ADDENDUM

PROJECT New Engineering and Science Building – The University of Connecticut
Project No. 901376

NO. Addendum No. 03

DATE April 20, 2015

All items of this addendum become part of the Contract Documents and amend, supplement, modify, change, delete or add to the provisions of the Contract Documents. Where any provision of the Contract Documents is so affected, the unaltered provisions shall remain in effect. Where possible, the provisions of this addendum shall be construed together with and harmonized with the provisions of the Contract Documents, but where the provisions of this addendum cannot be harmonized, the provisions of this addendum take precedence over conflicting provisions articles, paragraphs or subparagraphs in the Contract Documents.

THE PURPOSE OF THIS ADDENDUM IS TO CHANGE THE FOLLOWING ITEMS:
Make changes to scope of work as identified on the following affected specifications and drawings:

CHANGES TO THE SPECIFICATIONS:

1. Refer to revised specification Section 042000 Unit Masonry:
   a. **Change** to paragraph 3.4B Mortar Bedding and Jointing.
2. Refer to revised specification Section 062000 Carpentry:
   a. **Change** to paragraph 2.2 HARDWARE.
3. Refer to revised specification Section 072700 Air and Vapor Barrier Membrane:
   a. **Change** to paragraphs 1.5 QUALITY ASSURANCE, 2.2B Transition Membrane, 3.2 PREPARATION, 3.4 TRANSITION MEMBRANE, 3.5 THROUGH-WALL FLASHING MEMBRANE.
4. Refer to revised specification Section 075625 Fluid Applied Roofing System:
   a. **Change** to paragraphs 1.5 REFERENCES, 1.7 QUALITY ASSURANCE, 2.9 TAPERED INSULATION, 2.13 PRECAST CONCRETE PAVERS, 2.18 DRAIN INSPECTION BOXES, 3.3C Application of Primer, 3.5I Drip Edges and Gravel Stops, 3.11 INSULATION/COVER BOARD INSTALLATION.

5. Refer to revised specification Section 077100 Roof Specialties and Accessories:
   a. **Change** to paragraph 2.2 ALUMINUM COPINGS.
6. Refer to revised specification Section 078100 Sprayed Fire-Resistive Materials:
   a. **Change** to paragraph 1.3 SECTION INCLUDES.
7. Refer to revised specification Section 078123 Intumescent Fireproofing:
   a. **Change** to paragraph 1.3 SECTION INCLUDES.
8. Refer to revised specification Section 078413 Firestops and Smokeseals:
   a. **Change** to paragraph 1.3 SECTION INCLUDES.
9. Refer to revised specification Section 131146 Tank Filtration Equipment:
   a. **Added** Schematic Diagrams.
10. Refer to revised specification Section 133413 Fiberglass Tank Construction:
    a. **Change** to paragraphs 1.01 SUMMARY, 1.03 SUBMITTALS, 2.01A FRP Fabrications, 3.01 ONSITE INSTALLATION.

CHANGES TO THE DRAWINGS:

FOUNDATION

1. Refer to drawing FD1.0:
   A. **Change** cleanouts and piping layout.

LANDSCAPE

1. Refer to drawing L5.01A:
   A. **Change** roof planting plan layout.

ARCHITECTURAL

1. Refer to drawing A2.00:
   A. **Change** detail reference and notes for sewage ejector.
2. Refer to drawing A2.07:
   A. Roof Plan 1: **Revise** non-vegetated areas per FM Global Requirements.
3. Refer to drawing A4.01:

