

## ADDENDUM # 1

Project: Alterations and Expansion to the Lt. Job Lane Elementary School  
TBA Project: 1258  
Date: May 20, 2016

The attention of bidders submitting proposals for the above subject project is called to the following addendum to the specifications and drawings. The items set forth herein, whether of omission, addition, substitution, or clarifications are all to be included in and form a part of the proposal submitted.

THE NUMBER OF THIS ADDENDUM MUST BE ENTERED IN THE APPROPRIATE SPACE "B" PROVIDED AFTER THE WORD "No." ON PAGE "IB 14" OF THE CONTRACT FORM ENTITLED "FORMS FOR GENERAL BID" or AFTER THE WORD "No." ON PAGE "IB 27" OF THE CONTRACT FORM ENTITLED "FORM FOR SUB BID"

**Item 1.** Sub bids will be received until **Thursday June 2, 2016 at 2:00 pm** eastern standard. Sealed bids should be address to the addressed to the Bedford Facilities Department, 101 McMahon Road Bedford, MA 01730.

**Item 2.** General Bids will be received until **Friday June 10, 2016 at 11:00 am** eastern standard time. Sealed bids should be address to the addressed to the Bedford Facilities Department, 101 McMahon Road Bedford, MA 01730.

**Item 3.** The pre-bid meeting will be at 3:00 p.m. on May 25, 2016 at the Lt. Job Lane Elementary School, **66 Sweetwater Ave.** Bedford, MA 01730.

**Item 4. Page IB 11 Filing Procedure. 13.4 Delete and replace with the following:**

**13.4** Bids received prior to the time established herein for the opening of bids will be securely kept, unopened. The Owners Representative whose duty it is to receive and to open all bids will, when the specified time, per the time on the wall clock in the **Facilities Department Administrative Office** has arrived for the opening of bids, publicly open and read them. No responsibility will be attached to the Owners Representative for premature opening of a bid not properly addressed and identified.

**Item 5.** Replace Section 08 41 13 Aluminum Framed Entrances and Storefronts with the revised Section 08 41 13, 12 pages, attached.

**Item 6.** Replace Section 08 51 13 Aluminum Windows with the revised Section 08 51 13, 10 pages, attached.

**Item 7.** Insert Section 08 80 00 Glazing, 12 pages, into the project manual. The aluminum framed storefront section references this section 08 80 00 for glazing to be provided by the Glazing Filed Sub-Bid. The aluminum windows section references this section for glazing that will be factory installed in the aluminum windows and provided by the Metal Windows Filed Sub-Bid.

**Item 8.** Insert the following technical specification sections into the project manual:

Section 03 45 00 Precast Architectural Concrete, 10 pages (for stairs at new main office door, part of base-bid work.)

Section 05 12 13 Architecturally Exposed Structural Steel Framing, 4 pages

Section 06 06 60 Translucent Resin Panel System, 6 pages (panels at the split level stair)

Alterations and Expansion to the Lt. Job Lane Elementary School  
Addendum #1 - Page 1 of 128 (inclusive of attachments)  
TBA Project # 1258

Section 07 71 40 Aluminum Gutters and Downspouts, 6 pages (at cafetorium expansion, provided under General contractor)  
Section 07 95 00 Expansion Control, 6 pages (expansion joints at west wing expansion)  
Section 08 31 13 Access Doors and Frames, 4 pages (for mechanical & plumbing, provided under General contractor)  
Section 10 21 13 Phenolic-Core Toilet Compartments, 6 pages (at new gang bathrooms)  
Section 12 24 13 Roller Window Shades, 8 pages (at all new windows and existing cafetorium clerestory)

**Item 9.** Insert the attached geotechnical "Foundation Engineering Report, dated May 9, 2016 into the project manual. (36 pages)

**Item 10.Q:** Where is ACT 2 used?

**A:** ACT-2 (Kitchen) is not used in this project. Delete part 2.3.B of 09 51 20 Acoustic Tile Ceilings

**Item 11. Q:** Are Aluminum Storefront, Venting Windows, & Entrances included in the Aluminum Windows and Glazing Filed Sub Bid? Typically the same sub performs all of these trades.

**A:** See revised specification sections on windows, glazing and storefronts. Storefront framing will be provided under the General Contractor with glazing installed by the Glazing filed sub-contractor. Windows, including factory glazing, will be provided under the Metal Windows filed sub-contractor. The glazing specification has been revised for use by both the glazing and metal windows filed-sub-bidders.

**Item 12. Q:** Resilient Flooring and Tile are listed as a field sub bid. Will carpet be included as part of the filed sub-bid. Typically the same sub performs all of these trades.

**A:** Carpet is not part of the resilient flooring filed sub-bid. It will be provided under the General Contractor. Stair treads are included in the resilient flooring filed sub-bid. Ceramic and Porcelain Tile is under the Tile filed sub-bid.

**Item 13. Q:** Is spec section sheet metal flashing and trim to be included in the roofing filed sub-bid?

**A:** No, only flashings noted in the roofing spec. Sheet metal flashing and trim are by the General Contractor.

**Item 14. Q:** Please clarify who owns the caulking and sealants for the aluminum windows.

**A:** The General Contractor.

**Item 15. Q:** In paragraph 2.05.A of Section 085113 there are four finishes listed for the aluminum windows. Please select a finish so that the aluminum windows subcontractor can accurately price the project.

**A:** See the revised Section 08 51 13 Aluminum Windows specification, attached.

**Item 16.** Insert the following notes on Sheet D-1.1 Demolition Plans at Renovation Areas:

**DEMO NOTES:**

1. DEMO ALL FLOORING IN AREA INDICATED FOR NEW WORK.
2. DEMO WALLS AND APPURTENANCES AS INDICATED BY DASHED LINES.
3. DOORS LABELED E SHALL BE REUSED IN NEW CONSTRUCTION. LABEL AND STORE ALL DOORS IN DEMOLISH AREAS.
4. REPORT ANY DIFFERENCES TO ARCHITECT IN WRITING.
5. PROTECT ALL ADJACENT AREAS PER SPEC.

**Item 17.** Replace Detail 1 on sheet A-5.1 with the attached revised detail BSK-1.0 Revised Detail

1/A-5.1 Corner Detail @ Existing Wall. An expansion joint cover has been incorporated.

**Item 18.** Insert the attached sketches SKFP-1, SKFP-2, and SKFP-3 into the bidding documents. These are revisions and clarifications to the fire protection drawings.

**Item 19.** Insert the following notes, clarifications, and revisions into the bidding documents. They all are in reference to the electrical drawings as noted.

Drawing E-1.1 Reconfigured lighting in the main office and assistant principal's office.

Drawing E-1.1 Type "E" lighting fixture at door of assistant principal's office shall be wired to exterior normal/emergency lighting branch circuit thru existing exterior lighting contactor.

Drawing E-1.1 Delete one type "B" lighting fixture and associated branch circuit wiring by existing elevator.

Drawing E-1.2 Fire alarm system power boosters shall be wired as follows:  
First Floor – L1B-22  
Second Floor – L2A-18

Drawing E-1.3 Reconfigured receptacles in the main office and assistant principal's office.

Drawing E-3.0 Feeder schedule: Feeder F-3 circuit breaker should read 125 amperes in lieu of 225 amperes.

Drawing E-3.1 Modify panel schedules to read as follows:

L1B-22	20A	1	10,000	Fire alarm system power booster
L1B-23-30	20A	1	10,000	Spares
L2A-18	20A	1	10,000	Fire alarm system power booster
L2A-19-30	20A	1	10,000	Spares

**Attachments:**

08 41 13 Aluminum Framed Entrances and Storefronts, 12 pages

08 51 13 Aluminum Windows, 10 pages

08 80 00 Glazing, 12 pages

03 45 00 Precast Architectural Concrete, 10 pages

05 12 13 Architecturally Exposed Structural Steel Framing, 4 pages

06 06 60 Translucent Resin Panel System, 6 pages

07 71 40 Aluminum Gutters and Downspouts, 6 pages

07 95 00 Expansion Control, 6 pages

08 31 13 Access Doors and Frames, 4 pages

10 21 13 Phenolic-Core Toilet Compartments, 6 pages

12 24 13 Roller Window Shades, 8 pages

BSK-1.0 Revised Detail 1/A-5.1 Corner Detail @ Existing Wall, 1 page

SKFP-1, 1 page

SKFP-2, 1 page

SKFP-3, 1 page

Foundation Engineering Report, dated May 9, 2016, 36 pages

S-0.1 General Notes and Abbreviations (Attached separately)

Alterations and Expansion to the Lt. Job Lane Elementary School

Addendum #1 - Page 3 of 128 (inclusive of attachments)

TBA Project # 1258

Total number of pages of this addendum including attachments is one hundred and twenty-Eight (128).

**End of Addendum No. 1**

## SECTION 03 45 00

### PRECAST ARCHITECTURAL CONCRETE

#### PART 1 - GENERAL

##### 1.1 □ RELATED DOCUMENTS

- A. □ Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

##### 1.2 □ SUMMARY

- A. □ This Section includes the following:

- 1. □ Precast Concrete Stair and Landing

- B. □ Related Sections include the following:

- 1. □ Division 03 Section "Cast-In-Place Concrete" for installing connection anchors in concrete.

- C. □ Alternates: Alternate #1 Alterations and Renovations to the Main Office. All work of this section is Alternate #1 scope.

##### 1.3 □ DEFINITION

- A. □ Design Basis: Shea Concrete Products "Standard Concrete Steps 7" Rise" for architectural precast concrete color, finish and texture

##### 1.4 □ PERFORMANCE REQUIREMENTS

- A. □ Structural Performance: Provide architectural precast concrete units and connections capable of withstanding the following design loads within limits and under conditions indicated:

- 1. □ Loads: As indicated on structural drawings.

##### 1.5 □ ACTION SUBMITTALS

- A. □ Product Data: For each type of product indicated.

- B. □ Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.

- C. □ Shop Drawings: Detail fabrication and installation of architectural precast concrete units. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit.

Indicate joints, reveals, and extent and location of each surface finish. Indicate details at building corners.

- 1.□ Indicate welded connections by AWS standard symbols. Detail loose and cast-in hardware and connections.
- 2.□ Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
- 3.□ Indicate relationship of architectural precast concrete units to adjacent materials.
- 4.□ When required submit additional shop drawings and calculations for jurisdictional review.

D.□ Samples: For each type of finish indicated on exposed surfaces of architectural precast concrete units, in sets of 3, illustrating full range of finish, color, and texture variations expected; approximately 12 by 12 by 2-inches.

- 1.□ When other faces of precast concrete unit are exposed, include Samples illustrating workmanship, color, and texture of backup concrete as well as facing concrete.

#### 1.6□ INFORMATIONAL SUBMITTALS

A.□ Qualification Data: For Installer, fabricator and testing agency.

B.□ Welding certificates.

C.□ Material Certificates: For the following items, signed by manufacturers:

- 1.□ Cementitious materials.
- 2.□ Reinforcing materials.
- 3.□ Admixtures.
- 4.□ Bearing pads.
- 5.□ Structural-steel shapes and hollow structural sections.
- 6.□ Stone anchors.

D.□ Material Test Reports: For aggregates.

E.□ Source quality-control test reports.

F.□ Field quality-control test and special inspection reports.

#### 1.7□ QUALITY ASSURANCE

A.□ Fabricator qualifications: A firm that assumes responsibility for engineering architectural precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

- 1.□ Designated as a PCI-certified plant for Group A, Category A1 - Architectural Cladding and Load Bearing Units or designated as an APA-certified plant for production of architectural precast concrete products.

B.□ Installer Qualifications: Installer shall demonstrate a record of at least five years of successful installation of precast units similar to those required for this project.

- C.□ Testing Agency Qualifications: An independent testing agency acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- D.□ Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."
- E.□ Welding: Qualify procedures and personnel according to AWS D1.1/D.1.1M, "Structural Welding Code - Steel"; and AWS D1.4, "Structural Welding Code - Reinforcing Steel."

## 1.8□ COORDINATION

- A.□ Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

## 1.9□ DELIVERY, STORAGE, AND HANDLING

- A.□ Deliver architectural precast concrete units in such quantities and at such times to limit unloading units temporarily on the ground.
- B.□ Support units during shipment on nonstaining shock-absorbing material.
- C.□ Store units with adequate dunnage and bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.
- D.□ Place stored units so identification marks are clearly visible, and units can be inspected.
- E.□ Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses which would cause cracking or damage.
- F.□ Lift and support units only at designated points shown on Shop Drawings.

## PART 2 - PRODUCTS

### 2.1□ MANUFACTURERS

- A.□ Products shall be manufactured by one of the following manufacturers:
  - 1.□ Shea Concrete Products.
  - 2.□ Means Precast
  - 3.□ Atlas Concrete
  - 4.□ Substitutions:
    - a.□ Other manufacturers' products that meet or exceed specified design requirements may be considered. Submit the following information with request for substitutions.
    - b.□ Test reports specified in 1.3.

## 2.2□ MOLD MATERIALS

- A.□ Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.
  - 1.□ Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.

## 2.3□ REINFORCING MATERIALS

- A.□ Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

## 2.4□ CONCRETE MATERIALS

- A.□ Portland Cement: ASTM C 150, Type I or Type III, gray or white based on architects selection. Use only one brand type and color from same mill.
- B.□ Supplementary Cementitious Materials:
  - 1.□ Metakaolin Admixture: ASTM C 618, Class N.
  - 2.□ Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- C.□ Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project to match design reference sample mix design.
- D.□ Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.
- E.□ Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- F.□ Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.

## 2.5□ STEEL CONNECTION MATERIALS

- A.□ As indicated on drawings.
- B.□ Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.
- C.□ Carbon-Steel Plate: ASTM A 283/A 283M.
- D.□ Deformed-Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706/A 706M.
- E.□ Welding Electrodes: Comply with AWS standards.

## 2.6 □ BEARING PADS

- A. □ Provide one of the following bearing pads for architectural precast concrete units as recommended by precast fabricator for application:

## 2.7 □ ACCESSORIES

- A. □ Precast Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install architectural precast concrete units.
- B. □ Stair Nosings: Consisting of an abrasive filler bonded and locked into channels in an extruded aluminum base, alloy 6063-T6. Coefficient of friction 1.02 dry and .098 wet per ASTM standard F-609 Provide the following:
  - 1. □ Basis of design:
    - a. □ Balco Inc.
  - 2. □ Alternate acceptable Manufacturers:
    - a. □ American Safety Inc.
    - b. □ Wooster Products Inc.

## 2.8 □ CONCRETE MIXTURES

- A. □ Prepare design mixtures for each type of precast concrete required.
  - 1. □ Limit use of fly ash to 20 percent of portland cement by weight; limit metakaolin and to 10 percent of portland cement by weight.
- B. □ Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at architectural precast concrete fabricator's option.
- C. □ Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 or PCI MNL 117 when tested according to ASTM C 1218/C 1218M.
- D. □ Normal-Weight Concrete Mixtures: Proportion full-depth mixtures, at fabricator's option by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
  - 1. □ Compressive Strength (28 Days): 5000 psi minimum.
  - 2. □ Maximum Water-Cementitious Materials Ratio: 0.45.
- E. □ Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 117.
  - 1. □ Compressive Strength (28 Days): 4000 psi.
  - 2. □ Unit Weight: Calculated equilibrium unit weight of 115 lb/cu. ft., plus or minus 3 lb/cu. ft., according to ASTM C 567.
- F. □ Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.
- G. □ When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

## 2.9 □ FABRICATION

- A. □ Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
1. □ Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."
- B. □ Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.
1. □ Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcing exceeds limits specified in ASTM A 775/A 775M, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
  2. □ Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
  3. □ Place reinforcement to maintain at least 3/4-inch -minimum coverage. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
  4. □ Place reinforcing steel to maintain at least 3/4-inch -minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2-inches when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
  5. □ Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.
- C. □ Reinforce architectural precast concrete units to resist handling, transportation, and erection stresses.
- D. □ Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
- E. □ Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units.
1. □ Place backup concrete mixture to ensure bond with face-mixture concrete.
- F. □ Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 117.
1. □ Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."
- G. □ Comply with PCI MNL 117 for hot- and cold-weather concrete placement.
- H. □ Identify pickup points of architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or

permanently mark casting date on each architectural precast concrete unit on a surface that will not show in finished structure.

- I.□ Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.
- J.□ Discard and replace architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Architect's approval.

## 2.10□ FABRICATION TOLERANCES

- A.□ Fabricate architectural precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished panel complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.
- B.□ Fabricate architectural precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished panel complies with the following product tolerances:
  - 1.□ Overall Height and Width of Units, Measured at the Face Exposed to View: As follows:
    - a.□ 10-feet or under, plus or minus 1/8-inch.
  - 2.□ Overall Height and Width of Units, Measured at the Face Not Exposed to View: As follows:
    - a.□ 10-feet or under, plus or minus 1/4-inch.
  - 3.□ Variation from Square or Designated Skew (Difference in Length of the Two Diagonal Measurements): Plus or minus 1/8-inch per 72-inches or 1/2-inch total, whichever is greater.
  - 4.□ Local Smoothness: 1/4-inch per 10-feet.
- C.□ Position Tolerances: For cast-in items measured from datum line location, as indicated on Shop Drawings.
  - 1.□ Weld Plates: Plus or minus 1/2-inch.
  - 2.□ Inserts: Plus or minus 1/2-inch.
  - 3.□ Reinforcing Steel and Welded Wire Fabric: Plus or minus 1/4-inch where position has structural implications or affects concrete cover; otherwise, plus or minus 1/2-inch.
  - 4.□ Reinforcing Steel Extending out of Member: Plus or minus 1/2-inch of plan dimensions.

## 2.11□ FINISHES

- A.□ Panel faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight, and sharp. Finish exposed-face surfaces of architectural precast concrete units to match approved design reference sample and as follows:
  - 1.□ As-Cast Surface Finish: Provide surfaces free of pockets, sand streaks, and honeycombs.
- B.□ Finish exposed indicated on drawings surfaces of architectural precast concrete units by smooth, steel-trowel finish.
- C.□ Finish unexposed surfaces of architectural precast concrete units by float finish.

## 2.12 □ FACTORY APPLIED SEALERS AND COATINGS

- A. □ Concrete Coatings, water repellants. High performance factory applied coatings as follows:
- B. □
  - 1. Low VOC type; colorless, pure silane water repellent penetrating sealers.
    - a. □ Hydrozo 100 High performance sealer
  - 3. Sealer to maintain natural look of concrete surface with no glaze or gloss, darkening of color change.

## 2.13 □ SOURCE QUALITY CONTROL

- A. □ Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 117 requirements. If using self-consolidating concrete, also test and inspect according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."
- B. □ Strength of precast concrete units will be considered deficient if units fail to comply with ACI 318 requirements for concrete strength.
- C. □ Testing: If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 requirements, precaster will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42/C 42M.
- D. □ Patching: If core test results are satisfactory and precast concrete units comply with requirements, clean and dampen core holes and solidly fill with precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.

## PART 3 - EXECUTION

### 3.1 □ EXAMINATION

- A. □ Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance.
- B. □ Proceed with installation only after unsatisfactory conditions have been corrected.
- C. □ Do not install precast concrete units until supporting cast-in-place building structural framing has attained minimum allowable design compressive strength or supporting steel or other structure is complete.

### 3.2 □ INSTALLATION

- A. □ Install clips, hangers, bearing pads, and other accessories required for connecting architectural precast concrete units to supporting members and backup materials.

- B.□ Connect architectural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
  - 1.□ Do not permit connections to disrupt continuity of roof flashing.
- C.□ Welding: Comply with applicable AWS D1.1/D1.1M and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
  - 1.□ Protect architectural precast concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
  - 2.□ Welds not specified shall be continuous fillet welds, using no less than the minimum fillet as specified by AWS.
  - 3.□ Clean weld-affected metal surfaces with chipping hammer followed by brushing, and apply a minimum 4.0-mil -thick coat of galvanized repair paint to galvanized surfaces according to ASTM A 780.
  - 4.□ Clean weld-affected metal surfaces with chipping hammer followed by brushing, and reprime damaged painted surfaces.
  - 5.□ Remove, reweld, or repair incomplete and defective welds.

### 3.3□ ERECTION TOLERANCES

- A.□ Erect architectural precast concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 117, Appendix I.
- B.□ Erect architectural precast concrete units level, plumb, square, and true, without exceeding the following noncumulative erection tolerances:
  - 1.□ Plan Location from Building Grid Datum: Plus or minus 1/2-inch.
  - 2.□ Plan Location from Centerline of Steel: Plus or minus 1/2-inch.
  - 3.□ Top Elevation from Nominal Top Elevation: 1/8":
  - 4.□ Plumb in Any 10 Feet of Element Height: 1/4-inch.

### 3.4□ REPAIRS

- A.□ Repair architectural precast concrete units if permitted by Architect. The Architect reserves the right to reject repaired units that do not comply with requirements.
- B.□ Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet .
- C.□ Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.

### 3.5□ CLEANING

- A.□ Clean surfaces of precast concrete units exposed to view.
- B.□ Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.

- C.□ Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
  - 1.□ Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
  - 2.□ Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 034500

# ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

## SECTION 051213

### PART 1 - GENERAL

#### 1.1 □ RELATED DOCUMENTS

- A. □ Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 □ SUMMARY

- A. □ Section includes architecturally exposed structural-steel (AESS)
  - 1. □ Loose laid steel lintels at new masonry openings.

- B. □ Related Requirements:

- 1. □ Section 048100 "Unit Masonry "
- 2. □ Section 099000 Painting for surface preparation and priming requirements.

#### 1.3 □ DEFINITIONS

- A. □ AESS: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.
- B. □ Category 1 AESS: AESS that is within 96 inches vertically and 36 inches horizontally of a walking surface and that is visible to a person standing on that walking surface or is designated as "Category 1 architecturally exposed structural steel" or "AESS-1" in the Contract Documents.

#### 1.4 □ COORDINATION

- A. □ Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

#### 1.5 □ ACTION SUBMITTALS

#### 1.6 □ INFORMATIONAL SUBMITTALS

- A. □ Qualification Data: For Installer fabricator.
- B. □ Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

#### 1.7 □ QUALITY ASSURANCE

- A. □ Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).
- B. □ Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

#### 1.8 □ DELIVERY, STORAGE, AND HANDLING

- A. □ Use special care in handling to prevent twisting, warping, nicking, and other damage. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

- 1.□ Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

#### 1.9□ FIELD CONDITIONS

- A.□ Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

### PART 2 - PRODUCTS

#### 2.1□ Angles:

- A.□ Angles-Shapes: **ASTM A 36/A 36M**
  - 1.□ Finish: Hot Dipped Galvanized with primer coat.

#### 2.2□ FILLER

- A.□ Filler: Polyester filler intended for use in repairing dents in automobile bodies.

#### 2.3□ PRIMER

- A.□ Primer: Comply with Section 099000 "Painting"
- B.□ Primer: SSPC-Paint 25, Type II, zinc oxide, alkyd, linseed oil primer.
- C.□ Etching Cleaner for Galvanized Metal: MPI#25.
- D.□ Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20 ASTM A 780/A 780M.
- E.□ Shop Primer for Galvanized Steel: MPI#134, water-based galvanized metal primer.

