competitive involvement from multiple manufacturers that are able to supply similar products.

- Reinforced Concrete Pipe (RCP):

Reinforced-Concrete Pipe and Fittings: ASTM C 76 (ASTM C 76M), with bell-and-spigot ends and sealant joints with ASTM C 990 (ASTM C 990M), bitumen or butyl-rubber sealant.

Pipe shall conform to AASHTO M170 for the specified diameters and strength classes. The minimum cement content shall be 564 pounds per cubic yard.

All catch basin outlet pipes on new catch basins and all outlet pipes on existing catch basins shall be fitted with a catch basin hood.

- Hydrodynamic Separators:

Acceptable suppliers may be Vortsentry Contech Stormwater Solutions, Hydroguard by Hydroworks, Downstream Defender, or approved equivalent.

Materials and Design:

Concrete for precast stormwater treatment systems shall conform to ASTM C857 and C478 and meet the following additional requirements:

In all cases the wall thickness shall be no less than the minimum thickness necessary to sustain HS20 loading requirements.

Sections shall have tongue and groove or ship-lap joints with a butyl mastic sealant conforming to ASTM C990.

Cement shall be Type I, II, or III Portland cement conforming to ASTM C150.

All sections shall be cured by an approved method. Sections shall not be shipped until the concrete has attained a compressive strength of 4,000 psi (28 MPa) or other designate suitable handling strength.

Pipe openings shall be sized to accept pipes of the specified size(s) and material(s), and shall be sealed by the Construction Manager with hydraulic cement conforming to ASTM C595M.

- Performance:

Each stormwater treatment system shall have treatment, sediment storage, and oil storage capacities equal to or greater than that shown on the table below. For the purpose of determining equivalency, the treatment capacity shall be defined as the flow rate at which the stormwater treatment system removes 60% of an unground silica sample having an average particle size equal to or less than 240 microns. Treatment capacity shall be additionally defined as the maximum flow rate prior to which bypass of any flow occurs. Calculations must be provided to show the below criteria are met with the shop drawing for the treatment system submitted.

Each stormwater treatment system shall have the capability of bypassing high flow internally as well as controlling through the treatment chamber so as to avoid wash-out of previously captured pollutants under high flow conditions.

Each stormwater treatment system shall include a circular chamber with a tangential inlet to induce a swirling flow pattern within the treatment chamber. The outlet from the treatment chamber shall be located in the center of the chamber so as to maximize the particle flow path within the treatment system.

Each stormwater treatment system shall be contained within one concrete manhole structure.

- Catch Basins:

Catch Basins shall be precast concrete and conform to MA Std. E201.4.0. Concrete shall have a minimum strength of 5000 psi at twenty-eight (28) days and strength of 3000 psi at the time of form release. Catch Basins shall be 4' diameter with a 4' deep sump.

Catch basin frame shall conform to MA Std. 201.6.0

Catch Basin grate shall conform to MA Std. 201.11.0

Catch Basin Hood shall be installed in each Catch Basin and shall conform to MA Std. 201.12.0

- Storm Drain Manholes:

Manholes shall be precast concrete and conform to MA Std. 202.4.0. Concrete shall have a minimum strength of 5000 psi at twenty-eight (28) days and strength of 3000 psi at the time of form release. Manholes shall be between 4' and 6' in diameter

Frame and cover shall conform to MA Std. 202.6.0R

- **Underground Detention System:**

Underground Detention system shall be a STORMTRAP system or approved equivalent.

Detention system shall be watertight having a concrete base and waterproof coating.

- **Area Drains**

PVC surface drainage inlets shall include the drain basin type as indicated on the contract drawing and referenced within the contract specifications.

The ductile iron grates for each of these fittings are to be considered an integral part of the surface drainage inlet and shall be furnished by the same manufacturer.

Drain basin grates in hardscaped areas shall be ADA compliant. Drain basin grates in landscaped areas shall be standard grates.

The drain basins required for this contract shall be manufactured from PVC pipe stock, utilizing a thermoforming 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. The flexible elastomeric seals shall conform to ASTM F477. The pipe bell spigot shall be joined to the main body of the drain basin or catch basin. 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

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