A. **Revise** section to show 3rd floor slab.

4. Refer to drawing A4.02:

   A. **Revise** section to show 3rd floor slab.

5. Refer to drawing A4.04:

   A. Detail 2: **Delete** spray foam insulation at storefront.

6. Refer to drawing A4.05:

   A. Detail 3: **Delete** spray foam insulation at storefront.

7. Refer to drawing A6.00:

   A. Detail 5: **Define** waterstops at utility tunnel.

8. Refer to drawing A6.02:

   A. **Add** detail reference key for glass fin in plan.

   B. **Add** enlarged plan detail at unitized joint between aluminum panel and glass unit.

9. Refer to drawing A6.04:

   A. Detail 3: **Delete** spray foam insulation at storefront.

10. Refer to drawing A6.05:

    A. Detail 3: **Delete** spray foam insulation at storefront.

11. Refer to drawing A6.10:

    A. Detail 1, 2, 3 & 5: **Add** AVB transition membrane at CMU corners.

    B. Detail 2: **Clarify** CMU construction at steel column.

    C. Detail 4: **Clarify** AVB continuity; **Add** detail reference key at left side of the door.

    D. Detail 6: **Clarify** AVB extent and construction sequence; **Revise** CMU depth.

    E. Detail 7: **Clarify** AVB extent and construction sequence.

12. Refer to drawing A6.11:

    B. Detail 5: **Add** mullion wrap insulation at spandrel area.

    C. **Add** Detail 7 for enlarged plan of aluminum trim at Door S1B.2.

13. Refer to drawing A6.12:

    A. Detail 7: **Add** AVB transition membrane at changes in back-up materials.

14. Refer to drawing A6.13:

    A. **Add** Detail 7 for WT-1 transition at aluminum panel and glass unit.

15. Refer to drawing A6.14:

    A. Detail 1 & 2: **Add** AVB transition membranes at CMU corners.

    B. Detail 3: **Add** AVB transition membrane; **Add** thermal insulation at steel post; **Delete** note for metal steps.

    C. Detail 4 & 5: **Add** AVB transition membrane at CMU corners; **Clarify** note for galvanized steel sub-girt set in mastic.

16. Refer to drawing A6.30:

    A. Detail 3, 4, 5, 6, 7, 8, 9: **Clarify** AVB transition membrane and through wall flashing at window and louver openings.

17. Refer to drawing A6.31:

    A. Detail 1: **Clarify** overlap at stainless steel flashing and roofing membrane; **Add** detail reference key.

    B. Detail 3 & 11: **Clarify** AVB at door head; **Extend** roofing under threshold and into wall cavity at jambs.

    C. Detail 5: **Clarify** overlap at stainless steel flashing and roofing membrane.

    D. Detail 7: **Add** exterior gypsum sheathing; **Clarify** overlap at stainless steel flashing and roofing membrane.

    E. Detail 8: **Clarify** typical foundation waterproofing detail.

    F. Detail 9: **Clarify** extent of roofing membrane.

    G. Detail 10: **Extend** solid blocking; **Clarify** transition of AVB and roofing.

18. Refer to drawing A6.32:

    B. Detail 3, 4: **Clarify** AVB transition membrane and through wall flashing

    C. Detail 5, 6, 8: **Delete** spray foam insulation at storefront

19. Refer to drawing A6.33:
    A. **Add** detail 5.
    B. Detail 2: **Clarify** detail at stainless steel flashing and roofing membrane; **Add** detail reference key.
    C. Detail 4: **Clarify** AVB at door head and waterproofing at threshold.
    D. **Add** Detail 5: waterproofing detail at foundation pits.
    E. Detail 6: **Revise** to show concrete header
    F. Detail 8: **Add** AVB transition membranes at changes in back-up materials.
    G. **Add** Detail 10 & 11 for typical wall and slab penetration details.
    H. **Add** Detail 12 for typical WT-1 parapet coping at backup wall
20. Refer to drawing A6.50:
    A. Detail 4, 5: **Add** galvanized steel gabions at roof drains.
21. Refer to drawing A6.70:
    A. Detail 1 & 3: **Add** epoxy resin composition flooring beneath walk-off mat.
    B. Detail 2: **Delete** spray foam insulation at aluminum weather barrier.
    C. Detail 5: **Clarify** transition from waterproofing to AVB; **Add** epoxy resin composition flooring beneath walk-off mat.
22. Refer to drawing A8.01:
    A. **Add** sprinkler heads at exterior soffit.
23. Refer to drawing A9.05:
    A. **Changes** water tank sections and details.