#### 2.4□ FABRICATION

- A.□ Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.
- B.□ In addition to special care used to handle and fabricate AESS, comply with the following:
  - 1.□ Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
  - 2.□ Grind sheared, punched, and flame-cut edges of Category 1 AESS to remove burrs and provide smooth surfaces and edges.
  - 3.□ Fabricate Category 1 AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
  - 4.□ Fabricate Category 1 and Category 2 AESS with exposed surfaces free of seams to maximum extent possible.
  - 5.□ Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
  - 6.□ Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
  - 7.□ Fabricate Category 1 AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
  - 8.□ Fabricate Category 2 and Category 3 AESS to the tolerances specified in AISC 303 for steel that is not designated AESS.

- 9.□ Seal-weld open ends of hollow structural sections with 3/8-inch closure plates for Category 1 AESS.
  - C.□ Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch with a tolerance of 1/32 inch for Category 1 AESS.
  - D.□ Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
  - E.□ Cleaning Corrosion-Resisting Structural Steel: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - F.□ Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
    - 1.□ Cut, drill, or punch holes perpendicular to steel surfaces.
    - 2.□ Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
    - 3.□ Weld threaded nuts to framing and other specialty items indicated to receive other work.
- 2.5□ GALVANIZING
- A.□ Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
    - 1.□ Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
    - 2.□ Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- 2.6□ SHOP PRIMING
- A.□ Shop prime steel surfaces except the following:
    - 1.□ Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
    - 2.□ Surfaces to be field welded.
    - 3.□ Surfaces to be high-strength bolted with slip-critical connections.
    - 4.□ Surfaces to receive sprayed fire-resistive materials.
  - B.□ Preparing Galvanized Steel for Shop Priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
  - C.□ Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
    - 1.□ Stripe paint corners, crevices, bolts, welds, and sharp edges.
    - 2.□ Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

## PART 3 - EXECUTION

### 3.1 □ PROVISION

1. □ Provide galvanized, primed angles for use as lintels to Masonry Subcontractor for inclusion in the work of the mason at new openings and existing openings at #74 Warren Avenue.
- B. □ Examine AESS for twists, kinks, warping, gouges, and other imperfections before providing.

### 3.2 □ REPAIRS AND PROTECTION

- A. □
- B. □ Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.
- C. □ Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  1. □ Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION 051213

## SECTION 06 06 60

### TRANSLUCENT RESIN PANEL SYSTEM

#### PART 1 - GENERAL

##### 1.1 □ RELATED DOCUMENTS

- A. □ Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

##### 1.2 □ SUMMARY

- A. □ This section includes the Resin Fabrication with a minimum of Class B fire rating as shown and specified in the described systems:
  - 1. □ Decorative wall panels along stair.
  - 2. □ Feature wall between stair flights.
- B. □ Related Sections include the following:
  - 1. □ Section 06 10 00 Rough Carpentry
  - 2. □ Section 06 20 00 Finish Carpentry
  - 3. □ Section 09 29 00 Gypsum Board
  - 4. □ Section 09 30 13 Tiling
  - 5. □ Section 09 90 00 Painting

##### 1.3 □ SUBMITTALS

- A. □ General: Submit the following in accordance with conditions of contract and Division 1 specification section 01 33 00 "Submittal Procedures."
- B. □ Product Data: Indicate product description, fabrication information, and compliance with specified performance requirements.
- C. □ Submit material test results or certifications indicating each type and class of panel system complies with the project performance requirements
  - 1. □ Test results required are:
    - a. □ Rate of Burning (ASTM D 635)
    - b. □ Self-Ignition Temperature (ASTM D 1929)
    - c. □ Density of Smoke (ASTM D 2843)
    - d. □ Flame Spread and Smoke Developed (ASTM E 84)
    - e. □ Room Corner Burn Test (NFPA 286)
    - f. □ Impact Strength (ASTM D 3763)
  - 2. □ Submit minimum 3.5 inch by 3.5 inch samples.
  - 3. □ Indicate full color, texture, and pattern variation.
  - 4. □ Approved samples will be retained as standards for work.
- D. □ Samples for Verification:
  - 1. □ Submit minimum 8 inch by 8 inch sample for each type, texture, pattern and color of Resin.

- E.□ Mockups:
  - 1.□ Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects.
  - 2.□ Approved mockups may become part of the completed work if undisturbed at time of substantial completion.
- F.□ Maintenance Data: Submit manufacturer's care and maintenance data, including care, repair and cleaning instructions. Include in Project closeout documents.

#### 1.4□ QUALITY ASSURANCE

- A.□ Manufacturer's Qualifications
  - 1.□ Materials and systems shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least 5 consecutive years.
- B.□ Performance Criteria
  - 1.□ Rate of Burning (ASTM D 635) CC1
  - 2.□ Self-Ignition Temperature (ASTM D 1929) Minimum 800°F
  - 3.□ Density of Smoke (ASTM D 2843) Maximum 39%
  - 4.□ Flame Spread (ASTM E 84) Maximum Flame Spread 60
  - 5.□ Smoke Developed (ASTM E 84) Maximum Smoke Developed 450
  - 6.□ Room Corner Burn Test (NFPA 286) Pass (up to 3/8" Gauge)
  - 7.□ Impact Strength (ASTM D 3763) 1.7 ft-lb/in
  - 8.□ Safety Glazing Impact Resistance (ANSI Z97.1-2004)
  - 9.□ UPITT Test for Combustion Product Toxicity
- C.□ Manufacturer to have available qualified installers/fabricators upon demand.
- D.□ Allowable Tolerances:
  - 1.□ Flatness: 1/16" maximum deviation over 12"
  - 2.□ Thickness: ±10%
  - 3.□ Height/Width: ±1/2"

#### 1.5□ DELIVERY, STORAGE, AND HANDLING

- A.□ Deliver no components to project site until areas are ready for installation.
- B.□ Handle materials to prevent damage to finished surfaces and edges.
- C.□ Keep protective masking in place while fabricating.
- D.□ Provide protective coverings to prevent damage or staining following installation for duration of project.
- E.□ Store components on edge, fully supported at 10 off vertical, indoors where atmospheric conditions are controlled to avoid temperature extremes and exposure to ultraviolet light and moisture.
- F.□ Follow Manufactures recommendations for storage and handling.
- G.□ Before installing Resin Fabrications, permit them to reach room temperature.

## 1.6 □ PROJECT CONDITIONS

- A. □ Environmental Limitations: Do not install Resin Fabrications until spaces are enclosed and weatherproof, and ambient temperatures and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

## 1.7 □ WARRANTY

- A. □ Manufacturer's Special Warranty on Plastic Fabrications: Manufacturer's standard form agreeing to repair or replace units that fail in material or workmanship within the specified warranty period.
- B. □ Warranty Period: 2 year after the date of substantial completion.
- C. □ The warranty shall not deprive the owner of other rights or remedies the Owner may have under other provisions of the Contract Documents, and is in addition to and runs concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

## PART 2 - PRODUCTS

### 2.1 □ MANUFACTURERS

- A. □ Manufacturers: Products are based upon one or a multiple of manufacturers to establish a quality and design standard and is not meant to discourage competition in any way.
  - 1. □ Lumicor, Inc. – Lumiform R4
  - 2. □ LumiVisions Architectural Elements, Inc. - Lumiresin Satino
  - 3. □ 3Form Inc. - Varia Ecoresin
- B. □ Substitutions: Permitted with Architect's approval under Section 01 60 00 - Product Requirements: Product Substitution Procedures

### 2.2 □ Materials

- A. □ Translucent Resin Panels
  - 1. □ Engineered PETG resin with a minimum of 40% post industrial recycled content.
  - 2. □ Sheet Size: Standard 4' x 8'
  - 3. □ Thickness: Nominal 3/8"
  - 4. □ Finishes: Gloss, color to be selected by Architect from manufacturer's standards.
  - 5. □ Options:
    - a. □ UV protection layer
  - 6. □ Basis of Design Product: The design of Resin Fabrications is based on Lumiform R4™ panels as provided by Lumicor, Inc. Products from other manufacturers must be approved by the Architect or Designer prior to bidding in accordance with the Instructions to Bidders and Section 10 60 00 "Product Requirements".
- B. □ Description:  
Minimum nominal 3/8" thickness, color to be selected by Architect, cut to size, edge sealed per manufacturer's specification, and installed per architect's drawings.

- C.□ Interlayer Materials: Compatible with acrylic and bonding process to create a monolithic sheet of material when complete.

## 2.3□ FABRICATION

- A.□ General: Fabricate Resin Fabrications to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes, profiles and other characteristics are indicated on the drawings.
- B.□ Comply with manufacturer's written recommendations for fabrication.
- C.□ Machining: Acceptable means of machining are listed below. Ensure that material is not chipped or warped by machining operations.
  - 1.□ Sawing: Select equipment and blades suitable for type of cut required.
  - 2.□ Drilling: Drills specifically designed for use with Resin products.
  - 3.□ Milling: Climb cut where possible.
  - 4.□ Routing
- D.□ Forming: Form products to shapes indicated using the appropriate method listed below. Comply with manufacturer's written instructions.
  - 1.□ Cold Bending
  - 2.□ Hot Bending
  - 3.□ Thermoforming
  - 4.□ Drape Forming
  - 5.□ Matched Mold Forming
  - 6.□ Mechanical Forming
- E.□ Laminating: Laminate to substrates indicated using adhesives and techniques recommended by manufacturer.

## 2.4□ Miscellaneous Materials

- A.□ General: Provide products of material, size, and shape required for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B.□ Cleaner: Type recommended by manufacturer.
- C.□ Fasteners: Use screws designed specifically for Resins. Provide threaded metal or nylon inserts for applications requiring frequent disassembly such as light fixtures.
- D.□ Bonding Cements: Solvent or adhesives, suitable for use with product and application.
- E.□ Drilled Panel Wall Anchors: As provided by the manufacturer. Provide extensions to accommodate thicknesses scheduled or illustrated.

## PART 3 - EXECUTION

### 3.1 □ EXAMINATION

- A. □ Examine substrates, areas, and conditions where installation of Resin Fabrications will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for installation and comply with requirements specified.

### 3.2 □ INSTALLATION

- A. □ General: Comply with manufacturer's written instructions for the installation of Resin Fabrications.
- B. □ Shop fabricates items to the greatest degree possible.
- C. □ Utilize fasteners, adhesives and bonding agents recommended by manufacturer for type of installation indicated. Material that is chipped, warped, hazed or discolored as a result of installation or fabrication methods will be rejected.
- D. □ Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
- E. □ Form field joints using manufacturer's recommended procedures. Locate seams in panels so that they are not directly in line with seams in substrates.

### 3.3 □ CLEANING AND PROTECTION

- A. □ Protect surfaces from damage until date of substantial completion. Repair work or replace damaged work, which cannot be repaired to Architect's satisfaction.

END OF SECTION 06 06 60

This page left intentionally blank.

SECTION 07 71 40  
ALUMINUM GUTTERS & DOWNSPOUTS

PART 1- GENERAL

1.1 □ REQUIREMENTS

- A. □ Division 1, General Conditions, Supplementary General Conditions, the Drawings, and all other parts of the Contract Documents are hereby made a part of this Section.

1.2 □ SUMMARY

- A. □ Section includes aluminum gutters and downspouts to be installed as indicated on the drawings.
1. □ Provide:
- A. □ Aluminum Gutters and fasteners
  - B. □ Boots to connect to underground drainage system.
  - C. □ Aluminum Downspouts
  - D. □ Aluminum Downspout brackets.

- B. □ Related Sections:

Division 1           – General Requirements, all Sections  
Section 02 41 00 – Selective Demolition  
Section 07 90 00 – Joint Protection

1.3 □ REFERENCES

- A. □ American Architectural Manufacturers Association:
- 1. □ AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
  - 2. □ AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
  - 3. □ AAMA 2604 - Voluntary specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
- B. □ ASTM International:
- 1. □ ASTM B32 - Standard Specification for Solder Metal.
  - 2. □ ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 3. □ ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction.
  - 4. □ ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. □ Sheet Metal and Air Conditioning Contractors:

1.□ SMACNA - Architectural Sheet Metal Manual

1.4□ DESIGN REQUIREMENTS

- A.□ Conform to applicable code for size and method of rain water discharge.
- B.□ Match existing gutter profiles; see drawings for locations.

1.5□ SUBMITTALS

- A.□ Section 01 33 00 - Submittal Procedures.
- B.□ Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details and accessories to minimum scale of 1-1/2 inch to 1 ft.
- C.□ Product Data:
  - 1.□ Submit data on attachment hardware, finish hardware, and joint compounds.
  - 2.□ Submit data on manufactured components, materials, and finishes.
- D.□ Samples: Submit two samples, 12 inch long illustrating component design, finish, color, and configuration.

1.6□ QUALITY ASSURANCE

- A.□ Perform Work in accordance with SMACNA Manual.
- B.□ Maintain one copy of each document on site.

1.7□ QUALIFICATIONS

- A.□ Fabricator: company specializing in sheet metal work with minimum three years documented experience.

1.8□ DELIVERY, STORAGE, AND HANDLING

- A.□ Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B.□ Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope to drain.
- C.□ Prevent contact with materials during storage capable of causing discoloration, staining, or damage.

1.9□ COORDINATION

- A.□ Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B.□ Coordinate Work with downspout discharge pipe inlet.

### 1.10 □ WARRANTY

- A. □ Section 01 70 00 - Execution Requirements: Product warranties and product bonds.
- B. □ Furnish five year manufacturer warranty for gutter and downspout finishes.

### 1.11 □ FIELD MEASUREMENTS

- A. □ Verify field measurements prior to fabrication.

## PART 2 PRODUCTS

### 2.1. □ GUTTERS AND DOWNSPOUTS, SHEET METAL FLASHING AND TRIM

- A. □ Manufacturers
  - 1. □ Alcoa Aluminum
  - 2. □ Lynch Aluminum Manufacturing Co.
  - 3. □ US Aluminum Inc.
- B. □ Products
  - 1. □ Aluminum Downspouts to be sheet metal; conform to SMACNA, Corrugated rectangular profile.
  - 2. □ Splash Pads to be pre-cast concrete type, standard sizes and profiles; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.
- C. □ Aluminum Materials
  - 1. □ Pre-Finished Aluminum Sheet: 3003 alloy, H14, 0.032 inch (0.8 mm) thick; plain finish, shop pre-coated with enamel, color to be white.
- D. □ Accessories
  - 1. □ Fasteners: concealed, same material, configuration and finish to match, install with soft neoprene washers.

### 2.2. □ COMPONENTS

- A. □ Aluminum Downspouts
  - 1. □ Primer: Zinc molybdate type.
  - 2. □ Pre-Finished Aluminum Sheet: ASTM B209, manufacturer's standard alloy and temper for specified finish; 0.032 inch thick; plain finish shop pre-coated with modified silicone acrylic polyester PVDF (polyvinylidene fluoride) coating; color to match existing.
  - 3. □ 0.024 in at preformed drip caps
  - 4. □ 0.040 in at preformed corner boards, minimum 4 ft length
  - 5. □ Solder: ASTM B32, type suitable for application and material being soldered.

### 2.3. □ ACCESSORIES

- A. □ Anchors and Supports: Profiled to suit downspouts.

- 1.□ Gutter Supports: two per length or as recommended by fabricator, whichever provides more support.
  - 2.□ Anchoring Devices for Downspouts: Type recommended by fabricator.
  - 3.□ Downspout Supports: Brackets.
- B.□ Fasteners: Same material and finish as gutters and downspouts, with soft neoprene washers.
- C.□ Boots sufficient for connection between downspout and separately installed underground drainage system.

## 2.4.□ FABRICATION

### A.□ Gutters

- 1.□ Fabricate in longest lengths possible, in a profile to match existing, free of distortion or defects detrimental to appearance or performance
- 2.□ Fabricate cleats of same material as sheet metal, interlocking with sheet.
- 3.□ Hem exposed edges on underside ½ inch; miter and seam corners.
- 4.□ Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

### B.□ Downspouts

- 1.□ Form downspouts of profiles and sizes required to accommodate full drainage capacity.
- 2.□ Fabricate with required connection pieces.
- 3.□ Form sections to match existing, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- 4.□ Hem exposed edges of metal.

- D.□ Fabricate gutter and downspout accessories; solder downspouts and seal gutters watertight.

## 2.5.□ FACTORY FINISHING

- A.□ Acrylic coating: Baked enamel system conforming to AAMA 2603.
- B.□ Washcoat: Finish concealed side of metal sheets with washcoat compatible with finish system, as recommended by finish system manufacturer.
- C.□ Primer Coat: Finish concealed side of metal sheets with primer compatible with finish system, as recommended by finish system manufacturer.

## PART 3 - EXECUTION

### 3.1.□ EXAMINATION

- A.□ Section 013000 - Administrative Requirements: Coordination and project conditions.

B.□ Verify surfaces are ready to receive gutters and downspouts.

### 3.2□ PREPARATION

A.□ Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to minimum dry film thickness of 15 mil.

### 3.3□ INSTALLATION

#### A.□ Gutters

- 1.□ Slope gutters ¼ inch per foot minimum.
- 2.□ Screw replacement boots in predrilled holes to attach downspouts.
- 3.□ Fit flashings tight in place. Make corners square, surfaces true and straight in planes and lines accurate to profiles.
- 4.□ Seal metal joints watertight.

#### B.□ Downspouts

- 1.□ Sheet Metal: Join lengths with formed seams soldered watertight. Flash and seal downspouts and accessories.
- 2.□ Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.
- 3.□ Install boots to subsurface drainage pipes. Secure in place.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

SECTION 07 95 00  
EXPANSION CONTROL

PART 1 - GENERAL

1.01 □ RELATED DOCUMENTS

- A. □ Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 □ SUMMARY

- A. □ This Section includes the following:

- 1. □ Architectural joint systems for building interiors.
- 2. □ Architectural joint systems for building exteriors.

- B. □ Related Sections include the following:

- 1. □ Division 03 Section "Cast-in-Place Concrete" for cast-in architectural-joint-system frames furnished, but not installed, in this Section.
- 2. □ Division 04 Section "Unit Masonry" for masonry wall joint systems.
- 3. □ Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal wall joint systems.
- 4. □ Division 07 Section "Joint Sealants" for liquid-applied joint sealants.

1.03 □ DEFINITIONS

- A. □ Maximum Joint Width: Widest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.
- B. □ Minimum Joint Width: Narrowest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.
- C. □ Movement Capability: Value obtained from the difference between widest and narrowest widths of a joint.
- D. □ Nominal Joint Width: The width of the linear opening specified in practice and in which the joint system is installed.

1.04 □ SUBMITTALS

- A. □ Shop Drawings: Provide the following for each joint system specified and obtain approval prior to fabrication and shipment of materials to the job site:
  - 1. □ Placement Drawings: Include line diagrams showing plans, elevations, sections, details, splices, blockout requirement, entire route of each joint system, and attachments to

other work. Where joint systems change planes, provide isometric or clearly detailed drawing depicting how components interconnect.

- B.□ Product Data: Submit copies of manufacturer's latest published literature for materials specified herein for approval, and obtain approval before materials are fabricated and delivered to the site. Data to clearly indicate movement capability of cover assemblies and suitability of material used in exterior seal for UV exposure.
- C.□ Certificates – Material test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of fire-rated expansion joint assemblies with requirements indicated.

#### 1.05 □ QUALITY ASSURANCE

- A.□ Installer Qualifications: Approved by manufacturer.
- B.□ Source Limitations: Obtain all architectural joint systems through one source from a single manufacturer.
- C.□ Product Options: Drawings indicate size, profiles, and dimensional requirements of architectural joint systems and are based on the specific systems indicated. Refer to Division 01 Section "Product Requirements."
  - 1.□ Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D.□ Loading Characteristics: Standard loading refers to covers that are capable of withstanding up to 500 lb. point loads. Heavy duty refers to covers that are capable of withstanding up to 2000 lb. point loads.
- E.□ Fire-Test-Response Characteristics: Where indicated, provide architectural joint system and fire-barrier assemblies identical to those of assemblies tested for fire resistance per UL 2079 and/or ASTM E 1966 by a testing and inspecting agency acceptable to authorities having jurisdiction. Fire rating not less than the rating of adjacent construction.
- F.□ Manufacturer to provide 5 year warranty for all joint covers.

#### 1.06 □ COORDINATION

- A.□ Coordinate installation of exterior wall joint systems with roof expansion assemblies to ensure that wall transitions are watertight.

### PART 2 - PRODUCTS

#### 2.01 □ MATERIALS

- A.□ Aluminum: ASTM B 221, Alloy 6005A-T61, 6063-T5, 6061-T5, 6105-T5 for extrusions; ASTM B 209, Alloy 6061-T6, 3003-H14, 5005-H34 for sheet and plate.

- 1.□ Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
- 2.□ Mill Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).
- 3.□ Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

B.□ Elastomeric Seals: Preformed elastomeric membranes or extrusions to be installed in metal frames.

C.□ Compression Seals: ASTM D2000; preformed rectangular elastomeric extrusions having internal baffle system and designed to function under compression.

D.□ Moisture Barrier: 7-ply laminate reinforced Polyethylene.

E.□ Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

## 2.02 □ ARCHITECTURAL JOINT SYSTEMS, GENERAL

A.□ General: Provide architectural joint systems of design, basic profile, materials, and operation indicated. Provide units with capability to accommodate variations in adjacent surfaces.

B.□ Design architectural joint systems for the following size and movement characteristics:

- 1.□ Nominal Joint Width: *As indicated on Drawings.*
- 2.□ Lateral Shear Movement Capability: *As indicated on Drawings.*

## 2.03 □ ARCHITECTURAL JOINT SYSTEMS FOR BUILDING INTERIORS

A.□ Basis of Design: Construction Specialties, Inc., 6696 Route 405 Highway, Muncy, PA, shall manufacture expansion joint cover assemblies specified herein and indicated on the drawings. Other manufacturers may be accepted as substitutions only if the manufacturer can demonstrate product compliance with the requirements of the contract documents. Substitution requests must be reviewed prior to bid and must include the following information:

- 1.□ Details
- 2.□ ASTM- E1399 test reports
- 3.□ Mock-ups
- 4.□ Reference list of projects with similar products as those specified herein.
- 5.□ Sample of written 5 year warranty

B.□ Floor-to-Floor Joint Systems:

- 1.□ Basis-of-Design Product: Construction Specialties, Inc. model *SJP-300S*
- 2.□ Type: Cover plate.

a.□ Exposed Metal: Aluminum.

1)□ Finish: Mill.

- 3.□ Cover Plate Design: Plain
- 4.□ Attachment Method: Mechanical anchors.
- 5.□ Load Capacity: Standard duty.
- 6.□ Moisture Barrier: Manufacturer's standard.

C.□ Floor-to-Wall Joint Systems:

- 1.□ Basis-of-Design Product: Construction Specialties, Inc. model *SJPFW-300S*
- 2.□ Type: Cover plate.

a.□ Exposed Metal: Aluminum.