STRUCTURAL

1. Refer to drawing S-100:
    A. **Changes** to footing elevations on grid lines F & G.
    B. **Change** to depth of sewage ejector pit.
2. Refer to drawing S-201:

A. **Add** waterstops and vapor barrier to sections.

3. Refer to drawing S-202:

   A. **Add** waterstops and waterproofing to sections.

HVAC

1. Refer to drawing H-1.06

   A. **Added** (3) FSD's at exhaust fan room

2. Refer to drawing H-3.01

   A. **Added** (3) FSD's at exhaust fan room

3. Refer to drawing H-2.00

   A. **Revised** drawing to show location of CH and HW piping to water tank heat exchanger, piping was also shown as part of Bid Documents dated 2/20/2015 on drawings H-3.01, H-3.03 and H-5.03 detail #8.

4. Refer to drawing H-0.10

   A. **Added** drawing "FOR REFERENCE ONLY"

PLUMBING

1. Refer to drawing P1.00:

   A. **Relocated** piping for water tank connections.

FIRE PROTECTION

1. Refer to drawing FP0.02:

   A. **Added** dry sprinkler valve detail.

2. Refer to drawing FP1.00:

   A. **Added** dry sprinkler valve and associated piping.

3. Refer to drawing FP1.01:

   A. **Added** dry sprinkler piping and sprinklers to all exterior overhangs.

4. Refer to drawing FP3.00:

   A. **Coordinated** riser diagram with plan revisions.

ELECTRICAL

1. Refer to drawing E-300

   A. **Added** power connections for water tank equipment.

   B. **Added** power for Dry Valve system.

2. Refer to drawing FA-400

   A. **Added** Alarm Check Valve fire alarm devices.

3. Refer to drawing FA-401

   A. Added (1) Water motor gong.

CHANGES TO FUSCO MANUAL 00

1. Changes and Clarifications to Scope of Work for BP 03.0
2. Changes and Clarifications to Scope of Work for BP 05.0
3. Changes and Clarifications to Scope of Work for BP 07.0
4. Changes and Clarifications to Scope of Work for BP 08.0
5. Changes and Clarifications to Scope of Work for BP 22.0
6. Changes and Clarifications to Scope of Work for BP 23.0
7. Changes and Clarifications to Scope of Work for BP 31.0

Sign in Sheet for April 16, 2015 Pre Bid Conference

END OF ADDENDUM No. 3 SUMMARY

EXHIBIT "B"
SCOPE OF WORK
New Engineering & Science Building
UCONN Storrs Campus
Storrs, CT
UCONN Project No. 901376

Bid Package No.23.0 HVAC

THE FOLLOWING WORK IS INCLUDED IN THE SUBCONTRACT:

The Scope of Work shall include but not be limited to labor, materials, equipment and all incidental work associated with **HVAC** as described in the Contract Documents and as outlined below. It is the intent of this Subcontractor to provide for the complete coordination, furnishing and installation of all **HVAC** as required, shown, described and specified under this Bid Package, and all related scope and services, required to complete the Project.

This Subcontractor shall be responsible to perform all Work not expressly specified or indicated by the Contract Documents but as required for a thorough and complete execution of the Work of this Bid Package/Subcontract in every respect. Note that the word "provide" if, and when used herein shall mean furnish and install completely, including all costs for labor, materials, and equipment. It is further understood that the Project Drawings, Specifications and other Documents listed in Exhibit B, may not be fully developed, and that the total Subcontract Agreement Price will include whatever is required beyond same to provide a complete and functional installation to the satisfaction of the Owner and Construction Manager. Should a conflict occur within the Contract Documents, the most restrictive, greatest quantity and highest quality shall prevail.

SCOPE OF WORK

1) **BID PACKAGE #22.0 – HVAC:** This Subcontractor is responsible to provide all coordination, manufacturing, fabrication, labor, materials, tools, equipment and appurtenances of every kind for the complete execution to furnish and install the **HVAC** and related work as described in the Specifications, Drawings, Site Logistics Plans and herein. The Scope of Work shall include, but not be limited to, the General Conditions, all Division One Specification Sections and all of the Work of this Bid Package in the following Specification Section(s) and those related Specification Sections, as shown and indicated on the Contract Documents, as shown and as further described herein:

Specification Sections of the Project Manuals:
Include all work for all specifications sections specifically listed below or as applicable if indicated "(As Applicable)". In addition, complete work in other specification sections not listed as applicable to this scope of work and as described in the Scope of Work and Contract Documents.

SECTION	
01-1000	Summary
01-2200	Unit Prices
01-2300	Alternates
01-2500	Substitution Procedures
01-2600	Contract Modification Procedures
01-3100	Project Management and Coordination
01-3200	Construction Progress Documentation
01-3233	Photographic Documentation
01-3300	Submittal Procedures
01-4000	Quality Requirements
01-5000	Temporary Facilities and Controls
01-5639	Temporary Tree and Plant Protection
01-5719	Temporary Environmental controls
01-6000	Product Requirements
01-6100	University Product Standard
01-7300	Execution
017419	Construction Demolition Waste Management
01-7700	Closeout Procedures
01-7823	Operation and Maintenance Data
01-7839	Project Record Documents
01-7900	Demonstration and Training
018113	VOC Limits for Adhesives, Sealants, Paints and Coatings
018119	Construction Indoor Air Quality
019113	Building Commissioning Requirements

DIVISION 6 - WOOD, PLASTICS AND COMPOSITES SECTION	
064023	Architectural Woodwork

DIVISION 7 - THERMAL AND MOISTURE PROTECTION SECTION	
079200	Joint Sealers

DIVISION 8 - OPENINGS SECTION	
089000	Louvers and Vents (As Applicable)

DIVISION 11 - EQUIPMENT SECTION	
116200	Laboratory Equipment (As Applicable)

DIVISION 13 - SPECIAL CONSTRUCTION SECTION

132100 Laboratory Environmental Rooms (As Applicable)

DIVISION 14 - CONVEYING EQUIPMENT

142100 Traction Elevators (As Applicable)

TABLE OF CONTENTS – VOLUME 2

DIVISION 21 - FIRE SUPPRESSION (As

Applicable)

DIVISION 22 – PLUMBING (As Applicable)

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING

230500 BASIC MECHANICAL MATERIALS AND METHODS
230510 3D BUILDING INFORMATION MODELING
230513 MOTORS AND CONTROLLERS
230514 VARIABLE FREQUENCY DRIVES
230516 PIPE EXPANSION
230519.10 METERS
230519.20 HYDRONIC PIPING SPECIALTIES
230523 HVAC VALVES AND STRAINERS
230529 HANGERS AND SUPPORTS
230533 ELECTRIC HEAT TRACE
230548 MECHANICAL VIBRATION CONTROLS & SEISMIC RESTRAINTS
230553 MECHANICAL IDENIFICATION
230584 TROUGH-PENETRATION FIRESTOP SYSTEMS
230593 TESTING, ADJUSTING AND BALANCING
230713 DUCT INSULATION
230716 EQUIPMENT INSULATION
230719 HVAC PIPING INSULATION
232000 HVAC PIPING AND JOINTS
232113.13 HVAC UNDERGROUNDPIPING
232123 HVAC HTDRONIC PUMPS AND ACCESSORIES
232223 STEAM AND CONDENSATE SPECIALTIES
232500 CHEMICAL WATER TREATMENT
233100 SHETTMETAL WORK AND ACCESSORIES
233319 SOUND ANTENUATORS
233600 AIR TERMINAL BOXES
233620 LABORATORY SYSTEM
233700 REGISTERS, GRILLES AND DIFFUSERS
233723 ROOF ACCESSORIES
233900 FANS AND ACCESSORIES

234100	FILTERS
235700	HEAT EXCHANGERS
236415	AIR COOLED WATER CHILLERS
236500	COOLING TOWERS
237323	FACTORY BUILT-UP AIR HANDLING UNITS
238216	COILS
238235	TERMINAL HEAT TRANSFER UNITS
238900	STEAM HUMIDIFIERS
239000	HVAC SPECIALTIES

DIVISION25 – INTERGRATED AUTOMATION

250500	BASIC MATERIALS AND METHODS
250630	SCHEDULES
251000	DIRECT DIGITAL/AUTOMATIC TEMPERATURE CONTROLS
253523	DDC CFM TRACKING TERMINAL BOXES (VAV, VCV, CV, VVE, CVE DESIGNATIONS)
255000	INSTRUMENTATION TERMINAL DEVICES
259000	SEQUENCE OF OPERATIONS

DIVISION 26 – ELECTRICAL As Applicable)

DIVISION 27 – COMMUNICATIONS TABLE OF CONTENTS (As Apllicable)