1)□ Finish: Mill.

- 3.□ Cover Plate Design: Plain
- 4.□ Attachment Method: Mechanical anchors.
- 5.□ Load Capacity: Standard duty.
- 6.□ Moisture Barrier: Manufacturer's standard.

D.□ Wall-to-Wall Joint Systems:

- 1.□ Basis-of-Design Product: Construction Specialties, Inc. model AFW-300, ASM
- 2.□ Type: Snap-on cover.
- 3.□ Exposed Metal: Aluminum.
- 4.□ Finish: Class II, clear anodic.
- 5.□ Moisture Barrier: Manufacturer's standard.

E.□ Ceiling to Ceiling Joint Systems:

- 1.□ Basis-of-Design Product: Construction Specialties, Inc. model AFW-300
- 2.□ Type: Snap-on cover.
- 3.□ Exposed Metal: Aluminum.
- 4.□ Finish: Class II, clear anodic.
- 5.□ Moisture Barrier: Manufacturer's standard.

2.04□ ARCHITECTURAL JOINT SYSTEMS FOR BUILDING EXTERIORS

A.□ Basis of Design: Construction Specialties, Inc., P.O. Box 380 Muncy, PA, shall manufacture expansion joint cover assemblies specified herein and indicated on the drawings. Other manufacturers may be accepted as substitutions only if the manufacturer can demonstrate product compliance with the requirements of the contract documents. Substitution requests must be reviewed prior to bid and must include the following information:

- 1.□ Details
- 2.□ ASTM- E1399 test reports
- 3.□ Mock-ups
- 4.□ Reference list of projects with similar products as those specified herein.
- 5.□ Sample of written 5 year warranty

B.□ Exterior Wall to Corner:

- 1.□ Basis-of-Design Product: Construction Specialties, Inc. model ASMC-300X
- 2.□ Type: Snap-on cover.

- 3.□ Exposed Metal: Aluminum.
- 4.□ Finish: Class II, clear anodic.
- 5.□ Moisture Barrier: Manufacturer's standard "Dura-Flex"

## 2.05□ FINISHES

- A.□ Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B.□ Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C.□ Appearance of Finished Work: Noticeable variations in same piece are not acceptable.

## PART 3 - EXECUTION

### 3.01□ EXAMINATION

- A.□ Examine surfaces and blockouts where architectural joint systems will be installed for installation tolerances and other conditions affecting performance of work.
  - 1.□ Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02□ PREPARATION

- A.□ Prepare substrates according to architectural joint system manufacturer's written instructions.
- B.□ Repair concrete slabs and blockouts using manufacturer's recommended repair grout of compressive strength adequate for anticipated structural loadings.
- C.□ Coordinate and furnish anchorages, setting drawings, and instructions for installing joint systems. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of joint systems.

### 3.03□ INSTALLATION

- A.□ Comply with manufacturer's written instructions for storing, handling, and installing architectural joint assemblies and materials unless more stringent requirements are indicated.
- B.□ Metal Frames: Perform cutting, drilling, and fitting required to install joint systems.
  - 1.□ Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
  - 2.□ Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation. Notify Architect where discrepancies occur that will affect proper joint installation and performance.
  - 3.□ Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.

- 4.□ Locate in continuous contact with adjacent surfaces.
- 5.□ Standard-Duty Systems: Shim to level where required. Support underside of frames continuously to prevent vertical deflection when in service.
- 6.□ Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.

C.□ Seals in Metal Frames: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.

- 1.□ Provide in continuous lengths for straight sections.
- 2.□ Seal transitions according to manufacturer's written instructions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
- 3.□ Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

D.□ Compression Seals: Apply adhesive or lubricant adhesive as recommended by manufacturer before installing compression seals.

E.□ Terminate exposed ends of joint assemblies with field- or factory-fabricated termination devices.

F.□ Fire-Resistance-Rated Assemblies: Coordinate installation of architectural joint assembly materials and associated work so complete assemblies comply with assembly performance requirements.

- 1.□ Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.

G.□ Water Barrier: Provide water barrier at exterior joints and where called for on Drawings. Provide drainage fittings where indicated.

### 3.04 □ PROTECTION

A.□ Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.

B.□ Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over joints. Reinstall cover plates or seals prior to Substantial Completion of the Work.

END OF SECTION 07 95 00

SECTION 08 31 13  
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 □ RELATED DOCUMENTS

- A. □ Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 □ SUMMARY

- A. □ Section includes access doors and frames for walls
- B. □ Locations:
  - 1. □ Drawing M-1.0.at West Wing (2)
  - 2. □ Drawing P 2.1 at all new lavatories.(5) base bid (1) alternate #1
- C. **Alternates: Alternate #1 Alterations and Reconfiguration of the Main Office**
- D. □ Related Requirements:
  - 1. □ Section 22 00 00 "Plumbing".
  - 2. □ Section 23 00 00 "Mechanical"

1.3 □ ALLOWANCES

- A. □ Access doors and frames are part of an access door and frame allowance.

1.4 □ ACTION SUBMITTALS

- A. □ Product Data: For each type of product.
  - 1. □ Include construction details material descriptions, dimensions of individual components and profiles, and finishes.
- B. □ Samples: For each type of access door and frame and for each finish specified, complete assembly minimum 6 by 6 inches (150 by 150 mm) in size.
- C. □ Product Schedule: For access doors and frames. Use same designations indicated on Drawings.

## PART 2 - PRODUCTS

### 2.1 □ ACCESS DOORS AND FRAMES

#### A. □ Flush Access Doors with Concealed Flanges:

1. □ Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. □ Babcock-Davis.
  - b. □ Cendrex Inc.
  - c. □ Milcor; Commercial Products Group of Hart & Cooley, Inc.
  - d. □ Or approved equal
2. □ Description: Face of door flush with frame; with concealed flange for gypsum board, tile installation and concealed hinge.
3. □ Locations: Wall.
4. □ Door Size: 8" x 8" at lavatories, 12" x 12" at fire dampers.
5. □ Stainless-Steel Sheet for Door: Nominal 0.062 inch (1.59 mm), 16 gage, No. 4 finish.
6. □ Frame Material: Same material and thickness as door.
7. □ Latch and Lock: Cam latch, key operated.

### 2.2 □ MATERIALS

- A. □ Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. □ Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304. Remove tool and die marks and stretch lines, or blend into finish.
- C. □ Frame Anchors: Same material as door face.
- D. □ Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

### 2.3 □ FABRICATION

- A. □ General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. □ Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. □ Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.

- 1.□ For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.

## 2.4□ FINISHES

- A.□ Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B.□ Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C.□ Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D.□ Stainless-Steel Finishes:
  - 1.□ Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
  - 2.□ Polished Finish: No. 4 finish. Grind and polish surfaces to produce uniform finish, free of cross scratches.
    - a.□ Run grain of directional finishes with long dimension of each piece.
    - b.□ When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

## PART 3 - EXECUTION

### 3.1□ EXAMINATION

- A.□ Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B.□ Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2□ INSTALLATION

- A.□ Comply with manufacturer's written instructions for installing access doors and frames.

### 3.3□ ADJUSTING

- A.□ Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113

This Page Left Blank Intentionally

SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

(Revised)

PART 1 - GENERAL

1.1 □ GENERAL PROVISIONS

- A. □ Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 □ DESCRIPTION OF WORK

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

1. □ Exterior aluminum-framed storefronts including aluminum frames for fixed glazing and for operable sash, doors, hardware and glass.

- B. Alternates: Add Alternate #1 Alteration and Reconfiguration of the Main Office.**

- C. □ Items To Be Furnished Only: Not Applicable.

- D. □ Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. □ Section 0726 00 – Vapor Retarders: perimeter vapor seal between glazing system and adjacent construction.  
2. □ Section 07 27 00 – Air Barriers: perimeter air seal between glazing system and adjacent construction.  
3. □ Section 07 90 00 – Joint Protection: for installation of joint sealants installed with aluminum-framed systems and for sealants to the extent not specified in this Section.

1.3 □ PERFORMANCE REQUIREMENTS

- A. □ General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:

1. □ Structural loads.  
2. □ Thermal movements.  
3. □ Dimensional tolerances of building frame and other adjacent construction.  
4. □ Failure includes the following:

- a. □ Deflection exceeding specified limits.  
b. □ Thermal stresses transferred to building structure.

- c.□ Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
  - d.□ Noise or vibration created by wind and thermal and structural movements.
  - e.□ Loosening or weakening of fasteners, attachments, and other components.
  - f.□ Sealant failure.
  - g.□ Failure of operating units to function properly.
- B.□ Structural Loads: Wind and seismic loads not less than that required by Code.
- C.□ Deflection of Framing Members:
- 1.□ Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
  - 2.□ Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller, amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components directly below to less than 1/8 inch and clearance between members and operable units directly below to less than 1/16 inch.
- D.□ Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
- 1.□ Temperature Change (Range): 120 deg F, ambient; 180 deg F material surfaces.
- E.□ Air Infiltration Test: Test unit in accordance with ASTM E 283, as follows:
- 1.□ Static Air Pressure Difference: 6.24 psf for fixed storefront units, and 1.567 psf for doors.
  - 2.□ Performance: Maximum air leakage shall not exceed the following: fixed storefront units, 1.0 cfm/sf.; glazed entrance door units, 0.3 cfm/sf of other areas.
- F.□ Water Leakage Test: Test fixed framing system in accordance with ASTM E 331.
- 1.□ Test Pressure: 8 psf.
  - 2.□ Performance: No leakage as defined in test method at specified test pressure. No uncontrolled water penetrating system or appearing on normally exposed interior surfaces.
- G.□ Solar Heat-Gain Coefficient: Provide units with a whole-unit SHGC maximum as required by Code, determined according to NFRC 200 procedures. Submit proof of compliance with submittals as specified.
- H.□ Thermal Transmittance: Provide window units that have a U-value as required by Code rated in BTU/hour/sq. ft./degrees F at 15-mph exterior wind velocity, when tested in accordance with AAMA 1503.1. Test unit to be 4 ft. x 6 ft. Submit proof of compliance with submittals as specified.

- I.□ Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 for fixed storefront units and not less than 48 for doors when tested according to AAMA 1503.

#### 1.4□ SUBMITTALS

- A.□ Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.
- B.□ Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
  - 1.□ Include structural analysis data signed and sealed by the qualified professional engineer registered in the Commonwealth of Massachusetts responsible for their preparation.
  - 2.□ Include structural analysis of story drift and deflection from anticipated live loads, and determination whether head receptors are required.
  - 3.□ Include details of provisions for system expansion and contraction and for draining moisture occurring within the system to the exterior.
  - 4.□ For entrances, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.
- C.□ Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- D.□ Qualification Data: For Installer.
- E.□ Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems.
- F.□ Performance Reports: Based on systems, components and glazing methods proposed for use on this Project, proof that units as glazed for this Project meet or exceed Code requirements for the following:
  - 1.□ U-value.
  - 2.□ Solar heat-gain coefficient.
- G.□ Maintenance Data: For aluminum-framed systems to include in maintenance manuals.
- H.□ Warranties: Special warranties specified in this Section.

#### 1.5□ QUALITY ASSURANCE

- A.□ Installer Qualifications: Capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.
  - 1.□ Engineering Responsibility: Preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.

## 1.6 □ PROJECT CONDITIONS

- A. □ Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.
  - 1. □ Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating aluminum-framed systems without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

## 1.7 □ WARRANTY

- A. □ Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
  - 1. □ Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 □ MANUFACTURERS

- A. □ Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. □ Storefront, Thermal Break, 2 inch by 4-1/2 inch profile :
    - a. □ EFCO Corporation, S-403.
    - b. □ Kawneer, VG451T.
    - c. □ Tubelite Inc., E14000 IO.
    - d. □ Traco, TR-7850.

### 2.2 □ MATERIALS

- A. □ Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
  - 1. □ Sheet and Plate: ASTM B 209
  - 2. □ Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
  - 3. □ Extruded Structural Pipe and Tubes: ASTM B 429.
  - 4. □ Structural Profiles: ASTM B 308/B 308M.
  - 5. □ Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
- B. □ Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
  - 1. □ Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.

- 2.□ Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
- 3.□ Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

### 2.3□ FRAMING SYSTEMS

- A.□ Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
  - 1.□ Construction: Thermal-break.
- B.□ Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C.□ Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
  - 1.□ Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
  - 2.□ Reinforce members as required to receive fastener threads.
  - 3.□ Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
- D.□ Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- E.□ Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.
- F.□ Framing System Gaskets and Sealants: Manufacturer's standard recommended by manufacturer for joint type

### 2.4□ .ENTRANCE DOOR SYSTEMS

- A.□ Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
  - 1.□ Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
    - a.□ Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
  - 2.□ Door Design: As indicated.
  - 3.□ Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.
    - a.□ Provide nonremovable glazing stops on outside of door.

## 2.5 □ ENTRANCE DOOR HARDWARE

- A. □ Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."
- B. □ General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door to comply with requirements in this Section.
  - 1. □ Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products products complying with BHMA standard referenced].
  - 2. □ Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
  - 3. □ Opening-Force Requirements:
    - a. □ Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbfto set the door in motion and not more than 15 lbf to open the door to its minimum required width.
- C. □ Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
  - 1. □ Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
  - 2. □ References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.
- D. □ Pivot Hinges: BHMA A156.4, Grade 1.
  - 1. □ Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.
- E. □ Butt Hinges: BHMA A156.1, Grade 1, radius corner.
  - 1. □ Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
  - 2. □ Exterior Hinges: Stainless steel, with stainless-steel pin.
  - 3. □ Quantities:
    - a. □ For doors up to 87 inches high, provide three hinges per leaf.
    - b. □ For doors more than 87 and up to 120 inches high, provide four hinges per leaf.
- F. □ Continuous-Gear Hinges: Manufacturer's standard with stainless-steel bearings between knuckles, fabricated to full height of door and frame.
- G. □ Mortise Auxiliary Locks: BHMA A156.5, Grade 1.
- H. □ Manual Flush Bolts: BHMA A156.16, Grade 1.

- I.□ Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.
- J.□ Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
- K.□ Cylinders: As specified in Section 087100 "Door Hardware." BHMA A156.5, Grade 1.
  - 1.□ Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE" to be furnished by Owner.
- L.□ Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.
- M.□ Operating Trim: BHMA A156.6.
- N.□ Removable Mullions: BHMA A156.3, extruded aluminum.
  - 1.□ When used with panic exit devices, provide removable mullions listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305. Use only mullions that have been tested with exit devices to be used.
- O.□ Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to comply with field conditions and requirements for opening force.
- P.□ Concealed Overhead Holders: BHMA A156.8, Grade 1.
- Q.□ Surface-Mounted Holders: BHMA A156.16, Grade 1.
- R.□ Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.
- S.□ Weather Stripping: Manufacturer's standard replaceable components.
  - 1.□ Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
  - 2.□ Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
- T.□ Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
- U.□ Silencers: BHMA A156.16, Grade 1.
- V.□ Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.
- W.□ Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

## 2.6 □ GLAZING SYSTEMS

- A. □ Glazing Glass per section 08 80 00, field installed by filed sub-bid.
- B. □ Insulated Opaque Panels: Laminated, metal-faced flat panels with no deviations in plane exceeding 0.8 percent of panel dimension in width or length.
  - 1. □ Overall Panel Thickness: Match Existing.
  - 2. □ Exterior Skin: Painted Aluminum.
    - a. □ Thickness: Match Existing.
    - b. □ Finish: Kynar
    - c. □ Texture: Smooth
    - d. □ Backing Sheet: 0.125-inch-thick, corrugated, high-density polyethylene
  - 3. □ Interior Skin: Aluminum
    - a. □ Thickness: Manufacturer's standard for finish and texture indicated
    - b. □ Finish: Mill finish
    - c. □ Texture: Smooth.
    - d. □ Backing Sheet: corrugated, high-density polyethylene
  - 4. □ Thermal Insulation Core: Manufacturer's standard rigid, closed-cell, polyisocyanurate board
- C. □ Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. □ Flame-Spread Index: 25 or less.
  - 2. □ Smoke-Developed Index: 450 or less.
- D. □ Glazing Gaskets: Manufacturer's standard compression types, replaceable, molded or extruded, that maintain uniform pressure and watertight seal.
- E. □ Spacers and Setting Blocks: Manufacturer's standard elastomeric types.

## 2.7 □ HARDWARE: Projected Windows

- A. □ General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows and sized to accommodate sash or ventilator weight and dimensions. Do not use aluminum in frictional contact with other metals.
- B. □ Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
- C. □ Projected Windows: Provide the following operating hardware:
  - 1. □ Hinge: Concealed stainless steel four-bar friction hinge with adjustable-slide friction shoe; two per ventilator.
  - 2. □ Lock: One Point Lift locks, white bronze locking handle and keeper (two per ventilator).

- 3.□ Lock: One painted zinc die cast scissor arm (roto) operator at sill and one painted zinc die cast single point lock at each jamb.

## 2.8□ INSECT SCREENS

- 1.□ General: Design windows and hardware to accommodate full screens at operable windows in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Locate screens on inside of window. Provide insect screens on all operable sash.
- 2.□ Aluminum Inside Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and access panel to operable window hardware.
- 3.□ Extruded-Aluminum Tubular Framing Sections and Cross Braces: Not less than 0.050-inch (1.3-mm) wall thickness.
- 4.□ Finish: Match aluminum window members.
- 5.□ Aluminum Wire Fabric: 18-by-16 (1.1-by-1.3-mm) mesh of 0.011-inch- diameter, coated aluminum wire.
- 6.□ Wire-Fabric Finish: Charcoal gray

## 2.9□ ACCESSORY MATERIALS

- A.□ Insulating Materials: As specified in Section 07 21 00 - BUILDING INSULATION.
- B.□ Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Section 07 90 00 - JOINT PROTECTION.
- C.□ Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-milthickness per coat.

## 2.10□ FABRICATION

- A.□ Form aluminum shapes before finishing.
- B.□ Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C.□ Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
  - 1.□ Profiles that are sharp, straight, and free of defects or deformations.
  - 2.□ Accurately fitted joints with ends coped or mitered.
  - 3.□ Means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
  - 4.□ Physical and thermal isolation of glazing from framing members.
  - 5.□ Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 6.□ Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D.□ Mechanically Glazed Framing Members: Fabricate for flush glazing (without projecting stops).

- E.□ After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.11 □ ALUMINUM FINISHES

- A.□ General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B.□ High-Performance Organic Finish (3-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.
  - 1.□ Color and Gloss: As selected by Designer from manufacturer's full range.

## PART 3 - EXECUTION

### 3.1 □ EXAMINATION

- A.□ Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
  - 1.□ Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 □ INSTALLATION

- A.□ General:
  - 1.□ Comply with manufacturer's written instructions.
  - 2.□ Do not install damaged components.
  - 3.□ Fit joints to produce hairline joints free of burrs and distortion.
  - 4.□ Rigidly secure non-movement joints.
  - 5.□ Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
  - 6.□ Seal joints watertight, unless otherwise indicated.
- B.□ Metal Protection:
  - 1.□ Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
  - 2.□ Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

- C.□ Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- D.□ Set continuous sill members and flashing in full sealant bed as specified in Section 07 90 00 - JOINT PROTECTION and to produce weathertight installation.
- E.□ Install components plumb and true in alignment with established lines and grades, without warp or rack.
- F.□ Install glazing.
  - 1.□ Structural-Sealant Glazing:
    - a.□ Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
    - b.□ Install weatherseal sealant according to Section 07 90 00 - JOINT PROTECTION and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.
- G.□ Erection Tolerances: Install aluminum-framed systems to comply with the following maximum tolerances:
  - 1.□ Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet 1/4 inch over total length.
  - 2.□ Alignment:
    - a.□ Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
    - b.□ Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.
  - 3.□ Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

### 3.3□ FIELD QUALITY CONTROL

- A.□ Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B.□ Testing Services: Testing and inspecting of representative areas to determine compliance of installed systems with specified requirements shall take place as follows and in successive stages as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.
  - 1.□ Air Infiltration: Areas shall be tested for air leakage of 1.5 times the rate specified for laboratory testing under Part 1 "Performance Requirements" Article, but not more than 0.09 cfm/sq. ft. of fixed wall area when tested according to ASTM E 783 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft.
  - 2.□ Water Penetration: Areas shall be tested according to ASTM E 1105 at a minimum cyclic static-air-pressure difference of 0.67 times the static-air-pressure difference specified for laboratory testing under Part 1 "Performance

Requirements" Article, but not less than 4.18 lbf/sq. ft., and shall not evidence water penetration.

3.  Water Spray Test: Before installation of interior finishes has begun, a minimum area of 75 feet by 1 story of aluminum-framed systems designated by Designer shall be tested according to AAMA 501.2 and shall not evidence water penetration.
- C.  Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.
- D.  Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 08 41 13

**SECTION 08 51 13  
ALUMINUM WINDOWS  
(Filed Sub-bid Required)  
(Revised)**

**PART 1 GENERAL**

**1.01 FILED SUB-BID REQUIREMENT**

- A. The Aluminum Window filed sub-bid includes the Work specified in the following Sections:
  - 1. 08 51 13, Aluminum Windows
- B. Submit sub-bids in accordance with the provisions of Massachusetts General Laws, Chapter 149, Sections 44A-44H, inclusive, as amended. The time and place of submission of sub-bids is set forth in the INSTRUCTIONS TO BIDDERS.
- C. With each sub-bid, submit bid security in the form of a BID BOND, or CERTIFIED CHECK on, or a TREASURER'S or CASIHER'S CHECK issued by, a responsible bank or trust company, payable to the TOWN OF BEDFORD, MASSACHUSETTS, in the amount of five percent (5%) of the bid amount. A bid bond shall be (a) in a form satisfactory to Awarding Authority, (b) with a surety company qualified to do business in the Commonwealth of Massachusetts, and (c) conditioned upon the faithful performance by the principal of the agreements contained in the bid.
- D. Submit each sub-bid for the work of this Section on a form furnished by the Awarding Authority.
- E. The work of this Section is shown on Drawings: Cover Sheet, A-1.0, A-1.2, A-2.0, A-3.0, A-3.1, A-3.2, A-5.0, A-5.1, A-5.2, A-5.6 & A-6.0.

**1.02 SUMMARY**

Section Includes:

- 1.  All exterior Architectural Performance Class (AW) windows furnished and installed as shown on drawings, specified in this section and designated in AAMA/WDMA/CSA 101/I.S.2/A440-2011 North American Fenestration Standard (NAFS-2011).
- 2.  All labor, materials, tools, equipment and services needed to furnish and install AW Class windows.
- 3.  Components furnished with installed windows.
- 4.  Installation accessories furnished and installed.

**1.03 REFERENCES**

- A.  Refer to NAFS-2011 for a complete list of references and industry standards.

**1.03 SYSTEM DESCRIPTION AND PERFORMANCE REQUIREMENTS**

A. Design Wind Loads - Allowable Stress Design (ASD)

- a.  The design wind pressure for the project will be: 21 psf positive and negative; 21 psf negative at corner zones
- b.  Per local building codes

- 2.  All structural components, including meeting rails, mullions and anchors shall be designed accordingly, complying with deflection and stress requirements of Paragraph 1.03.B.

Air, Water and Structural Performance Requirements

- 1.  When tested in accordance with cited test procedures, windows shall meet or exceed the following performance criteria, as well as those indicated in NAFS-2011 for Architectural AW Performance Class windows, Performance Grade 100 (AW100) unless otherwise noted herein.
  - a.  Test units shall not be smaller in either width or height than the "Gateway Test Size" specified in NAFS-2011 for AW Performance Class.
  - b.  "Downsize" testing to meet Optional Performance Class requirements specified herein shall not be permitted.
  - c.  Testing to previous, less stringent versions of NAFS shall not be acceptable.
  - d.  Test units shall employ manufacturer's standard sealing, lock spacing and anchorage.
- 2.  Air Test Performance Requirements
  - a.  Air infiltration maximum 0.1 cfm per square foot at 6.24 psf pressure differential when tested in accord with ASTM E283.
- 3.  Water Test Performance Requirements
- 4.  No uncontrolled water leakage at 15.00 psf static pressure differential, with water application rate of 5 gallons/hr/sq ft when tested in accord with both ASTM E331 and ASTM E547. Static water test shall be repeated after application of design test pressures. Structural Test Performance Requirements
  - a.  Uniform Load Deflection Test
    - i.  No deflection of any unsupported span L of test unit (framing rails, muntins, mullions, etc.) in excess of L/175 at both a positive and negative load of 100 psf (design test pressure) when tested in accord with ASTM E330.
  - b.  Uniform Load Structural Test
    - i.  Unit to be tested at 1.5 x design test pressure, both positive and negative, acting normal to plane of wall in accord with ASTM E330.
    - ii.  No glass breakage; permanent damage to fasteners, hardware parts, or anchors; damage to make windows inoperable; or permanent deformation of any main frame or ventilator member in excess of 0.2% of its clear span.

Life Cycle Testing

- 1.  When tested in accordance with AAMA 910-10, there is to be no damage to fasteners, hardware parts, support arms, activating mechanisms or any other damage that would cause the window to be inoperable at the conclusion of testing.
  - a.  Air infiltration and water resistance tests shall meet the primary performance requirements specified after completion of 4000 operational cycles plus thermal cycling.
  - b.  Testing to previous, less stringent versions of AAMA 910 shall not be acceptable.

Condensation Resistance and Thermal Transmittance Performance Requirements

- 1.  Perform thermal tests in accordance with NFRC 102 and/or AAMA 1503, or provide finite element computer thermal modeling and calculations per NFRC 100, NFRC 705 or AAMA 507, using DOE/LBL THERM, WINDOW, and/or CMAST software.

- a.  Thermal Transmittance (U-Factor) for the overall window area shall be less than or equal to .44 BTU/hr-ft<sup>2</sup>-°F.
- b.  Condensation Resistance Factor (CRF) requirements: CRF minimum .62 (Frame) and CRF minimum .56 (Glass).

#### E. Acoustic Performance Requirements

- 1.  Perform acoustical tests in accordance with ASTM E90 and ASTM E1425 on the glass type(s) specified in 08 80 00, rigidly supported in aluminum framing of the same product type.
- 2.  "Glass-only" test results shall not be acceptable.
- 3.  Sound Transmission Class (STC) shall not be less than 31.
- 4.  Outdoor-Indoor Transmission Class (OITC) shall not be less than 25.

### 1.04 SUBMITTALS

#### General Requirements

- 1.  Provide all submittals in a timely manner to meet the required construction completion schedule.

#### Shop Drawings

- 1.  Shop drawings must be prepared wholly by the window manufacturer, or a qualified engineering services firm under the guidance of the manufacturer. Shop drawings for pre-engineered configurations may be prepared by installers upon written manufacturer consent.
- 2.  Provide design details along with bid proposals to define system aesthetic and functional characteristics.
- 3.  Provide up to three photocopied sets of shop drawings, including half size details of all necessary conditions.

#### Samples

- 1.  Components: Submit samples of anchors, fasteners, hardware, assembled corner sections and other materials and components as requested by Architect.
- 2.  Finish: Submit color samples for Architect's approval as requested.

#### Test Reports and Calculations

- 1.  Submit certified independent laboratory test reports verifying compliance with all test requirements of 1.03.
- 2.  Submit structural calculations indicating adequacy of all materials furnished under this section, in meeting the uniform and structural load requirements as specified in 1.03A.

### 1.05 QUALITY ASSURANCE

Qualifications: Upon request, the window manufacturer shall provide written consent for the installation subcontractor to install window products to be used on this project.

In-Plant Testing: Conduct detailed quality audits and ASTM E331 static water infiltration testing on a minimum of 4% of factory-glazed windows prior to shipping, subject to reasonable unit size restrictions.

- 1.  Each tested unit shall be identified with a removable sticker on the inside glass face.
- 2.  Provide detailed documentation of in-plant testing upon request.

### 1.06 DELIVERY, STORAGE AND HANDLING

Packing, Shipping, Handling and Unloading

1.  Materials will be packed, loaded, shipped, unloaded, stored and protected in accordance with AAMA CW-10.

## 1.07 WARRANTY

Aluminum Window Warranty

1.  Products: Submit a written warranty, executed by the window manufacturer, for a period of **10** years from the date of manufacture, against defective materials or workmanship, including substantial non-compliance with applicable specification requirements and industry standards, which result in premature failure of the windows, finish, factory-glazed glass, or parts, outside of normal wear.
2.  In the event that windows or components are found defective, manufacturer will repair or provide replacement material without charge at manufacturer's option.
3.  Warranty for all components must be direct from the manufacturer (non pass-through) and non pro-rated for the entire term. Warranty must be assignable to the non-residential owner, and transferable to subsequent owners through its length.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

Acceptable Manufacturer

1.  Drawings and specification are based on:
  - a.  Wausau Window and Wall Systems 4250i INvent Series Thermal Fixed, Projected and/or Casement Windows.
  - b.  Base bid will be Wausau Window and Wall Systems.
2.  Substitutions
  - a.  EFCO, Wausau and other manufacturers' products that meet or exceed specified design requirements may be considered. Submit the following information with request for substitutions.
    - i.  Test reports specified in 1.03.
    - ii.  Full proposal details and samples specified in 1.04.
    - iii.  Copy of manufacturer's warranty specified in 1.07.
    - iv.  Proof of at least 10 years experience in the design and fabrication of AW Performance Class windows.
    - v.  Other information as requested for evaluation
3.  Substitute products not approved by the Architect via addenda will not be considered.

### 2.02 MATERIALS

Aluminum Framing Members

1.  Extruded aluminum billet, 6063-T5 or T6 alloy for primary non-radius components; 6063-T5 or T6, 6005-T5, 6105-T5 or 6061-T6 for anchor components; all meeting the requirements of ASTM B221.
2.  Aluminum sheet alloy 5005-H32 (for anodic finishing), or alloy 3003-H14 (for painted or unfinished sheet) meeting the requirements of ASTM B209.
3.  Principal window frame and sash ventilator members will be a minimum 0.125" in thickness at hardware mounting locations.
4.  Extruded or formed trim components will be a minimum 0.060" in thickness.
5.  Frame depth 4 1/2" minimum.
6.  Sash ventilator sections must be tubular, and close flush with adjoining frame surfaces at interior and exterior.

- a. □ Overlap sash ventilators will not be accepted.

## 2.03 COMPONENTS

### □ □ Hardware

1. □ All steel components including attachment fasteners to be stainless steel except as noted.
2. □ Extruded aluminum components 6063-T5 or -T6.
3. □ Locking handles, bases and strikes to be die cast, white bronze or stainless steel in manufacturer's standard surface finish.
4. □ Thermo-plastic or thermo-set plastic caps, housings and other components to be injection-molded nylon, extruded PVC, or other suitable compound.
5. □ Hardware to be occupant-operated and include: : *stainless steel four-bar hinges, extruded aluminum butt hinges, locking cam handles, keepers, two-point keepers, linear operators, single-handle multi-lock, roto-operators, concealed friction adjusters, concealed limited opening devices.*

### □ □ Sealants

1. □ All sealants shall comply with applicable provisions of AAMA 800 and/or Federal Specifications FS-TT-001 and 002 Series.
2. □ Frame joinery sealants shall be suitable for application specified and as tested and approved by window manufacturer.

### □ □ Glass

1. □ Provide in accordance with Section 08 80 00 ***but is factory installed not filed sub-bid Glazing.***
2. □ Sealed insulated glass shall be tested and certified in accord with ASTM E2190.

### □ □ Glazing

1. □ Provide in general accordance with Section 08 80 00 ***.but is factory installed not filed sub-bid Glazing.***
2. □ Glazing method shall be in general accordance with the GANA Glazing Manual for specified glass type, or as approved by the glass fabricator.

### □ □ Glazing Materials

1. □ Setting Blocks/Edge Blocking: Provide in sizes and locations recommended by GANA Glazing Manual. Setting blocks used in conjunction with soft-coat low-e glass shall be silicone.
2. □ Back-bedding tapes, expanded cellular glazing tapes, toe beads, heel beads and cap beads shall meet the requirements of applicable specifications cited in AAMA 800.
3. □ Glazing gaskets shall be non-shrinking, weather-resistant, and compatible with all materials in contact.
4. □ Structural silicone sealant where used shall meet the requirements of ASTM C1184.
5. □ Spacer tape in continuous contact with structural silicone shall be tested for compatibility and approved by the sealant manufacturer for the intended application.
6. □ Gaskets in continuous contact with structural silicone shall be extruded silicone or compatible material.

### □ □ Steel Components

1. □ Provide steel reinforcements as necessary to meet the performance requirements of 1.03.
2. □ Concealed steel anchors and reinforcing shall be factory painted after fabrication with TGIC powder coating, or rust-inhibitive primer complying with Federal Specification TT-P-645B.

### □ □ Panning;

1. □ Panning shall be pre-assembled and all joinery back sealed prior to installation.
2. □ Finish to match window frames.

□□ Receptors

1. □ Provide extruded aluminum receptors to receive windows, as shown on architectural drawings.
2. □ Finish to match window frames.

□□ Insect Screens:

1. □ Tubular extruded aluminum frames shall meet the requirements of ANSI/SMA 1004.
2. □ Screen frame finish to match window frames.
3. □ Aluminum cloth shall comply with GSA-FS-RR-W-365 and USDC-CS-138 with 18 x 16 mesh.
4. □ Cloth mesh color shall be bright mesh.

□□ Dual Glazed Access Panel:

1. □ Hinged access panel provided with Allen hex locks for custodial operation.
2. □ Finish to match window frames.

## 2.04 FABRICATION

□□ General:

1. □ Finish, fabricate and shop assemble frame and sash ventilator members into complete windows under the responsibility of one manufacturer.
2. □ No bolts, screws or fastenings shall impair independent frame movement, or bridge the thermal barrier, unless such bridging was also present in thermal test units and thermal models.
3. □ Fabricate to allow for thermal movement of materials when subjected to a temperature differential from -30 °F to +180 °F.

□□ Frames:

1. □ Cope and mechanically fasten each corner, or miter and weld, or corner block each corner; then seal weather tight.
2. □ Make provisions for continuity of frame joinery seals at extrusion webs.

□□ Main Sash Ventilator

1. □ Miter all corners and mechanically stake over a solid extruded aluminum corner block, set and sealed in epoxy, leaving hairline joinery, then sealed weather tight.
2. □ Make provisions for continuity of sash ventilator joinery seals at extrusion webs.

□□ Glass Drainage: (field glazed units only)

1. □ Provision shall be made to insure that water will not accumulate and remain in contact with the perimeter area of sealed insulating glass.

□□ Hardware:

1. □ Concealed Hinges
  - a. □ Provide two stainless steel concealed four-bar adjustable friction hinges per vent meeting AAMA 904.1.
2. □ Locks
  - a. □ Stainless steel cam locks, strikes and/or keepers for manual operation shall secure sash in closed position.
  - b. □ Provide locks for ventilators at maximum 40" spacing; 50" for single operator multi-lock hardware.
  - c. □ Provide double grip hardware activated by a lower device for locks exceeding 6'-0" from floor.

- 3.  Limited Opening Device
  - a.  Provide concealed device to limit initial sash operation to 4"
  - b.  Operation past this point to be by use of a tool or removable key.
- 4.  Exposed Hinges
  - a.  Provide two (2) five-knuckle aluminum nylon-bushed hinges with coated stainless steel pins.
  - b.  Provide three (3) hinges on units over 4'-0" high.
  - c.  Finish of extruded aluminum hinge leaves and covers shall match window finish.

Dual Glazed Access Panel

- 1.  Hinged access panel will be constructed with mitered corners, mechanically staked over a solid aluminum corner block leaving hairline joinery.

Thermal Break Construction:

- 1.  Continuous extruded polyamide with 25% glass fiber reinforcing, mechanically crimped into cross-knurled cavities.
- 2.  Minimum thermal barrier width 24 mm.
- 3.  Quality assurance records must be maintained and available as requested.

Weather-stripping:

- 1.  Bulb- or fin-type neoprene, EPDM, dual-durometer PVC, polypropylene, TPE, or other suitable material as tested and approved by the window manufacturer.
- 2.  Miter, crowd, stake or join at corners. Provide drainage to exterior as necessary.
- 3.  Weather-stripping shall provide an effective pressure-equalization seal at the interior face of the sash ventilator.

**2.05 FINISHES**

**A. *Finish of Aluminum Components***

- 1. ***Finish of all exposed areas of aluminum windows and components shall be done in accord with the appropriate AAMA Voluntary Guide Specification shown (Select from below).***

<i>Designation</i>	<i>Description</i>	<i>Standard</i>	<i>Color</i>
<i>AAM10C21A41</i>	<i>Clear Class I</i>	<i>AAMA 611</i>	<i>Clear</i>

**PART 3 EXECUTION**

**3.01 EXAMINATION**

**A. *Site Verification of Conditions***

- 1. ***Verify that building substrates permit installation of windows according to the manufacturer's instructions, approved shop drawings, calculations and contract documents.***
- 2. ***Do not install windows until unsatisfactory conditions are corrected.***

**3.02 INSTALLATION**

**A. *Erection of Aluminum Windows***

- 1. ***Install all windows with skilled workers in accordance with approved shop drawings, installation instructions, specifications, and the AAMA Commercial Window and Door Installation Manual.***

2. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
- 3.
4. Vent windows must be installed, and remain, plumb, square and level, to one-half of the unit shimming tolerances cited in the AAMA Commercial Window and Door Installation Manual, for proper weathering and operation.
5. Aluminum that is not organically coated shall be insulated from direct contact with steel, masonry, concrete or other dissimilar metals by bituminous paint, rust-inhibiting primer, non-conductive shims or other suitable insulating material.
6. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- 7.
8. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
9. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
10. Proceed with installation only after unsatisfactory conditions have been corrected.
- 11.

### 3.03 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
  1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Testing Services: Testing and inspecting of installed windows shall take place as follows:
  1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502.
  2. Air-Infiltration Testing:
    - a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.
    - b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.
  3. Water-Resistance Testing:
    - a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
    - b. Allowable Water Infiltration: No water penetration.
  4. Testing Extent: Three windows of each type as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured.
  5. Test Reports: Prepared according to AAMA 502.
- C. Windows will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

### 3.04 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

- 1. Keep protective films and coverings in place until final cleaning.*
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.*
- D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.*

*END OF SECTION 085113*

This page left blank.

SECTION 08 80 00

GLAZING (Revised)

PART 1 - GENERAL

1.1  FILED SUB-BID REQUIREMENT

- A. The Glazing filed sub-bid includes the Work specified in the following Sections:
  - 1. 08 80 00, Glazing
- B. Submit sub-bids in accordance with the provisions of Massachusetts General Laws, Chapter 149, Sections 44A-44H, inclusive, as amended. The time and place of submission of sub-bids is set forth in the INSTRUCTIONS TO BIDDERS.
- C. With each sub-bid, submit bid security in the form of a BID BOND, or CERTIFIED CHECK on, or a TREASURER'S or CASIHER'S CHECK issued by, a responsible bank or trust company, payable to the TOWN OF BEDFORD, MASSACHUSETTS, in the amount of five percent (5%) of the bid amount. A bid bond shall be (a) in a form satisfactory to Awarding Authority, (b) with a surety company qualified to do business in the Commonwealth of Massachusetts, and (c) conditioned upon the faithful performance by the principal of the agreements contained in the bid.
- D. Submit each sub-bid for the work of this Section on a form furnished by the Awarding Authority.
- E. The work of this Section is shown on Drawings: Cover Sheet A-0.0, A-0.1, A-2.0, A-3.3, & A-6.0.

1.2  RELATED DOCUMENTS

- A.  Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.3  SUMMARY

- A.  Section includes:
  - 1.  Glass for doors, interior borrowed lites, storefront framing.
  - 2.  Glazing sealants and accessories.
  - 3.  Alternate #1 – Alteration and reconfiguration of the main office; infill of existing storefront panel with glass.
- B.  Related Requirements:
  - 1.  Section 081113 Hollow Metal Doors and Frames
  - 2.  Section 082120 Flush Wood Doors

3.□ Section 0841 13 "Aluminum Storefront, Venting Windows and Entrances."

1.4□ DEFINITIONS

- A.□ Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B.□ Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C.□ IBC: International Building Code.
- D.□ Interspace: Space between lites of an insulating-glass unit.

1.5□ COORDINATION

- A.□ Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.6□ PREINSTALLATION MEETINGS

- A.□ Preinstallation Conference: Conduct conference at Project site.
  - 1.□ Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 2.□ Review temporary protection requirements for glazing during and after installation.

1.7□ ACTION SUBMITTALS

- A.□ Product Data: For each type of product.
- B.□ Glass Samples: For each type of glass product other than clear monolithic vision glass the following products; 12 inches (300 mm) square.
  - 1.□ Coated glass.
  - 2.□ Laminated glass.
  - 3.□ Insulating glass.
- C.□ Glazing Accessory Samples: For sealants and colored spacers, in 12-inch (300-mm) lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
- D.□ Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

- E.□ Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.8□ INFORMATIONAL SUBMITTALS

- A.□ Qualification Data: For Installer manufacturers of insulating-glass units with sputter-coated, low-E coatings glass testing agency and sealant testing agency.
- B.□ Product Certificates: For glass.
- C.□ Product Test Reports: For coated glass insulating glass and glazing sealants, for tests performed by a qualified testing agency.
  - 1.□ For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- D.□ Preconstruction adhesion and compatibility test report.
- E.□ Sample Warranties: For special warranties.

#### 1.9□ QUALITY ASSURANCE

- A.□ Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
- B.□ Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- C.□ Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D.□ Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
- E.□ Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
  - 1.□ Install glazing in mockups specified in Section 084113 "Aluminum-Framed Entrances and Storefronts" to match glazing systems required for Project, including glazing methods.
  - 2.□ Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.10 □ PRECONSTRUCTION TESTING

- A. □ Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
  - 1. □ Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
  - 2. □ Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
  - 3. □ Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
  - 4. □ Schedule enough time for testing and analyzing results to prevent delaying the Work.
  - 5. □ For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

#### 1.11 □ DELIVERY, STORAGE, AND HANDLING

- A. □ Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. □ Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

#### 1.12 □ FIELD CONDITIONS

- A. □ Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
  - 1. □ Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F (4.4 deg C).

#### 1.13 □ WARRANTY

- A. □ Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
  - 1. □ Warranty Period: 10 years from date of Substantial Completion.

B.□ Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.□ Warranty Period: 10 years from date of Substantial Completion.

C.□ Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.□ Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1□ MANUFACTURERS

A.□ 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:

- 1.□ Guardian Industries Corp.; SunGuard.
- 2.□ PPG Flat Glass; PPG Industries, Inc.
- 3.□ Viracon, Inc.

B.□ Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.

- 1.□ Obtain tinted glass from single source from single manufacturer.
- 2.□ Obtain reflective-coated glass from single source from single manufacturer.

C.□ Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

### 2.2□ PERFORMANCE REQUIREMENTS

A.□ General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

- B.□ Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.
  - 1.□ Design Wind Pressures: As indicated on Drawings.
  - 2.□ Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
    - a.□ Wind Design Data: As indicated on Drawings.
    - b.□ Basic Wind Speed: 100 mph (46 m/s).
    - c.□ Importance Factor: 1.15.
    - d.□ Exposure Category: C.
  - 3.□ Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch (25 mm), whichever is less.
  - 4.□ Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- C.□ Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- D.□ Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
  - 1.□ For monolithic-glass lites, properties are based on units with lites 6 mm thick.
  - 2.□ For laminated-glass lites, properties are based on products of construction indicated.
  - 3.□ For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
  - 4.□ U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
  - 5.□ Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
  - 6.□ Visible Reflectance: Center-of-glazing values, according to NFRC 300.

### 2.3□ GLASS PRODUCTS, GENERAL

- A.□ Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1.□ IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B.□ Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C.□ Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

- D.□ Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
- E.□ Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

## 2.4□ GLASS PRODUCTS

- A.□ Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
- B.□ Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
  - 1.□ Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

## 2.5□ INSULATING GLASS

- A.□ Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
  - 1.□ Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
  - 2.□ Spacer: Stainless steel.
  - 3.□ Desiccant: Molecular sieve or silica gel, or a blend of both.

## 2.6□ GLAZING SEALANTS

- A.□ General:
  - 1.□ Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  - 2.□ Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  - 3.□ Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B.□ Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1.  Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a.  Dow Corning Corporation.
  - b.  GE Construction Sealants; Momentive Performance Materials Inc.
  - c.  Pecora Corporation.
  - d.  Sika Corporation.
  - e.  Tremco Incorporated.

## 2.7 GLAZING TAPES

- A.  Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
  1.  AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
- B.  Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
  1.  AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
  2.  AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

## 2.8 MISCELLANEOUS GLAZING MATERIALS

- A.  General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B.  Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C.  Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D.  Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E.  Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F.  Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

## 2.9 □ FABRICATION OF GLAZING UNITS

- A. □ Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
  - 1. □ Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
    - a. □ Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- B. □ Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. □ Grind smooth and polish exposed glass edges and corners.

## PART 3 - EXECUTION

### 3.1 □ EXAMINATION

- A. □ Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
  - 1. □ Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  - 2. □ Presence and functioning of weep systems.
  - 3. □ Minimum required face and edge clearances.
  - 4. □ Effective sealing between joints of glass-framing members.
- B. □ Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 □ PREPARATION

- A. □ Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. □ Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

### 3.3 □ GLAZING, GENERAL

- A. □ Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

- B.□ Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C.□ Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D.□ Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E.□ Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F.□ Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
  - 1.□ Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2.□ Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G.□ Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H.□ Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I.□ Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J.□ Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

### 3.4□ TAPE GLAZING

- A.□ Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B.□ Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C.□ Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

- D.□ Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E.□ Do not remove release paper from tape until right before each glazing unit is installed.
- F.□ Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- G.□ Apply cap bead of elastomeric sealant over exposed edge of tape.

### 3.5□ GASKET GLAZING (DRY)

- A.□ Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B.□ Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C.□ Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D.□ Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E.□ Install gaskets so they protrude past face of glazing stops.

### 3.6□ SEALANT GLAZING (WET)

- A.□ Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B.□ Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C.□ Tool exposed surfaces of sealants to provide a substantial wash away from glass.