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

281000	Security Systems (As Applicable)
283110	Fire Alarm System (As Applicable)

APPENDICES

Appendix 1
REPORT ON GEOTECHNICAL ENGINEERING ASESSMENT AND PRELIMINARY ENVIRONMENTAL PRECHARACTERIZATION PROGRAM – AUGUST, 2014
ADDITIONAL SUBSURFACE EXPLORATIONS AND GEOTECHNICAL ENGINEERING CONSIDERATIONS – 19 DECEMBER, 2014

Appendix 2
REPORT ON ENVIRONMENTAL PRECHARACTERIZATION PROGRAM PROPOSED SCIENCE AND ENGINEERING BUILDING – DECEMBER, 2014
REVISED FEBRUARY 2015

2) Electrical Connections for Equipment:

a. The Electrical Contractor shall provide single source line voltage to all equipment provided within this project for all trades unless specifically noted otherwise.
b. Starters, variable frequency drives (VFDs), Disconnects Low Voltage and Control Wiring including control voltage transformers shall be provided by the HVAC

Contractor for all of your equipment, unless specifically noted to be provided by the Electrical Contractor.

c. The Electrical Contractor shall provide line voltage to only those the Temperature Control Panels indicated or shown on the Contract Documents.
d. Failure to notify the Fusco Corporation of any discrepancies shall be construed as acceptance of the condition.

3) Seismic Bracing:

a. This Subcontractor shall furnish and install all seismic bracing as required and indicated in the Contract Documents including stamped calculations by a State of Connecticut licensed engineer.
b. This Subcontractor shall furnish and install all flexible joint assemblies associated with any mechanical restraint collars as indicated in the Contract Documents.

4) Temporary and Permanent Heating and Cooling:

a. <u>The HVAC Contractor shall utilize both the Permanent Cooling and Heating Equipment for Temporary Cooling and Heating subject to the approval of the Construction Manager, in its sole discretion. Subcontractor to provide all temporary heating and cooling as required and specified below.</u>

b. The HVAC Contractor shall provide Cooling / Humidity Control with **<u>New Permanent Heating System</u>** during the winter of 2016/2017. Sufficient temperature for temporary cooling shall be a maximum ambient temperature of 65 degrees Fahrenheit and a maximum relative humidity of 50 percent**.**

c. New mechanical systems may be employed to provide temporary heat during construction and occupancy of this project when feasible. Subcontractor shall be responsible to supply temporary or permanent power to these systems at each phase of the project as required. It will be the responsibility of this subcontractor to ensure that its equipment is properly maintained and protected while these systems are being utilized. Subcontractor shall carry all costs for an extended warrantee until final acceptance by owner for all equipment and systems employed to support these heating systems.

d. The HVAC Contractor shall provide **<u>all temporary control wiring</u>** for its temporary heating and cooling systems. At a minimum, thermostat controls shall be provided in a quantity (one per floor per unit) and location (remote from Units), as approved by the Construction Manager, to accommodate an evenly distribution of temporary heating and cooling.

e. All necessary Equipment, Temperature Controls, Piping, Safety Controls that may be required shall be installed and operational prior to requesting approval to utilize the permanent heating or cooling system.

f. The HVAC Contractor shall provide **temporary filters at all return ducts as required** and at the sole discretion of the Construction Manager, changed at weekly intervals, so as not to allow the migration of construction dirt and dust. Additionally Duct detectors shall be protected.

g. **Power Consumption** cost (**Usage Only**) to operate the Permanent Cooling System shall be by others.

h. **Fuel Consumption** cost (**Usage Only**) to operate the Temporary and Permanent Heating System shall be by others.

i. The HVAC Contractor shall take adequate precautions to prevent any Damage from occurring to the Permanent Heating and Cooling Equipment while providing Temporary Heating.

j. All system filters for liquid or air shall be routinely replaced as required by maintenance intervals, written in the O & M Manuals.

k. All permanent HVAC Systems and Components utilized for Temporary Heating shall be **completely serviced, vacuumed, cleaned and turned over in "As New" condition** prior to acceptance by Owner.

l. All HVAC Equipment and Filters used for Temporary Cooling shall have the **Warranties and Guarantees Extended** so that their full term as specified is available to the Owner from the date of Substantial Completion of each Phase as required by the Contract Documents.

m. The Electrical Contractor shall provide all power wiring necessary to accommodate the above Temporary and Permanent Heating and Cooling requirements.