### 3.7 □ CLEANING AND PROTECTION

- A. □ Immediately after installation remove nonpermanent labels and clean surfaces.
- B. □ Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
  - 1. □ If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. □ Remove and replace glass that is damaged during construction period.
- D. □ Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

### 3.8 □ MONOLITHIC GLASS SCHEDULE

- A. □ Glass Type GL-1 All interior glass: Clear fully tempered float glass.
  - 1. □ Minimum Thickness: 6 mm.
  - 2. □ Safety glazing required.

### 3.9 □ INSULATING GLASS SCHEDULE

- A. □ Glass Type GL-2 All Storefront Glass: Low-E-coated, clear insulating glass.
  - 1. □ Basis-of-Design Product: Viracon; VE1-85.
  - 2. □ Overall Unit Thickness: 1 inch (25 mm).
  - 3. □ Minimum Thickness of Each Glass Lite: 6 mm.
  - 4. □ Outdoor Lite: Fully tempered float glass.
  - 5. □ Interspace Content: Argon.
  - 6. □ Indoor Lite: Fully tempered float glass.
  - 7. □ Low-E Coating: Sputtered on second surface.
  - 8. □ Winter Nighttime U-Factor: 0.22 maximum.
  - 9. □ Summer Daytime U-Factor: 0.19 maximum.
  - 10. □ Visible Light Transmittance: 75 percent minimum.
  - 11. □ Solar Heat Gain Coefficient: 0.53 maximum.
  - 12. □ Safety glazing required.

END OF SECTION 088000

## SECTION 10 21 13

### PHENOLIC-CORE TOILET COMPARTMENTS

#### PART 1 - GENERAL

##### 1.1 □ RELATED DOCUMENTS

- A. □ Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

##### 1.2 □ SUMMARY

###### 1. □ Section includes:

- a. □ Phenolic-core toilet compartments configured as toilet enclosures and urinal screens including required fittings, hardware and accessories; floor supported and overhead braced.

###### B. □ Related Sections include the following:

- 1. □ Section 05 50 00 Metal Fabrications
- 2. □ Section 06 10 00 Rough Carpentry
- 3. □ Section 10 80 00 Toilet and Bath Accessories

##### 1.3 □ ACTION SUBMITTALS

###### A. □ Product Data: For each type of product.

- 1. □ Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

###### B. □ Shop Drawings: For toilet compartments.

- 1. □ Include plans, elevations, sections, details, and attachment details.
- 2. □ Show locations of cutouts for compartment-mounted toilet accessories.
- 3. □ Show locations of centerlines of toilet fixtures.
- 4. □ Show locations of floor drains.
- 5. □ Show ceiling grid, ceiling-mounted items, and overhead support or bracing locations.

###### C. □ Samples for Initial Selection: For each type of toilet compartment material indicated.

- 1. □ Include Samples of hardware and accessories involving material and color selection.

###### D. □ Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:

- 1. □ For color selection submit full range of colors for each type of unit required.

- 2.□ Each type of material, color, and finish required for toilet compartments, prepared on 6-inch- (152-mm-) square Samples of same thickness and material indicated for Work.
  - 3.□ Each type of hardware and accessory.
- E.□ Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.
- 1.4□ INFORMATIONAL SUBMITTALS
- A.□ Product Certificates: For each type of toilet compartment.
- 1.5□ CLOSEOUT SUBMITTALS
- A.□ Maintenance Data: For toilet compartments to include in maintenance manuals.
- 1.6□ MAINTENANCE MATERIAL SUBMITTALS
- A.□ Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
    - 1.□ Door Hinges: Two hinges with associated fasteners.
    - 2.□ Latch and Keeper: One latch and keeper with associated fasteners.
    - 3.□ Door Bumper: One door bumper with associated fasteners.
    - 4.□ Door Pull: One door pull with associated fasteners.
    - 5.□ Fasteners: Ten fasteners of each size and type.
- 1.7□ QUALITY ASSURANCE
- A.□ Products and installation shall comply with ADA Standards, ANSI A117.1
- 1.8□ PROJECT CONDITIONS
- A.□ Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.
  - B.□ Coordination: Furnish inserts and anchors which must be built into other work for installation of toilet compartments and related items. Coordinate delivery with other work to avoid delays.
  - C.□ Accessibility: Refer to Section 01 41 00 for definition of “accessible,” as used in this section to refer to the toilet stalls.
    - 1.□ Where stalls are shown as oversize (5’ x 5’ or larger), provide accessible hardware whether or not units are called out as “accessible” on the Drawings.

## PART 2 - PRODUCTS

### 2.1 □ PERFORMANCE REQUIREMENTS

- A. □ Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. □ Flame-Spread Index: 75 or less.
  - 2. □ Smoke-Developed Index: 450 or less.
- B. □ Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities, ICC A117.1, and the Massachusetts Architectural Access Board CMR 521 for toilet compartments designated as accessible.

### 2.2 □ PHENOLIC-CORE TOILET COMPARTMENTS

- A. □ Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. □ Scranton Products - 'Hiny Hiders'
  - 2. □ Bradley Corporation - 'Sentinel Overhead Braced Series 400'
  - 3. □ General Partitions Mfg. Corp. - 'Solid Phenolic Core'
- B. □ Toilet-Enclosure Style: Floor supported and overhead braced.
- C. □ Urinal-Screen Style: Floor supported and overhead braced.
- D. □ Door, Panel Screen, and Pilaster Construction: Solid phenolic-core panel material with melamine facing on both sides fused to substrate during panel manufacture (not separately laminated), and with eased and polished edges[ and no-sightline system]. Provide minimum 3/4-inch- (19-mm-) thick doors and pilasters and minimum 1/2-inch- (13-mm-) thick panels.
- E. □ Pilaster Shoes and Caps: Formed from stainless-steel sheet, not less than 0.031-inch (0.79-mm) nominal thickness and 3 inches (76 mm) high, finished to match hardware.
- F. □ Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters with shoe and sleeve (cap) matching that on the pilaster.
- G. □ Brackets (Fittings):
  - 1. □ Stirrup Type: Ear or U-brackets, stainless steel.
  - 2. □ Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.
- H. □ Phenolic-Panel Finish:
  - 1. □ Facing Sheet Finish: One color and pattern in each room.
  - 2. □ Color and Pattern: As selected by Architect from manufacturer's full range with manufacturer's standard through-color core matching face sheet.
  - 3. □ Edge Color: Through-color matching facing sheet color.

## 2.3 □ HARDWARE AND ACCESSORIES

- A. □ Hardware and Accessories: Manufacturer's standard operating hardware and accessories.
  - 1. □ Material: Stainless steel.
  - 2. □ Hinges: Manufacturer's standard self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees, allowing emergency access by lifting door.
  - 3. □ Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
  - 4. □ Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
  - 5. □ Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
  - 6. □ Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
  
- B. □ Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
  
- C. □ Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

## 2.4 □ MATERIALS

- A. □ Aluminum Castings: ASTM B 26/B 26M.
- B. □ Aluminum Extrusions: ASTM B 221 (ASTM B 221M).
- C. □ Brass Castings: ASTM B 584.
- D. □ Brass Extrusions: ASTM B 455.
- E. □ Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- F. □ Stainless-Steel Castings: ASTM A 743/A 743M.
- G. □ Zamac: ASTM B 86, commercial zinc-alloy die castings.

## 2.5 □ FABRICATION

- A. □ Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.

- B.□ Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C.□ Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- D.□ Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of posts. Provide shoes and caps at posts to conceal anchorage.
- E.□ Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments designated as accessible.

## **PART 3 - EXECUTION**

### **3.1□ EXAMINATION**

- A.□ Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
  - 1.□ Confirm location and adequacy of blocking and supports required for installation.
- B.□ Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2□ INSTALLATION**

- A.□ General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
  - 1.□ Maximum Clearances:
    - a.□ Pilasters and Panels: 1/2 inch (13 mm).
    - b.□ Panels and Walls: 1 inch (25 mm).
  - 2.□ Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than two brackets attached near top and bottom of panel.
    - a.□ Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
    - b.□ Align brackets at pilasters with brackets at walls.
  - 3.□ Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.

- a.□ Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
  - b.□ Align brackets at pilasters with brackets at walls.
- B.□ Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches (44 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C.□ Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches (51 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
- D.□ Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

### 3.3□ ADJUSTING

- A.□ Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 10 21 13.17

**SECTION 12 24 13**  
**ROLLER WINDOW SHADES**

**PART 1 - GENERAL**

1.1 □ RELATED DOCUMENTS

- A. □ Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 □ SUMMARY

1. □ Section includes:

- a. □ Manual room darkening and sunscreen double roller shades at classrooms and cafetorium.

- B. □ Related Sections include the following:

1. □ Section 06 10 00 Rough Carpentry
2. □ Section 09 29 00 Gypsum Board
3. □ Section 09 51 20 Acoustic Ceiling Tiles

1.3 □ REFERENCES

- A. □ ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- B. □ NFPA 70 - National Electrical Code.
- C. □ NFPA 701 - Fire Tests for Flame-Resistant Textiles and Films.

1.4 □ SUBMITTALS

- A. □ Submit under provisions of Section 01300.
- B. □ Product Data: Manufacturer's data sheets on each product to be used, including:
1. □ Preparation instructions and recommendations.
  2. □ Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
  3. □ Storage and handling requirements and recommendations.
  4. □ Mounting details and installation methods.
- C. □ Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances and relationship to adjacent work.
- D. □ Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes to fit those indicated in the window schedule and key to typical mounting details.

- E.□ Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.
- F.□ Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.
- G.□ Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

#### 1.5□ QUALITY ASSURANCE

- A.□ Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of ten years experience in manufacturing products comparable to those specified in this section.
- B.□ Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of five years experience in installing products comparable to those specified in this section.
- C.□ Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
- D.□ Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.
- E.□ Mock-Up: Provide a mock-up of one roller shade assembly for evaluation of mounting, appearance and accessories.
  - 1.□ Locate mock-up in window designated by Architect.
  - 2.□ Do not proceed with remaining work until, mock-up is accepted by Architect.

#### 1.6□ DELIVERY, STORAGE, AND HANDLING

- A.□ Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Schedule.

#### 1.7□ PROJECT CONDITIONS

- A.□ Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

#### 1.8□ WARRANTY

- A.□ Roller Shade Hardware and Chain Warranty: Manufacturer's standard non-depreciating twenty-five year limited warranty.

- B.□ Standard Shadecloth: Manufacturer's standard twenty-five year warranty.
- C.□ Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas.

## PART 2 - PRODUCTS

### 2.1□ MANUFACTURERS

- A.□ Basis-of Design Product: MechoShade Systems, Inc. – Mecho/5 Double Shades with fascia. Comparable substitutions are acceptable.
- B.□ Manufacturers: Products are based upon one or a multiple of manufacturers to establish a quality and design standard and is not meant to discourage competition in any way.
  - 1.□ MechoShade Systems, Inc. – Mecho/5 Double Shades with fascia
  - 2.□ Draper, Inc. – Dual Roller Flex Shade with fascia
  - 3.□ Insolroll – Dual Shade with fascia
- C.□ Substitutions: Permitted with Architect's approval under Section 01 60 00 - Product Requirements: Product Substitution Procedures

### 2.2□ Materials

- A.□ Manually Operated Shades:
  - 1.□ Mounting: Surface mounted with fascia.
  - 2.□ Configuration: Double solar and blackout shadecloth.
  - 3.□ Solar Shadecloths:
    - a.□ Fabric: ThermoVeil 2100, 10 percent open, 2 by 2 open basket-weave pattern.
    - b.□ Color: Selected from manufacturer's standard colors.
  - 4.□ Blackout Shadecloths:
    - a.□ Fabric: ThermoVeil Equinox 0100, blackout shadecloth with opaque acrylic backing.
    - b.□ Color: Selected from manufacturer's standard colors.

### 2.3□ SHADE CLOTH

- A.□ Visually Transparent Shadecloth: Based on MechoShade Systems, Inc., ThermoVeil series, single thickness non-raveling 0.030-inch (0.762 mm) thick vinyl fabric, woven from 0.018-inch (0.457 mm) diameter extruded vinyl yarn comprising of 21 percent polyester and 79 percent reinforced vinyl.
- B.□ Room Darkening Shadecloth: Based on MechoShade Systems, Inc., Equinox series, 0.008 inches thick (.19 mm) PVC-free blackout material and weighing 0.94 lbs. per square yard, comprising of 53 percent fiberglass, 45 percent acrylic, 2 percent poly finish.

## 2.4 □ SHADE BAND

- A. □ Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.
  - 1. □ Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.
  - 2. □ Shade Band and Shade Roller Attachment:
    - a. □ Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch (39.37 mm) in diameter for manual shades, and less than 2.55 inches (64.77 mm) for motorize shades are not acceptable.
    - b. □ Provide for positive mechanical engagement with drive / brake mechanism.
    - c. □ Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" snap-off" spline mounting, without having to remove shade roller from shade brackets.
    - d. □ Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
    - e. □ Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets are not acceptable.

## 2.5 □ SHADE FABRICATION

- A. □ Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.
- B. □ Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design. Fabricate hem as follows:
  - 1. □ Exposed blackout hembar with light seal.
- C. □ Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.
- D. □ For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadebands.

- E.□ Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shadebands.
- F.□ Blackout shadebands, when used in side channels, shall have horizontally mounted, roll-formed stainless steel or tempered-steel battens not more than 3 feet (115 mm) on center extending fully into the side channels. Battens shall be concealed in a integrally-colored fabric to match the inside and outside colors of the shadeband, in accordance with manufacturer's published standards for spacing and requirements.
  - 1.□ Battens shall be roll formed of stainless steel or tempered steel and concave to match the contour of the roller tube.
  - 2.□ Batten pockets shall be self-colored fabric front and back RF welded into the shadecloth. A self-color opaque liner shall be provided front and back to eliminate any see through of the batten pocket that shall not exceed 1-1/2 inches (38.1 mm) high and be totally opaque. A see-through moire effect, which occurs with multiple layers of transparent fabrics, shall not be acceptable.

## 2.6□ COMPONENTS

### A.□ Access and Material Requirements:

- 1.□ Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
- 2.□ Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
- 3.□ Use only engineered plastics for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.

### B.□ Manual Operated Chain Drive Hardware and Brackets:

- 1.□ Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.
- 2.□ Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.
- 3.□ Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.
- 4.□ Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer's design criteria. Connectors shall be offset to assure alignment from the first to the last shade band.
- 5.□ Provide shade hardware system that allows multi-banded manually operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.
- 6.□ Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable

- 7.□ Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.
- 8.□ Drive Bracket / Brake Assembly:
  - a.□ Drive Bracket shall be fully integrated with all M accessories, including, but not limited to: fascia, room darkening side / sill channels, center supports and connectors for multi-banded shades.
  - b.□ Drive sprocket and brake assembly shall rotate and be supported on a welded 3/8 inch (9.525 mm) steel pin.
  - c.□ The brake shall be an over-running clutch design which disengages to 90 percent during the raising and lowering of a shade. The brake shall withstand a pull force of 50 lbs. (22 kg) in the stopped position.
  - d.□ The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.
  - e.□ The entire assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.
  - f.□ Drive Chain: #10 qualified stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.

## 2.7□ ACCESSORIES

### A.□ Fascia:

- 1.□ Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
- 2.□ Fascia shall be able to be installed across two or more shade bands in one piece.
- 3.□ Fascia shall fully conceal brackets, shade roller and fabric on the tube.
- 4.□ Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.
- 5.□ Notching of Fascia for manual chain shall not be acceptable.

## PART 3 - EXECUTION

### 3.1□ EXAMINATION

- A.□ Do not begin installation until substrates have been properly prepared.
- B.□ If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.2□ PREPARATION

- A.□ Clean surfaces thoroughly prior to installation.

- B.□ Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### 3.3□ INSTALLATION

- A.□ Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.
- B.□ Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- C.□ Clean roller shade surfaces after installation, according to manufacturer's written instructions.
- D.□ Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

### 3.4□ PROTECTION

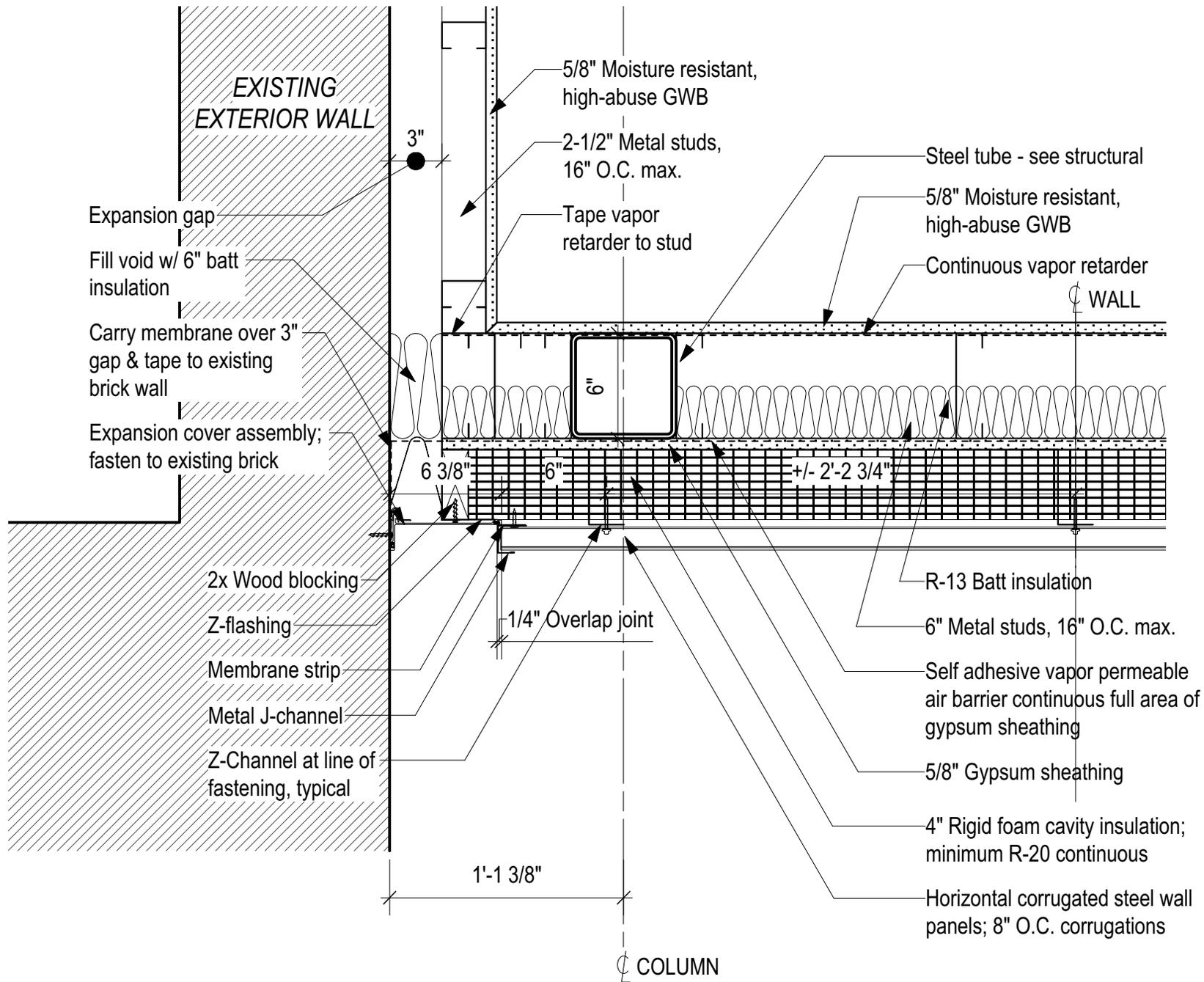
- A.□ Protect installed products until completion of project.
- B.□ Touch-up, repair or replace damaged products before Substantial Completion.

### 3.5□ SCHEDULE

- A.□ Dual Shades at all classroom windows as indicated on the elevations and sized to fit openings based on those in the window schedule.
- B.□ Dual Shades at all storefront openings in the cafetorium as indicated on the elevations and sized to fit openings based on those in the window schedule.
- C.□ Dual Shades at the clerestory above the cafetorium expansion as indicated on the elevations.

END OF SECTION 06 06 60

This page left intentionally blank.



TBA ARCHITECTS, INC.  
 ARCHITECTURE  
 PLANNING  
 PROJECT MANAGEMENT  
 43 BRADFORD STREET  
 CONCORD, MA 01742  
 TEL (781) 893-8828  
 FAX (781) 893-8834

NEW MODULAR BUILDING AT BARNSTABLE  
 WEST BARNSTABLE ELEMENTARY SCHOOL  
 2463 MAIN STREET, WEST BARNSTABLE, MA  
 CLIENT: TOWN OF BARNSTABLE, BARNSTABLE PUBLIC SCHOOLS  
 230 SOUTH STREET, BARNSTABLE, MA  
 DATE OF ISSUE  
 20 MAY 2016  
 REVISIONS

REVISED DETAIL 1/A-5.1  
 CORNER DETAIL @  
 EXISTING WALL

COPYRIGHT  
 2016  
**BSK-**  
**1.0**

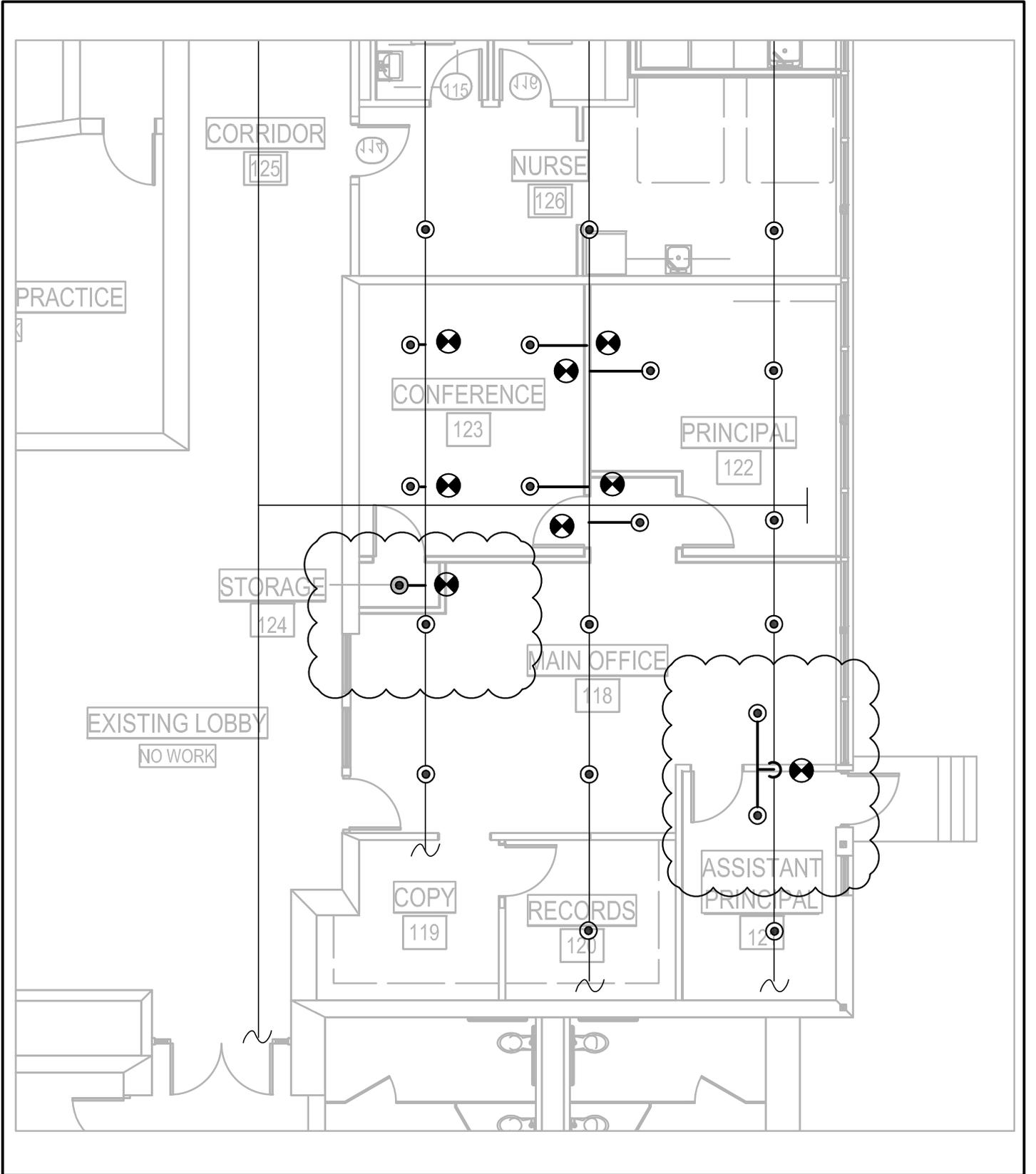
**1** REVISED CORNER DETAIL AT EXISTING WALL  
 SCALE: 1-1/2" = 1'-0"

**NORIAN / SIANI ENGINEERING, INC.**

43 Bradford St 3rd Flr  
Concord, MA 01742-2972  
Tel: (781) 398-2250  
Email: info@NS-Engineering.com

**JOB LT JOB LANE ELEMENTARY SCHOOL**

SHEET NO. SKFP-1 REF. DWG FP-1.1  
DRAWN BY RWS DATE 05/20/16  
CHECKED BY MAB DATE 05/20/16  
SCALE 1/8" = 1'-0"

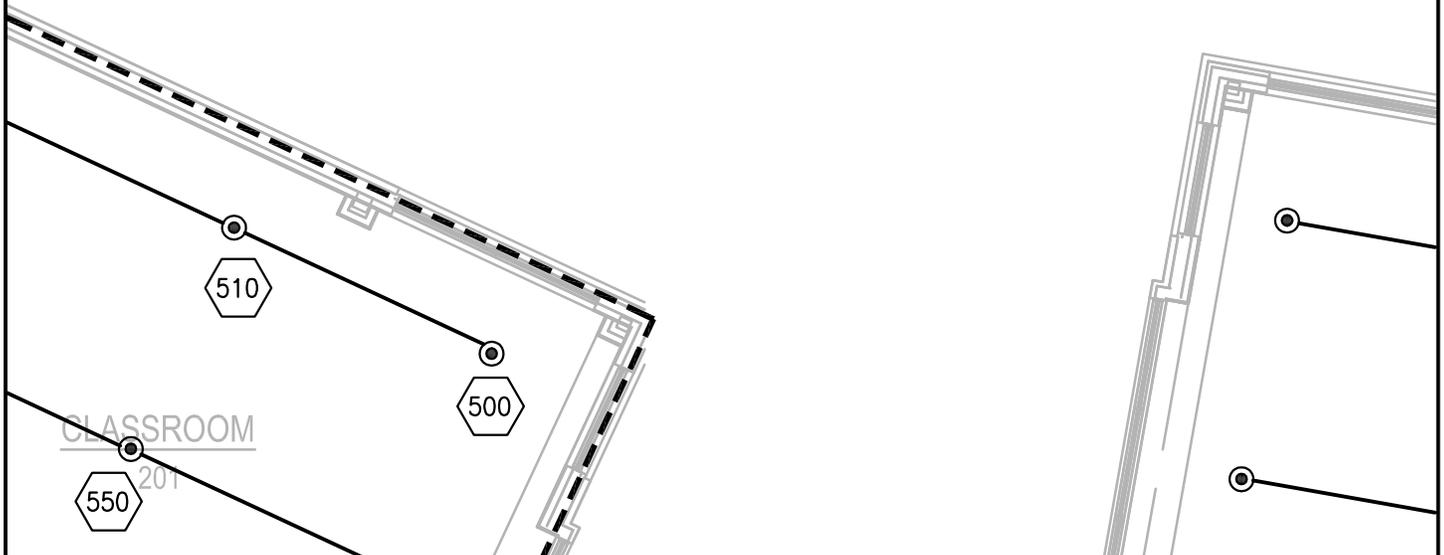


HYDRAULIC SUMMARY TABLE

REMOTE AREA 1 - LIGHT HAZARD AREA

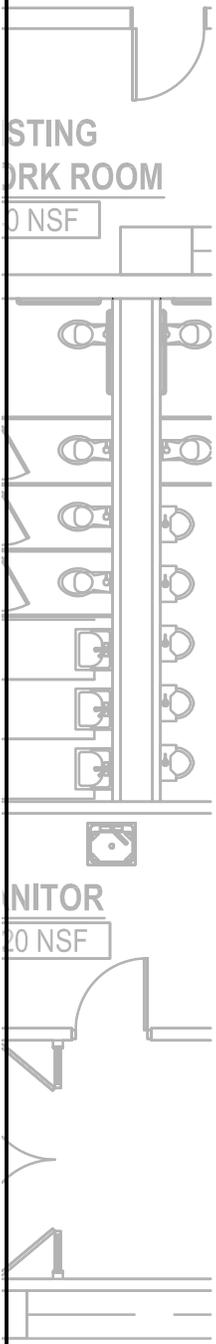
DESIGN AREA: CLASSROOM 201  
MINIMUM DENSITY: 0.1 GPM/SQ FT

CALCULATED FLOW: 260 GPM @ 30 PSI  
INCLUDING 100 GPM HOSE ALLOWANCE



**FIRE PROTECTION NOTES:**

1. SEE SPECIFICATIONS AND DETAILS FOR FURTHER REQUIREMENTS.
2. INSTALL EQUIPMENT AND SYSTEMS PER CODE AND PER MANUFACTURERS' INSTRUCTIONS.
3. ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE. CONTRACTOR TO INSPECT AND VERIFY ALL INFORMATION IN FIELD AND INFORM THE ENGINEERS OF ANY DISCREPANCIES IN WRITING IMMEDIATELY.
5. PIPING MAY BE SHOWN DISPLACED FOR CLARITY.
6. INSTALL ALL PIPING ON WARM SIDE OF BUILDING INSULATION.
7. ALL DRY SPRINKLER PIPING SHALL BE INTERNALLY AND EXTERNALLY GALVANIZED.
8. ALL PIPING SHALL BE 1" UNLESS NOTED OTHERWISE.
9. FPC SHALL EXAMINE ALL SPACES WITHIN BUILDING TO DETERMINE IF ANY ADDITIONAL COMBUSTIBLE VOID SPACES EXIST. NOTIFY ENGINEER IN WRITING OF ANY SUSPECT AREAS.
10. AT DROP CEILINGS, ALL HEADS SHALL BE LOCATED AT CENTER OF TILE UNLESS SPECIFICALLY NOTED OTHERWISE.
11. GC TO PROVIDE REQUIRED FIRESTOPPING. FPC TO PROVIDE GC WITH MARKED-UP PLAN SHOWING PENETRATIONS.



**HYDRAULIC SUMMARY TABLE**

---

REMOTE AREA 1 - LIGHT HAZARD AREA

DESIGN AREA: 1500 SQ FT  
MINIMUM DENSITY: 0.1 GPM/SQ FT

CALCULATED FLOW: 366 GPM @ 35 PSI  
INCLUDING 100 GPM HOSE ALLOWANCE



**FOUNDATION ENGINEERING REPORT**

**LT. JOB LANE ELEMENTARY SCHOOL  
ADDITIONS**

**BEDFORD, MASSACHUSETTS**

**MAY 9, 2016**

Prepared For:

TBA Architects, Inc.  
43 Bradford Street, Suite #300  
Concord, MA 01742

2269 Massachusetts Avenue  
Cambridge, MA 02140  
www.mcphailgeo.com  
(617) 868-1420

**PROJECT NO. 6151.2.00**



May 9, 2016

TBA Architects, Inc.  
43 Bradford Street, Suite #300  
Concord, MA 01742

Attention: Mr. Bob Jefferies

Reference: Lt. Job Lane Elementary Additions; Bedford, Massachusetts  
Foundation Engineering Report

Ladies and Gentlemen:

This report documents the results of our subsurface exploration program and foundation design study for the proposed additions to the existing Lt. Job Lane Elementary School located at Sweetwater Avenue in Bedford, Massachusetts. Refer to the Project Plan, Figure 1, for the general site location.

This report was prepared in accordance with our proposal dated March 16, 2016 and the subsequent authorization of TBA Architects, Inc. (TBA). These services are subject to the limitations contained in Appendix A.

### **Purpose and Scope**

The purposes of the subsurface exploration program and foundation design study are to assess the subsurface soil and groundwater conditions at the site as they relate to foundation design and, based on these conditions, to provide safe and economic foundation design recommendations for the proposed additions.

Foundation design includes foundation support for the proposed additions and their lowest level slabs, treatment of the lowest level slabs in consideration of groundwater, and seismic design considerations in accordance with the provisions of the Eighth Edition of the Massachusetts State Building Code (Code). Foundation construction considerations relating to geotechnical aspects of the proposed structures are also presented herein.

### **Available Information**

Information provided to McPhail Associates, LLC (McPhail) by TBA included following:

- An 1/8-scale drawing entitled "Alternations & Expansion at Lt. Job Lane Elementary School - Foundation Plan" dated April 18, 2016 prepared by RWM Engineering, Inc. (RWM);
- A 20-scale drawing entitled "Limited Existing Condition Plan" dated March 23, 2016 prepared by Samiotes Consultants, Inc. (Samiotes);



- A schematic submission set " Alternation & Expansion to the LT. Job Lane Elementary School" prepared by TBA and dated June 15, 2015;
- A drawing entitled "Exploration Location Plan" dated September, 1998 and the boring logs dated August 26, 1998 prepared by The Geotechnical Group, Inc. (TGGI); and
- Additional information provided included architectural, civil, mechanical, electrical, structural and fire protection drawings of the existing building.

Elevations referenced are understood to be referenced to the North American Vertical Datum (NAVD) of 1988.

### **Existing and Proposed Conditions**

Fronting onto Sweetwater Avenue to the southeast, the subject site is bounded by residential properties to the south, and a heavily wooded area to the north and west. Currently, an existing two-story school building occupies the central portion of the site. Further, the site is occupied by a paved surface, parking lot, grassed, landscape and playground areas. Based on the existing structural drawings provided to us, it is understood that the existing building does not contain below grade space. The lowest level slabs of the existing building varies from Elevation +204.5 at the west side to Elevation +209.5 at the southeast side of the existing building. Existing ground surface around the exterior of the existing building generally slopes downward from the east to the west portion of the site from about Elevation +211 to Elevation +193.

Based on the information provided to us, the proposed development will include the construction of a two-story addition to the west side of the existing building with an approximate 2,800 square foot footprint and an approximate 450 square foot in plan area one-story addition to the cafeteria to be located at the eastern side off the existing building. It is understood that the proposed structures will not contain below grade space. In addition, it is understood that the lowest level slabs are proposed to be coincident with the slab grade in the adjacent portion of the existing building. Therefore, the lowest level slab of the addition to be constructed to the west side of the existing building will be located at Elevation +204.5, and the lowest level slab of the proposed eastern addition will be built at Elevation +209.5.

### **Existing Subsurface Information**

Based on the information provided to us, seven (7) borings were previously completed at the site in 1998 for TGGI. Boring locations plan and boring logs prepared by TGGI are included in Appendix C.



### **Subsurface Exploration Program**

On April 19, 2016, a subsurface exploration program consisting of eight (8) test pits, TP-1 through TP-8, was completed at the site. The test pits were performed by the Department of Public Works of Bedford, Massachusetts. Logs of the test pits are contained in Appendix B. The approximate exploration locations are indicated on the attached Figure 2.

The test pits were excavated to depths ranging between about 3.5 and 12 feet below the existing ground surface using a backhoe excavator. The test pits were backfilled with the excavated soil following completion of the excavation.

The test pits were observed by a McPhail representative who prepared field logs, obtained and visually classified soil samples, monitored groundwater conditions in the completed explorations, made minor relocations, and determined the required exploration depths based upon the actual subsurface conditions encountered.

The field locations of the test pits were determined by taping from existing site features included on the above-referenced plan prepared by Semiotes. The existing ground surface elevation at the test pit locations was determined by a level survey performed by our field representative utilizing vertical control information on the above-referenced plan prepared by Semiotes.

### **Laboratory Testing**

At the completion of the recent field work, soil samples were returned to our laboratory for more detailed classification, analysis and testing. The laboratory testing consisted of sieve analyses to determine the gradations and confirm the visual classifications of the fill, glacial outwash and glacial till deposits. Laboratory test procedures were in general accordance with applicable ASTM Standards. Results of the gradation testing appear on Figures 3, 4 and 5 following the text of this report.

### **Subsurface Conditions**

Detailed descriptions of the subsurface conditions encountered within the explorations is presented on the test pit logs contained in Appendix B. The generalized subsurface conditions across the site were inferred primarily from the explorations, but also from our past experience and knowledge of the local geology.

#### **Topsoil:**

Each test pit encountered a surficial layer of topsoil that extended to depth of about 5 to 6 inches below the existing ground surface. The topsoil consisted of a loose, dark brown, silty fine sand with trace roots.



Fill:

Beneath the existing surface treatments, the test pits encountered a fill deposit that was observed to vary from 2.5 to 11.5 feet in thickness across the site. Generally, the fill deposit encountered within the footprint of the proposed eastern addition was observed to extend to depths of 2.5 to 3 feet below the existing ground surface corresponding to Elevation +205.3 and Elevation +204.8. However, the fill deposit encountered within the footprint of the proposed western addition was observed to extend to depth of about 5.1 to 12 feet below ground surface corresponding to Elevation +197.9 and Elevation +189.6. It was observed that the fill deposit near the existing footings at the west side of the existing building is thinner and gradually increases in thickness towards the west. The fill was observed to vary from a loose to compact, brown to dark brown, sand and gravel with trace silt a few cobbles varying to a fine to coarse sand with some gravel, trace silt with cobbles and boulders. Grain size distributions of typical samples of the fill deposit are contained on the enclosed Figure 3.

Test pits TP-1 and TP-2 were terminated within the fill deposit at a depth of 12 feet below ground surface, corresponding to Elevation +189.6 and Elevation +190, respectively.

Glacial Outwash:

A natural glacial outwash deposit was encountered underlying the fill material in test pits TP-4, TP-4A, TP-5 and TP-6 at depths ranging from 5.1 to 5.5 feet below ground surface, corresponding to Elevation +198 and Elevation +197.4. The glacial outwash deposit generally consists of a compact, light brown sand and gravel with trace silt, trace cobbles and boulders. Grain size distributions of typical samples of the glacial outwash deposit are presented on the enclosed Figure 4.

Test pits TP-4, TP-5 and TP-6 were terminated within the glacial outwash deposit at depths ranging from 5.8 to 6 feet below ground surface, which corresponds to about Elevation +197.3 to Elevation +197.

Glacial Till:

Underlying the fill and glacial outwash deposits, test pits TP-3 and TP-4A performed within the proposed footprint of the western addition encountered a natural glacial till deposit at depths ranging from 9.5 to 10 feet below ground surface corresponding to Elevation +192.6 and Elevation +192.9. Test pits TP-7 and TP-8 performed within the proposed eastern addition footprint area encountered a natural glacial till deposit at depths ranging from 2.5 to 3 feet below ground surface corresponding to Elevation +204.3 and Elevation +204.8. The natural glacial till deposit was observed to vary from a silty and gravelly sand to fine to coarse sand and gravel with some silt with trace cobbles and boulders. Grain size distributions of typical samples of the glacial till deposit are presented on the enclosed Figure 5.

Test pits TP-3, TP-4A, TP-7 and TP-8 were terminated within the glacial till deposit at depths ranging from 3.5 to 11.5 feet below ground surface, which corresponds to about Elevation +204.3 to Elevation +191.4.



#### Groundwater:

Groundwater was not encountered at any of the test pit locations upon completion of the explorations. However, it is anticipated that groundwater levels may vary due to factors such as normal seasonal changes, runoff particularly during or following periods of heavy precipitation, and alterations of existing drainage patterns.

#### **Existing Foundation Conditions**

A description of the existing building foundation conditions encountered within the test pit explorations is documented on the logs contained in Appendix B. Based on these explorations, the following is a description of the generalized foundation conditions encountered at the exterior of the west foundation wall of the existing building.

Based on the results of test pits TP-4 through TP-6 performed at the western side of the existing building, it appears that the existing building is supported on a concrete foundation wall below an approximate 12-inch thick concrete footing bearing directly on the glacial outwash deposit. It was observed that the bottom of the footing typically varies from about Elevation +197.6 to Elevation +198. In addition, based on our review of the existing structural drawings, the bottom of the existing footings adjacent to the proposed western and eastern additions are interpreted to be at about Elevation +198.5 and Elevation +204, respectively.

#### **Foundation Design Recommendations**

Based on the results of the subsurface exploration program, the sites of the proposed additions are underlain by a variable thickness of uncontrolled fill deposit which is unsuitable for support of the proposed building foundations. Generally, the fill deposit encountered within the footprint of the proposed eastern addition was observed to extend to depths of 2.5 to 3 feet below the existing ground surface. The fill deposit encountered within the footprint of the proposed western addition was observed to extend to depth of about 5.1 to 12 feet below ground surface. Within the southwestern and northeastern corners of the proposed western addition footprint, to establish the subgrade for the slab of the western addition at Elevation +204.5, up to 12 feet of uncontrolled fill will need to be removed and an additional 15 feet of fill will need to be placed and compacted. Furthermore, during our subsurface exploration program, boulders and cobbles were encountered within the existing fill material at the site, therefore, the installation of deep foundation elements within the western addition would not be feasible.

Therefore, based on our current understanding of the proposed construction and the anticipated subsurface conditions described above, foundation support of the proposed eastern and western additions is recommended to be provided by spread footing foundations in conjunction with slab-on-grade construction.



Preparation of the building pad for support of the footings and the slabs-on-grade should include the removal of all existing site improvements and fill material from the footprints of the proposed additions to expose the underlying, natural undisturbed glacial outwash or glacial till deposit.

The footings should bear directly on the undisturbed, natural glacial outwash or glacial till deposit, or on compacted structural fill placed directly over the undisturbed glacial outwash and/or glacial till deposit. It is recommended that the footings be proportioned utilizing a maximum allowable design bearing pressure of two (2) tons per square-foot (tsf). Recommended minimum footing widths for continuous and isolated spread footings are 24 and 30 inches, respectively.

Structural fill should consist of suitable excavated on-site fill or glacial outwash deposits, or an off-site well-graded, natural sand and gravel containing less than 8 percent passing the No. 200 sieve. All structural fill placed within the footprints of the proposed additions for support of the footings and slab-on-grade should be placed in lifts having a compacted thickness of 6 inches and be compacted to a minimum of 95 percent of its maximum modified Proctor dry density. Reuse of the on-site soil is discussed in more detail in the "Foundation Construction Considerations" section of this report.

Perimeter footings should be provided with a minimum 4-foot thickness of soil cover as frost protection. Interior foundations should be located such that the top of the foundation concrete is a minimum of 6 inches below the underside of the lowest level slab. All foundations should be located such that they are below a theoretical line drawn upward and outward at a 2 to 1 (horizontal to vertical) angle from the bottom exterior edge of all adjacent footings, structures and utilities.

The lowest level floor slabs for the proposed additions should be designed as a conventional slabs-on-grade underlain by polyethylene vapor barrier spread over a minimum 6-inch thickness of gravel fill having a maximum of 8 percent passing the U.S. No. 200 sieve.

Since the proposed lowest level slabs are understood to be located at or above the proposed finished grade, perimeter and underslab drainage are not considered necessary. All pits and depressions extending below the lowest level slabs (i.e. elevator pits, etc.) should be waterproofed and provided with properly tied continuous waterstops at all construction joints.

Below-grade foundation walls receiving lateral support at the top and bottom (i.e. restrained walls) should be designed for a lateral earth pressure corresponding to an equivalent fluid density of 60 pounds per cubic-foot. Similarly, drained cantilevered retaining walls, (i.e. receiving no lateral support at the top) should be designed for a lateral earth pressure corresponding to an equivalent fluid density of 40 pounds per cubic-foot. To these values must be added the pressures attributable to earthquake forces per the Code. To these values must be added the pressures attributable to earthquake forces per Section 1610.2 of the Code.



Lateral forces can be considered to be transmitted from the structure to the soil by passive pressure against the foundation walls utilizing an equivalent fluid density of 120 pounds per cubic-foot providing that the walls are designed to resist these pressures. Lateral force can also be considered to be transmitted from the structure to the soil by friction on the base of footings using a coefficient of 0.45, to which a safety factor of 1.5 should be applied.

### **Seismic Design Considerations**

For the purposes of determining parameters for structural seismic design, this site is considered to be a Site Class D as defined in Section 1613.5.2 of the Code. Furthermore, the bearing strata on the proposed site is not considered to be subject to liquefaction during an earthquake based on the criterion of Section 1806.4 of the Code.

### **Foundation Construction Considerations**

Foundation construction considerations associated with the proposed additions include the removal of the existing fill beneath proposed footing and slabs-on-grade locations, preparation of the foundation bearing surfaces and the slab-on-grade, re-use of excavated on-site soil, construction dewatering and off-site disposal of excess excavated soils.

Preparation of building pad for the proposed slab-on-grade of the proposed western addition will require removal of the existing fill up to 12 feet and the placement of up to 15 feet of structural fill.

All existing topsoil and fill should be removed from the proposed additions areas. Where proposed footings are to be supported on structural fill, the lateral limits of the excavation should extend beyond the outside edge of the footing for a horizontal distance equal to twice the depth from the bottom of the proposed footing to the surface of the natural, undisturbed glacial outwash or glacial till deposit, plus two feet in all plan directions.

To minimize disturbance to the natural glacial outwash and glacial till deposit, all soil bearing surfaces should be excavated with a backhoe bucket which has either a smooth, toothless cutting edge or a steel plate welded across the teeth.

It is anticipated that the excavated fill, glacial outwash and glacial till material may be re-used on-site as structural fill for support of the proposed building foundations and slabs-on-grade provided they are maintained in a dry condition and can be properly compacted. Based on the test pits, some cobbles and boulders may be encountered within the fill and glacial outwash deposits. Therefore, it is recommended that all boulders and all cobbles measured 4 inches or greater be culled out prior to the placement of on-site fill and glacial outwash material, as structural fill. The placement and compaction of structural fill should be monitored by a registered professional engineer or his designated representative in accordance with the provisions of the Code.