5) Fire Alarm Systems:

The HVAC Contractor shall provide any and all coordination that may be required with the Electrical Contractor as it relates to the Fire Alarm System. This shall include but not be limited to Tie-ins, Equipment, Meetings, Drawings, Sketches, Schematics Tests and etc as indicated on the Contract Documents

It is the intent of the Contract Documents that the Fire Alarm System be complete in all respects. Failure to notify the Construction Manager that discrepancies exist within the Contract Documents shall be construed as acceptance of the information provided. Duct Smoke Detectors will be furnished by the Electrical Contractor for Installation by this Contractor.

6) Underground Ducts and Utilities

The Site Contractor and/or Utility Company shall provide water, storm and sanitary service from point of origin to within 5' of the building line. The Site Contractor shall also provide Trenching, Bedding, Backfilling, Concrete Anchors, Thrust Blocks and Encasement as required for your work and the work of other trades.

The HVAC Contractor shall be responsible for connections to each service within your Scope of Work provided by the Site Contractor and/or Utility Co. to complete the installation. Inserts, sleeve and the like required to enter/penetrate Foundation Wall and/or slabs shall be provided and sealed/Waterproofed by the HVAC Contractor.

7) Service Connections:

The HVAC Contractor shall be responsible for all final connections, including, shut off valves, disconnects and etc. for all Equipment, (furnished by others) as it relates to your scope of work, including but not limited to: Casework, Lab Equipment and Casework, Fume Hoods, Walk in Coolers, Owner Supplied Equipment, and etc.

The HVAC Contractor shall coordinate with the appropriated Contractor to assure that all services are complete in all respects. Failure to notify the Construction Manager of any discrepancies shall be construed as acceptance of the connection locations.

The HVAC and Electrical Contractors shall each be responsible for final connections and control wiring as required for equipment and as noted on the Contract Documents.

8) Equipment:

The Electrical Contractor shall provide line voltage to all equipment provided within this project for all trades unless specifically noted otherwise. Starters and disconnects shall be provided by the Contractor that is providing the motorized equipment unless specifically noted to be provided by others.

The HVAC Contractor will coordinate and shall furnish all starters and disconnects switches for all HVAC, and ATC equipment and as specified and scheduled on the Plumbing and HVAC Drawings. Installation of such will be by the Electrical Contractor.

9) Balancing Systems:

The HVAC Balancing Subcontractor shall provide <u>extended service on balancing for one-hundred and eighty (180) days</u> beyond full building occupancy during which time any resetting, readjusting or rebalancing shall be performed to any terminal, fan or zone to correct comfort conditions or to confirm information submitted in the balancing report.

The Balancing Contractor shall provide technicians as needed to assist the mechanical engineers in making any test that he or she may require during this time.

The HVAC balancing Contractor must have at least three years experience in testing, adjusting and balancing (TAB) procedures for equivalent sized projects. The personnel conducting the air system TAB must be certified by Associated Air Balancing Council (AABC). All instruments must have documented calibration traceable o the bureau of standards.

10) Ductwork and Terminal Air Equipment:

The HVAC Contractor shall cover all open ends of ductwork and terminal air equipment with air tight seals on a daily basis and shall be maintained until such time as the system is completed and the Construction Manager and the Mechanical Engineer indicates that these seals can be removed. This includes from when the material is delivered to the site to final installation. This Contractor is required to perform air leakage testing per SMACNA requirements and/or per the contract document. If air seals are broken prior to installation, the Construction Manager may require the piece to be HAND Cleaned, resealed, retested.

As indicated in the Project Specification, the Mechanical Trade Contractor shall be responsible for **Cleaning ALL of the Ductwork and HVAC Units** before the Phase and the Project is turned over to the Owner.

11) Louvers and Grilles

Only "Architectural Louvers" shall be provided by the General Trades Contractor. All other louvers, grills and the like shall be the responsibility of the Plumbing and HVAC Contractor.