It is recommended that the placement and compaction of the on-site materials be completed during relatively dry and non-freezing conditions. Stockpiled excavated material designated for reuse on-site should be covered at all times with 6-mil polyethylene for protection from precipitation and also as a dust mitigation measure. If, due to any of the above conditions, the excavated material becomes unsuitable for reuse, it should be removed from the site and an off-site gravel fill should be used.

It is anticipated that dewatering, if required, by means of strategically located sumps and trenches should suffice during foundation construction operations. In addition, trapped surface water may accumulate within localized depressions in the ground surface across the site after periods of heavy precipitation and will most likely necessitate localized sumping. Groundwater accumulated on-site during foundation construction should be discharged into an on-site recharge system.

Should excess excavated soil generated from the proposed construction require off-site disposal, current Department of Environmental Protection (DEP) policies and regulations for off-site reuse of excess excavated soil require environmental characterization of the excavated soil prior to its off-site re-use.

### **Final Comments**

McPhail has been retained to provide design assistance to the design team during the design phase of this project. The purpose of our involvement is to review the structural foundation drawings and foundation notes for conformance with the recommendations presented herein and to prepare or review the earthwork specification section for inclusion into the Contract Documents for construction.

It is also recommended that McPhail be retained to provide construction phase services during the construction period to observe the over-excavation of unsuitable soils, preparation of foundation bearing surfaces, preparation of the slab-on-grade subgrade, placement and compaction of structural fill in accordance with the provisions of the Code and the Contract Documents. Our involvement during the construction phase of the work should minimize costly delays due to unanticipated field problems since our field engineer would be under the direct supervision of our project manager who was responsible for the subsurface exploration program and foundation design recommendations documented herein.



TBA Architects, Inc.  
May 9, 2016  
Page 9

We trust that the above is sufficient for your present requirements. Should you have any questions concerning the recommendations presented herein, please do not hesitate to call us.

Very truly yours,

McPHAIL ASSOCIATES, LLC

A handwritten signature in blue ink, reading "Fatima Babic-Konjic". The signature is fluid and cursive.

Fatima Babic-Konjic, P.E.

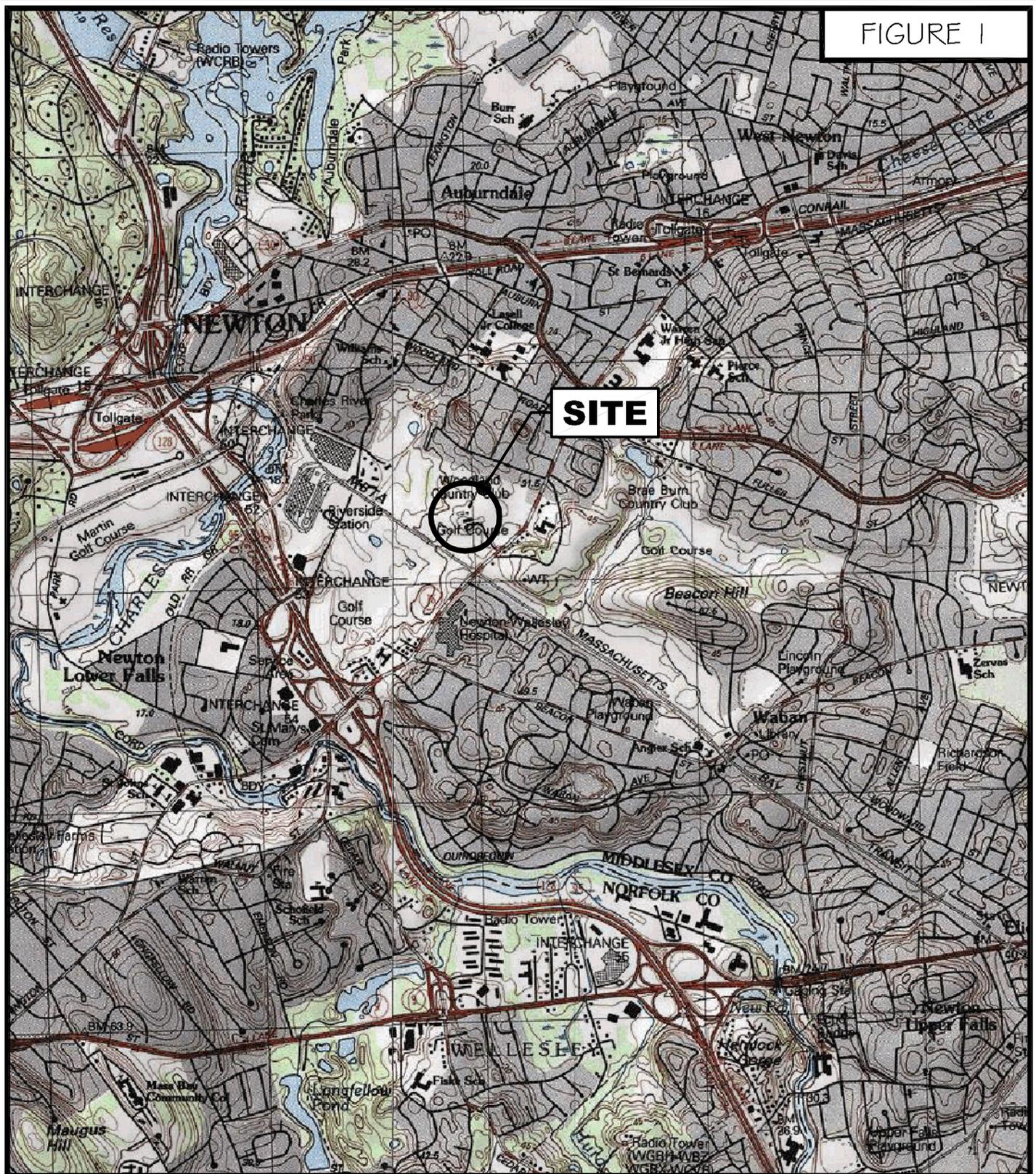
A handwritten signature in blue ink, reading "Ambrose J. Donovan". The signature is fluid and cursive.

Ambrose J. Donovan, P.E., L.S.P.

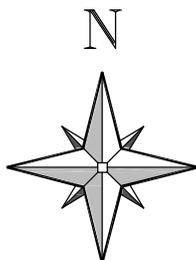
F:\WP5\REPORTS\6151\_FER\_050916.docx

FBK/ajd

FIGURE I



Geotechnical and  
Geoenvironmental Engineers  
2269 Massachusetts Avenue  
Cambridge, MA 02140  
617/868-1420  
617/868-1423 (Fax)  
www.mcphailgeo.com



SCALE 1:25,000

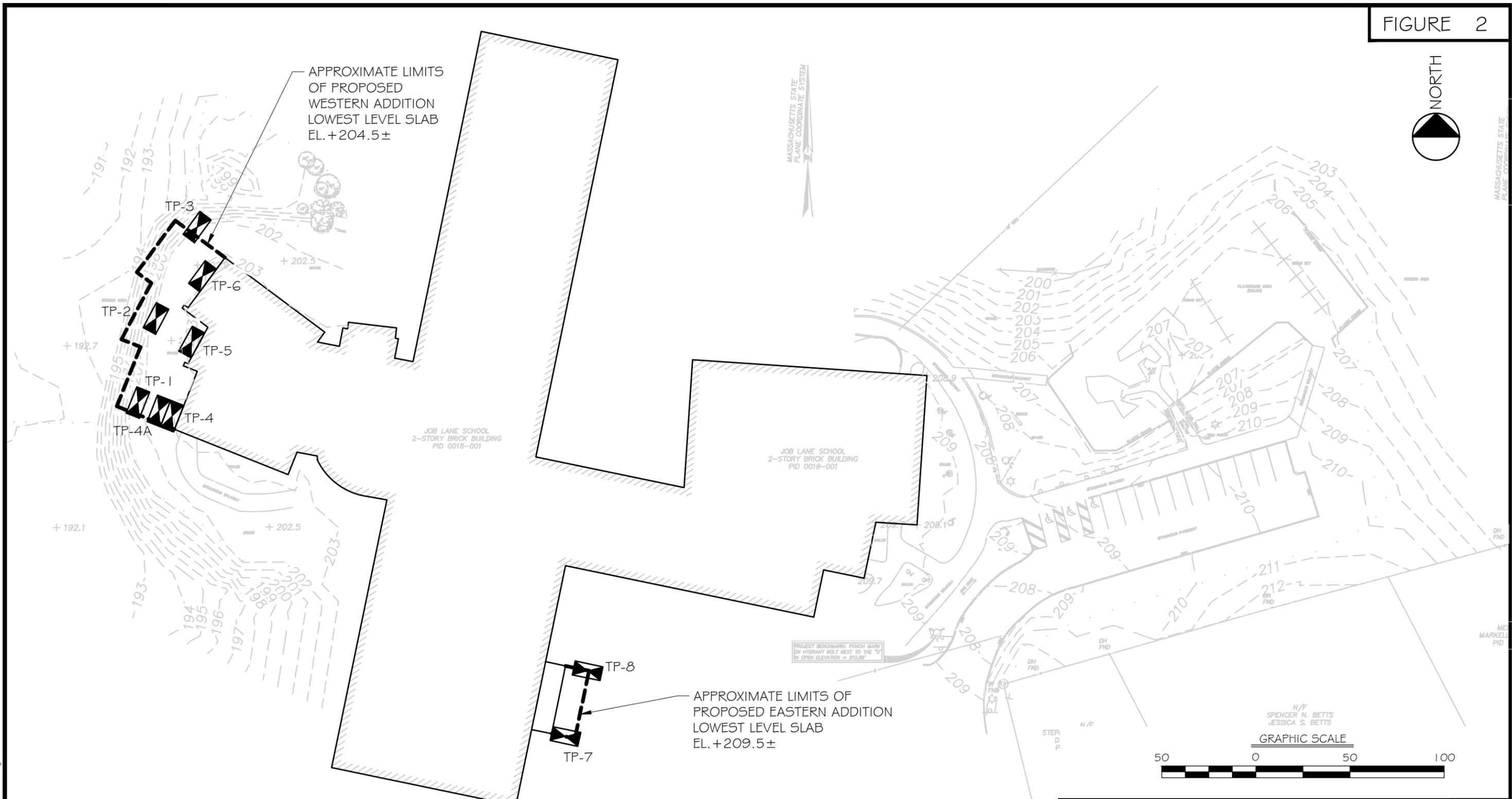
# PROJECT LOCATION PLAN

LT. JOB LANE

ELEMENTARY SCHOOL ADDITIONS

BEDFORD

MASSACHUSETTS



FILE NAME: H:\Acad\JOBS\151\G151-F02.dwg

**LEGEND**

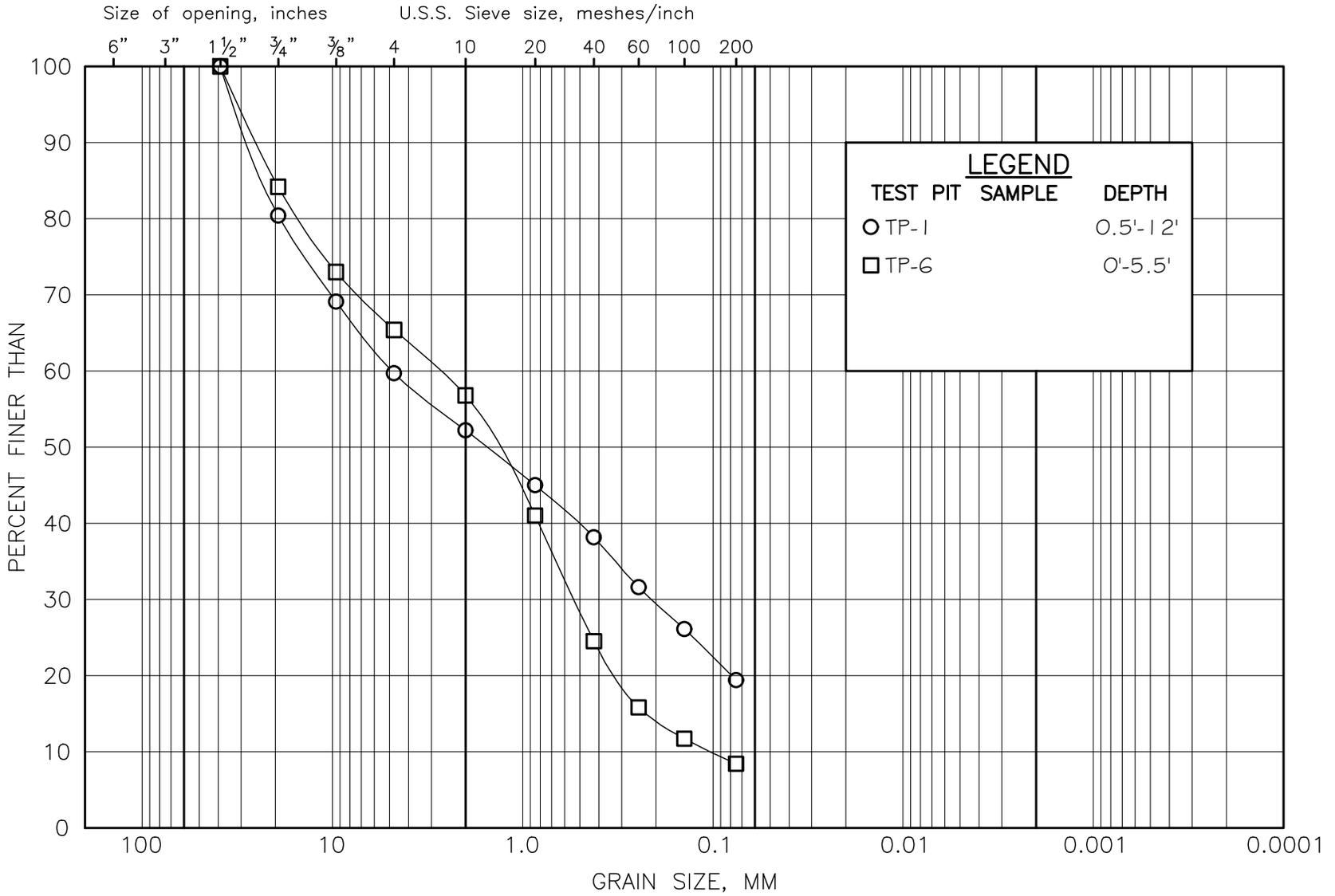
— APPROXIMATE LOCATION OF TEST PIT PERFORMED BY TOWN OF BEDFORD DEPARTMENT OF PUBLIC WORKS ON APRIL 19, 2016 FOR McPHAIL ASSOCIATES, LLC.

REFERENCE: THIS PLAN WAS PREPARED FROM A 20-SCALE DRAWING ENTITLED "LIMITED EXISTING CONDITIONS PLAN" DATED MARCH 23, 2016 BY SAMIOTES CONSULTANTS, INC.

**McPHAIL ASSOCIATES, LLC**  
 Geotechnical and Geoenvironmental Engineers  
 2269 Massachusetts Avenue  
 Cambridge, MA 02140  
 617/868-1420  
 617/868-1423 (Fax)  
 www.mcphailgeo.com

LT. JOB LANE ELEMENTARY SCHOOL ADDITIONS			
BEDFORD		MASSACHUSETTS	
SUBSURFACE EXPLORATION PLAN			
FOR			
TBA ARCHITECTS, INC.			
BY			
McPHAIL ASSOCIATES, LLC			
Date:	MAY 2016	Dwn:	F.G.P.
Project No:	G151	Chkd:	F.B.K.
		Scale: 1" = 50'	

M.I.T. GRAIN SIZE SCALE



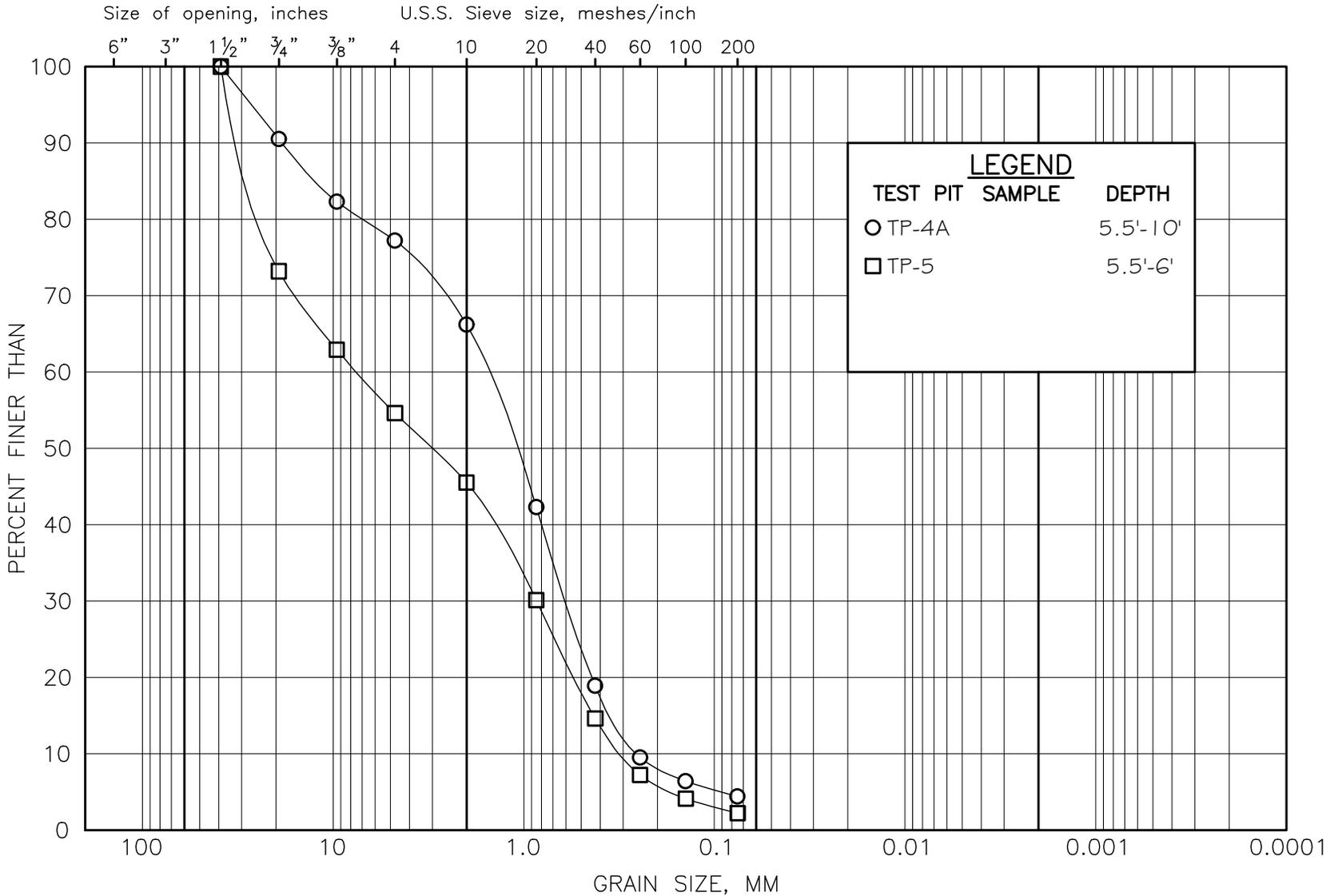
COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE
	GRAVEL SIZE			SAND SIZE				

McPHAIL ASSOCIATES, LLC

GRAIN SIZE DISTRIBUTION  
FILL

FIGURE 3

M.I.T. GRAIN SIZE SCALE



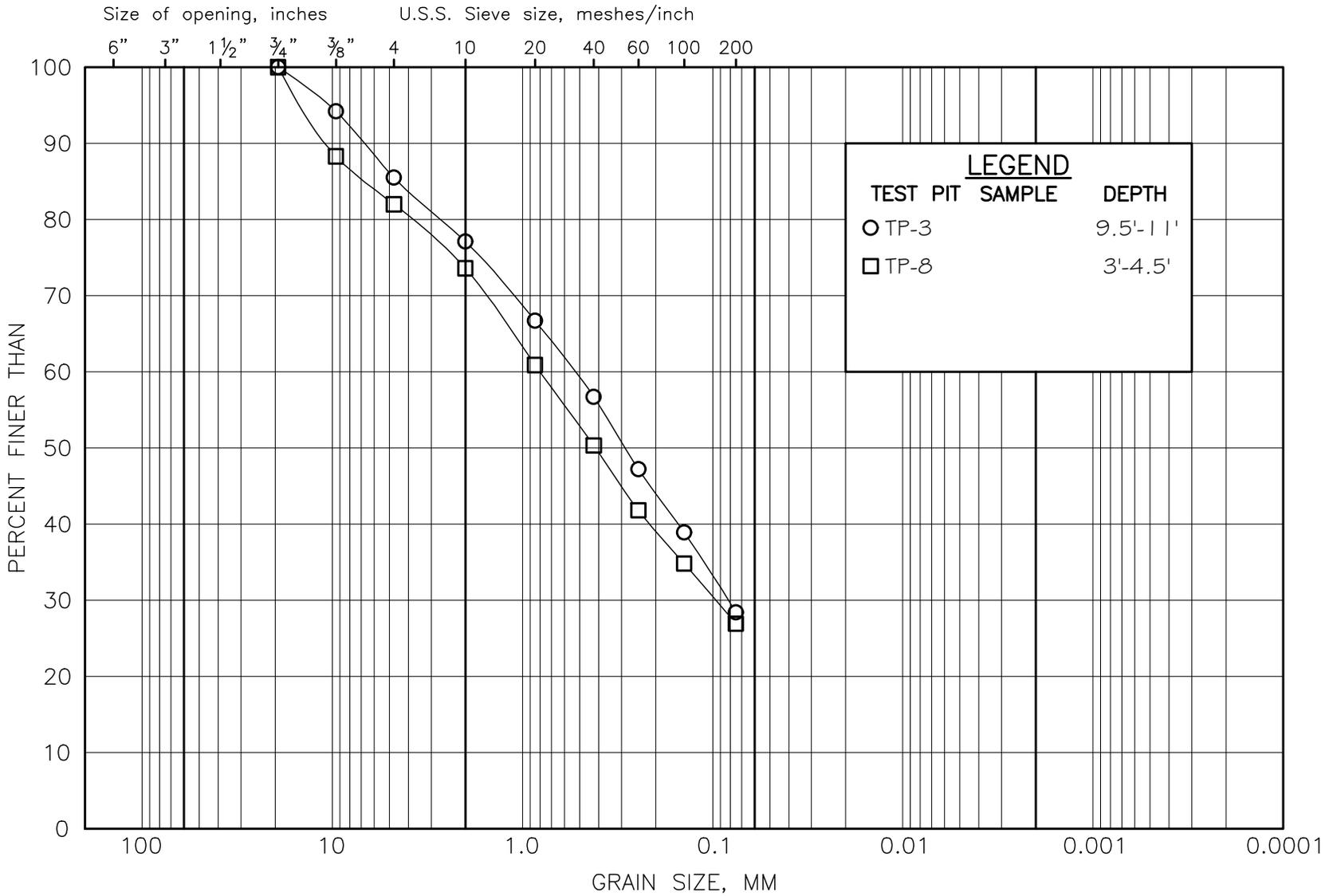
COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE
	GRAVEL SIZE			SAND SIZE				

McPHAIL ASSOCIATES, LLC

GRAIN SIZE DISTRIBUTION  
GLACIAL OUTWASH

FIGURE 4

M.I.T. GRAIN SIZE SCALE



**LEGEND**

TEST PIT	SAMPLE	DEPTH
○	TP-3	9.5'-11'
□	TP-8	3'-4.5'

COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE
	GRAVEL SIZE			SAND SIZE				

McPHAIL ASSOCIATES, LLC

GRAIN SIZE DISTRIBUTION  
GLACIAL TILL

FIGURE 5



**APPENDIX A:  
LIMITATIONS**



## **LIMITATIONS**

This report has been prepared on behalf of and for the exclusive use of TBA Architects, Inc. for specific application to the proposed additions to the existing Lt. Job Lane Elementary School to be located at Sweetwater Avenue in Bedford, Massachusetts in accordance with generally accepted soil and geotechnical engineering practices. No other warranty, expressed or implied, is made.

In the event that any changes in nature or design of the proposed construction are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by McPhail Associates.

The analyses and recommendations presented in this report are based upon the data obtained from the subsurface explorations performed at the approximate locations indicated on the enclosed plans. If variations in the nature and extent of subsurface conditions between the widely spaced explorations become evident during the course of construction, it will be necessary for a re-evaluation of the recommendations of this report to be made after performing on-site observations during the construction period and noting the characteristics of any variations.



**APPENDIX B:**

**TEST PITS TP-1 THROUGH TP-8  
PREPARED BY MCPHAIL**

JOB NO. 6151

DATE APRIL 19, 2016

# TEST PIT LOG

TEST PIT NO. 1

SOUTH ←

0 5 10 15 FT.

→ NORTH

GROUND SURFACE EL. +201.6

0.5

LOOSE, DARK BROWN, SILTY FINE SAND WITH TRACE ROOTS (TOPSOIL)

LOOSE TO DENSE, BROWN, SAND AND GRAVEL, TRACE SILT, TRACE COBBLES WITH BOULDERS, ROOTS, WOOD, BRICK, CONCRETE AND BLASTING WIRE (FILL)

12.0

BOTTOM OF TEST PIT

DEPTH (FT.)

0

5

10

15

McPHAIL ASSOCIATES, LLC

NOTE:

NO GROUNDWATER WAS OBSERVED IN OPEN TEST PIT UPON COMPLETION OF EXCAVATION.

JOB NO. 6151

DATE APRIL 19, 2016

# TEST PIT LOG

TEST PIT NO. 2

SOUTH ←

0 5 10 15 FT.

→ NORTH

GROUND SURFACE EL. +202.0

0.5

LOOSE, DARK BROWN, SILTY FINE SAND WITH TRACE ROOTS (TOPSOIL)

LOOSE TO DENSE, LIGHT BROWN TO BROWN, FINE TO COARSE SAND WITH SOME GRAVEL, TRACE SILT, TRACE COBBLES WITH BOULDERS, ROOTS, BLASTING WIRE AND BRICK (FILL)

12.0

BOTTOM OF TEST PIT

DEPTH (FT.)

0

5

10

15

McPHAIL ASSOCIATES, LLC

NOTE:

NO GROUNDWATER WAS OBSERVED IN OPEN TEST PIT UPON COMPLETION OF EXCAVATION.

JOB NO. 6151

DATE APRIL 19, 2016

# TEST PIT LOG

TEST PIT NO. 3

SOUTH ←

0 5 10 15 FT.

→ NORTH

GROUND SURFACE EL. +202.1

0.5

LOOSE, DARK BROWN, SILTY FINE SAND WITH TRACE ROOTS (TOPSOIL)

LOOSE TO DENSE, FINE TO COARSE SAND WITH SOME GRAVEL, TRACE TO SOME SILT WITH ROOTS, TRACE COBBLES WITH BOULDERS, TRACE BLASTING WIRE, BRICK, POSSIBLE MIX OF NATURAL GLACIAL TILL AND STRUCTURAL FILL (FILL)

5

9.5

COMPACT, LIGHT BROWN, SILTY AND GRAVELLY SAND, TRACE COBBLES (GLACIAL TILL)

11.0

BOTTOM OF TEST PIT

DEPTH (FT.)

0

10

15

McPHAIL ASSOCIATES, LLC

NOTE:

NO GROUNDWATER WAS OBSERVED IN OPEN TEST PIT UPON COMPLETION OF EXCAVATION.

JOB NO. 6151

DATE APRIL 19, 2016

# TEST PIT LOG

TEST PIT NO. 4

0 5 10 15 FT.

EAST ←

→ WEST

BUILDING BRICK AND MORTAR VENEER

GROUND SURFACE EL. +203.1

0

0.5

LOOSE, DARK BROWN, SILTY FINE SAND WITH TRACE ROOTS (TOPSOIL)

CONCRETE FOUNDATION WALL

LOOSE TO COMPACT, BROWN TO DARK BROWN, FINE TO COARSE SAND WITH SOME GRAVEL, TRACE SILT WITH COBBLES AND BOULDERS (FILL)

4.2

6 1/2"

CONCRETE FOOTING

5

5.5

6"

CONCRETE OVER-POUR DURING FOOTING POUR

BOTTOM OF TEST PIT

COMPACT, LIGHT BROWN, FINE TO COARSE, GRAVELLY SAND WITH TRACE COBBLES (GLACIAL OUTWASH)

5.8

DEPTH (FT.)

10

15

McPHAIL ASSOCIATES, LLC

NOTE:

NO GROUNDWATER WAS OBSERVED IN OPEN TEST PIT UPON COMPLETION OF EXCAVATION.

JOB NO. 6151

DATE APRIL 19, 2016

# TEST PIT LOG

TEST PIT NO. 4A

SOUTH ←

0 5 10 15 FT.

→ NORTH

GROUND SURFACE EL. +202.9

0

0.5

LOOSE TO COMPACT, BROWN TO DARK BROWN, FINE TO COARSE SAND, SOME GRAVEL, TRACE SILT WITH COBBLES AND BOULDERS, ROOTS, BRICK, GLASS, CONCRETE AND BLASTING WIRE (FILL)

LOOSE, DARK BROWN, SILTY FINE SAND WITH TRACE ROOTS (TOPSOIL)

5

5.5

COMPACT, LIGHT BROWN, SAND AND GRAVEL, TRACE SILT, TRACE COBBLES AND BOULDERS (GLACIAL OUTWASH)

10

10.0

DENSE TO VERY DENSE, LIGHT BROWN TO DARK GRAY, FINE TO COARSE SAND AND GRAVEL WITH SOME SILT, TRACE COBBLES AND BOULDERS (GLACIAL TILL)

11.5

BOTTOM OF TEST PIT

15

DEPTH (FT.)

MCPHAIL ASSOCIATES, LLC

NOTE:

NO GROUNDWATER WAS OBSERVED IN OPEN TEST PIT UPON COMPLETION OF EXCAVATION.

JOB NO. 6151

DATE APRIL 19, 2016

# TEST PIT LOG

TEST PIT NO. 5

0 5 10 15 FT.

EAST ←

→ WEST

BUILDING BRICK AND MORTAR VENEER

GROUND SURFACE EL. +203.2

0

0.5

LOOSE, DARK BROWN, SILTY FINE SAND WITH TRACE ROOTS (TOPSOIL)

CONCRETE FOUNDATION WALL

LOOSE TO COMPACT, DARK BROWN, FINE TO COARSE, SAND, SOME GRAVEL, TRACE SILT WITH COBBLES AND BOULDERS (FILL)

4.2

9 1/2"

CONCRETE FOOTING

2"

5

5.2

COMPACT, LIGHT BROWN, SAND AND GRAVEL, TRACE SILT, TRACE COBBLES (GLACIAL OUTWASH)

5.8

BOTTOM OF TEST PIT

DEPTH (FT.)

10

15

McPHAIL ASSOCIATES, LLC

NOTE:

NO GROUNDWATER WAS OBSERVED IN OPEN TEST PIT UPON COMPLETION OF EXCAVATION.

JOB NO. 6151

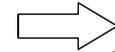
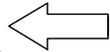
DATE APRIL 19, 2016

# TEST PIT LOG

TEST PIT NO. 6

0 5 10 15 FT.

EAST ←



→ WEST

BUILDING BRICK AND MORTAR VENEER

GROUND SURFACE EL. +203.0

0

0.5

LOOSE, DARK BROWN, SILTY FINE SAND WITH TRACE ROOTS (TOPSOIL)

CONCRETE FOUNDATION WALL

LOOSE TO COMPACT, BROWN TO DARK BROWN, SAND AND GRAVEL, TRACE SILT WITH COBBLES AND BOULDERS (FILL)

4.2

CONCRETE FOOTING

4 1/2"

5

5.1

6.0

BOTTOM OF TEST PIT

COMPACT, LIGHT BROWN, FINE TO COARSE, GRAVELLY SAND WITH TRACE COBBLES (GLACIAL OUTWASH)

DEPTH (FT.)

10

15

McPHAIL ASSOCIATES, LLC

NOTE:

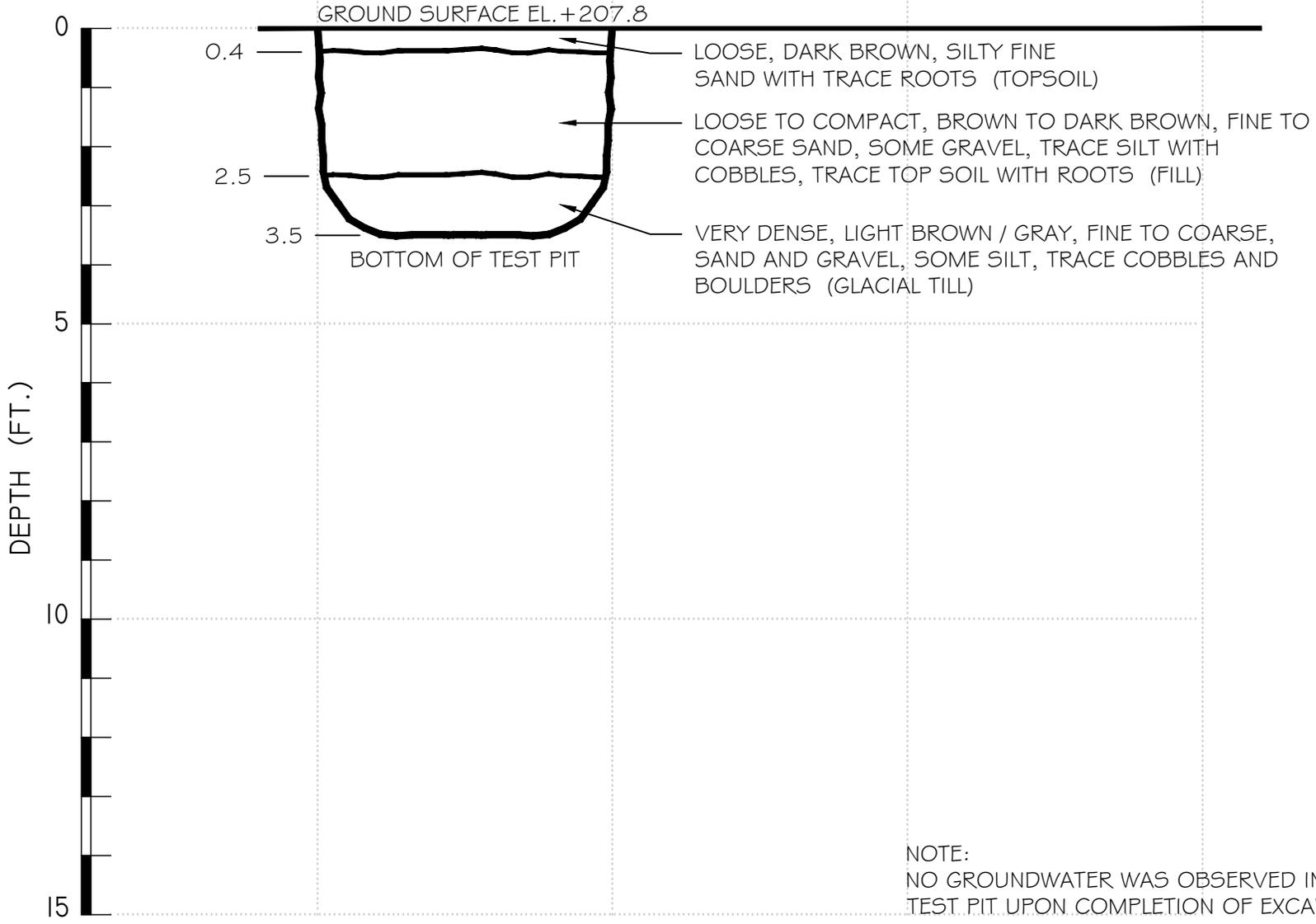
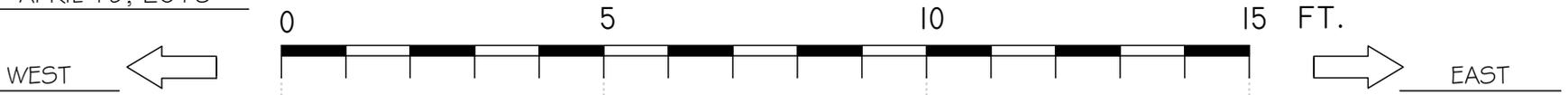
NO GROUNDWATER WAS OBSERVED IN OPEN TEST PIT UPON COMPLETION OF EXCAVATION.

JOB NO. 6151

DATE APRIL 19, 2016

# TEST PIT LOG

TEST PIT NO. 7



**MCPHAIL ASSOCIATES, LLC**

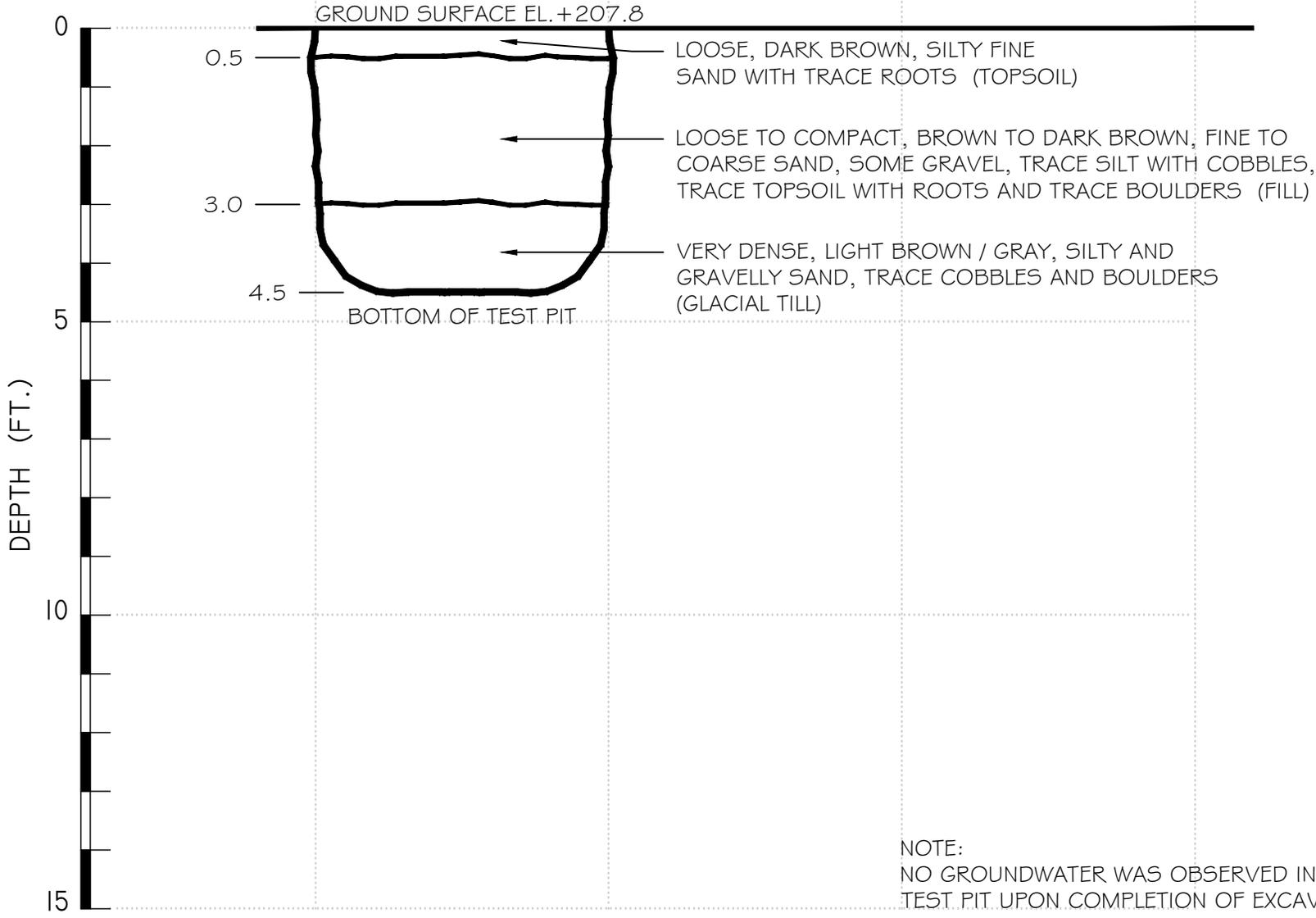
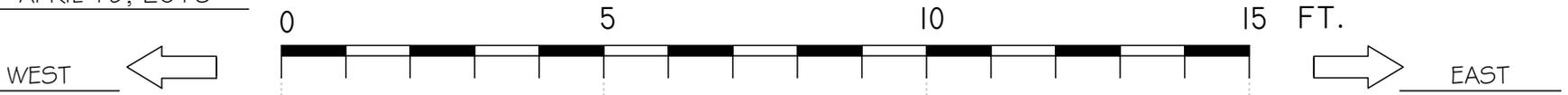
NOTE:  
NO GROUNDWATER WAS OBSERVED IN OPEN TEST PIT UPON COMPLETION OF EXCAVATION.

JOB NO. 6151

DATE APRIL 19, 2016

# TEST PIT LOG

TEST PIT NO. 8



**MCPHAIL ASSOCIATES, LLC**

NOTE:  
NO GROUNDWATER WAS OBSERVED IN OPEN TEST PIT UPON COMPLETION OF EXCAVATION.



**APPENDIX C:**

**BORING LOCATIONS PLAN AND BORING LOGS  
PREPARED BY TGGI**









# THE GEOTECHNICAL GROUP, INC.

Test Boring Log	- PROJECT -	Boring No.	B-4
	Proposed Additions Lane School Bedford, MA	Sheet 1 of 1	
		File No.	Y1422
		Review by:	James Handanyan

Boring Co. <i>Soil Exploration</i>	Boring Location: <i>See Plan</i>
Foreman <i>George</i>	Ground Elev. <i>201±</i>
TGG Observer <i>John Gannon</i>	Date Start > End <i>8/26/98</i>

<p style="text-align: center;">Sampling Protocol</p> <p>Unless otherwise noted, borings were accomplished using 4 inch inside diameter hollow stem augers. Samples were recovered using a 2-inch I.D. split spoon sampler, driven by blows of a 140 Lb. hammer falling 30 inches.</p>	Ground Water Readings (See Notes)				
	Date	Time	Depth to Bottom	Depth to Water	Rem.
	<i>8/26</i>	<i>Compl.</i>	<i>5.0'</i>	<i>--</i>	<i>5</i>

Sample Data						Strata Change	Sample Description
No.	Depth	Blows per 6 in.	Pen.	Rec	Rem		
<i>S-1</i>	<i>0-2.0</i>	<i>5-5-2-4</i>	<i>24"</i>	<i>12"</i>		<i>Fill 2.0</i>	<i>Loose tan fine to coarse SAND, some Silt, trace fine Gravel, trace roots.</i>
					<i>4</i>	<i>Glacial Till 5.0</i>	<i>Tan fine to coarse SAND, some fine to coarse Gravel, some Silt.</i>
					<i>3</i>		
<i>S-2</i>	<i>5.0</i>	<i>50/0"</i>	<i>0</i>	<i>0</i>	<i>1, 2</i>	Refusal	Bottom of Boring at 5.0 feet.

Remarks:

1. Auger and split spoon refusal at 5.0± feet.
2. Hole moved 7.0± feet south.
3. Auger refusal at 4.0± feet at new location.
4. Description based on auger flight sample.
5. No groundwater encountered.

# THE GEOTECHNICAL GROUP, INC.

Test Boring Log

- PROJECT -

Proposed Additions  
Lane School  
Bedford, MA

Boring No. B-5

Sheet 1 of 1

File No. Y1422

Review by: James Handanyan

Boring Co. Soil Exploration

Boring Location: See Plan

Foreman George

Ground Elev. 204±

TGG Observer John Gannon

Date Start > End 8/26/98

Sampling Protocol

Unless otherwise noted, borings were accomplished using 4 inch inside diameter hollow stem augers. Samples were recovered using a 2-inch I.D. split spoon sampler, driven by blows of a 140 Lb. hammer falling 30 inches.

Ground Water Readings (See Notes)

Date	Time	Depth to Bottom	Depth to Water	Rem.
8/26	Compl.	12.0'	--	4

Sample Data

No.	Depth	Blows per 6 in.	Pen.	Rec	Rem
5-1	0-2.0	2-8-12-9	24"	15"	
5-2	5.0-7.0	9-20-17-14	24"	18"	
5-3	10.0-11.0	25-50-50/0"	12"	12"	1, 2 3

Strata  
Change

Sample Description

		0.2 Topsoil Fill 1.0 Fill		Loose black Organic SILT, some roots.	
		Glacial Till		Medium dense brown fine to coarse SAND, some Silt, little fine coarse Gravel.	
		12.0		Dense light brown fine to coarse SAND, some Silt, little fine to coarse Gravel.	
		Refusal		Very dense brown fine to coarse SAND, some (-) Silt, little fine to coarse Gravel.	
				Bottom of Boring at 12.0 feet.	

Remarks: \*Medium dense brown fine to coarse SAND, some fine to coarse Gravel, trace Silt.

1. Split spoon refusal at 11.0± feet.
2. Possible weathered rock noted in nose of split spoon.
3. Auger refusal at 12.0± feet.
4. No groundwater encountered.