The Plumbing and HVAC Contractor shall be responsible for all final connections to the Architectural Louvers provided by the General Trades Contractor.

12) Condensate Piping

The HVAC Contractor is responsible for **ALL** condensate drain piping (including insulation) and related pumps and accessories.

13) Ductwork and Pipe Testing

The HVAC Contractor shall include all cost associated with duct work and pipe leakage testing, balancing, hydrostatic testing, flushing to industry cleanliness specifications, and chemical pretreatment and all other industry standard testing related to this bid package.

14) Building Management System

Furnish and install the complete building management controls system for the mechanical systems.

15) Heat Trace:

The Mechanical Contractor will furnish and install all electric heat trace cable systems indicated on the Contract Documents and the Electrical Contractor will provide all of the power wiring to these heating cables.

16) Commissioning and Training:

Engage factory-authorized service representatives to perform startup services and to demonstrate and train Owner's maintenance personnel as described in the Project manual and as specified below.

a.) Coordinate food equipment startup with service-utility testing, balancing, and adjustments. Do not operate steam lines before they have been cleaned and sanitized.

b.) Remove protective coverings and clean and sanitize equipment, both inside and out, and relamp equipment with integral lighting. Where applicable, comply with manufacturer's written cleaning instructions when final cleaning.

c.) Test each equipment item for proper operation. Repair or replace equipment that is defective in operation, including units that operate below required capacity or that operate with excessive noise or vibration.

d.) Test refrigeration equipment's ability to maintain specified operating temperature under heavy-use conditions. Repair or replace equipment that does not maintain specified operating temperature.

e.) Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

f.) Test motors and rotating equipment for proper rotation and lubricate moving parts according to manufacturer's written instructions.

g.) Test water, drain, gas, steam, oil, refrigerant, and liquid-carrying components for leaks. Repair or replace leaking components.

h.) Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance for each food service equipment item.

i.) Review data contained in the operation and maintenance manuals. Schedule training with Owner, through Architect, with at least 7 days' advance notice.

17) Access Doors:

The HVAC Contractor shall provide access doors to the General Trades Contractor for installation. The access door provided shall be of compatible use for the finish assemble. Sizing shall be suitable to meet required access code.

18) BIM Modeling Coordination Drawings:

a. This Subcontractor shall **take the lead, become the primary "Gate Keeper"** , provide BIM Modeling for the MEP Coordination Drawings and attend weekly coordination drawings.

CLARIFICATIONS

1. **This Bidder may elect to submit a Bid Proposal combining Bid Packages 22.0 and 23.0 if the amount of the Bid Proposal offers a cost reduction. This combined Bid Packages "Offer" will be valid only if the Bidder submits an individual offer for each package involved. Bidders may offer this combined package proposal by submitting it on his or her business letterhead, as an added page to each Bid Form.**

EXCLUSIONS

1) Sale and Use Taxes.

ALTERNATE BIDS

Provide Alternate Bids as requested on Bid Form.

UNIT PRICES

Provide Unit Prices as requested on Bid Form.

ALLOWANCES

This Contractor shall include within the Subcontract Price Allowances as listed below. Allowances shall include all necessary material, cost for delivery, installation, machinery, insurance, and applicable taxes.

Allowances shall appear as a line item on the Contractor's Schedule of Values. The allowance amount covers the cost of the Contractor's labor/material/equipment delivered to the project plus all taxes less any trade discounts to which the contractor may be entitled with respect to the item of work. The Contractor's costs for supervision, overhead, profit and other administrative expenses with respect to the allowance item are included in the base contract amount - not in the allowance amount.

All increases to an Allowance shall be by Change Order. Any unused portion of an allowance shall be returned to the Owner by deduct Change Order.

EXHIBIT "B"
SCOPE OF WORK

New Engineering & Science Building
UCONN Storrs Campus
Storrs, CT
UCONN Project No. 901376

Bid Package 03.0 - Concrete

THE FOLLOWING WORK IS INCLUDED IN THE SUBCONTRACT:

The Scope of Work shall include but not be limited to labor, materials, equipment and all incidental work associated with **Concrete** as described in the Contract Documents and as outlined below. It is the intent of this Subcontractor to provide for the complete coordination, furnishing and installation of all **Concrete** as required, shown, described and specified under this Bid Package, and all related scope and services required to complete the Project.

This Subcontractor shall be responsible to perform all Work not expressly specified or indicated by the Contract Documents but as required for a thorough and complete execution of the Work of this Bid Package/Subcontract in every respect. Note that the word "provide" if, and when used herein shall mean furnish and install completely, including all costs for labor, materials, and equipment. It is further understood that the Project Drawings, Specifications and other Documents listed in Exhibit B, may not be fully developed, and that the total Subcontract Agreement Price will include whatever is required beyond same to provide a complete and functional installation to the satisfaction of the Owner and General Contractor. Should a conflict occur within the Contract Documents, the most restrictive, greatest quantity and highest quality shall prevail.

SCOPE OF WORK

1) **BID PACKAGE #3.0 – Concrete:** This Subcontractor is responsible to provide all coordination, manufacturing, fabrication, labor, materials, tools, equipment and appurtenances of every kind for the complete execution to furnish and install the **Concrete** and related work as described in the Specifications, Drawings, Site Logistics Plans and herein. The Scope of Work shall include, but not be limited to, the General Conditions, all Division One Specification Sections and all of the Work of this Bid Package in the following Specification Section(s) and those related Specification Sections, as shown and indicated on the Contract Documents, as shown and as further described herein:

Project Manuals:

Entitled: Bid Documents **Volume 1** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Mitchell Giurgola Architects, LLP. 630 Ninth Avenue New York, NY 10036 Dated February 20, 2015

Entitled: Bid Documents **Volume 2** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Mitchell Giurgola Architects, LLP. 630 Ninth Avenue New York, NY 10036 Dated February 20, 2015

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REPORT ON GEOTECHNICAL ENGINEERING ASESSMENT AND PRELIMINARY ENVIRONMENTAL PRECHARACTERIZATION PROGRAM – AUGUST, 2014
ADDITIONAL SUBSURFACE EXPLORATIONS AND GEOTECHNICAL ENGINEERING CONSIDERATIONS – 19 DECEMBER, 2014

Entitled: Bid Documents **Appendix 2** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Mitchell Giurgola Architects, LLP. 630 Ninth Avenue New York, NY 10036 Dated February 20, 2015.
REPORT ON ENVIRONMENTAL PRECHARACTERIZATION PROGRAM PROPOSED SCIENCE AND ENGINEERINGBUILDING – DECEMBER, 2014

Entitled: Bid Documents **Volume 00** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Fusco Corporation 555 Long Wharf Drive New Haven, CT 06511 Dated February 20, 2015

Schedule of Drawings: See drawing list included in Manual 00

Specification Sections of the Project Manual:

DIVISION 1 - GENERAL REQUIREMENTS

SECTION

01-1000	Summary
01-2200	Unit Prices
01-2300	Alternates
01-2500	Substitution Procedures
01-2600	Contract Modification Procedures
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01-3200	Construction Progress Documentation
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01-5639	Temporary Tree and Plant Protection
01-5719	Temporary Environmental controls
01-6000	Product Requirements
01-6100	University Product Standard
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018113	VOC Limits for Adhesives, Sealants, Paints and Coatings
018119	Construction Indoor Air Quality
019113	Building Commissioning Requirements

DIVISION 3 - CONCRETE SECTION

033000	Cast-In-Place Concrete

DIVISION 5 - METALS

SECTION

051200	Structural Steel (As Applicable)
053000	Metal Decking (As Applicable)
055000	Miscellaneous Metals (As Applicable)
055100	Steel Pan Stairs (As Applicable)
055200	Decorative Rail Systems (As Applicable)
057000	Ornamental Metals (As Applicable)
057100	Ornamental Stairs (As Applicable)

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION

071326	Sheet Membrane Waterproofing (Elevator Pit)
079200	Joint Sealers (As Applicable)

DIVISION 14 - CONVEYING EQUIPMENT

142100	Traction Elevators (As Applicable)

APPENDICES

Appendix 1
REPORT ON GEOTECHNICAL ENGINEERING ASESSMENT AND PRELIMINARY ENVIRONMENTAL PRECHARACTERIZATION PROGRAM – AUGUST, 2014
ADDITIONAL SUBSURFACE EXPLORATIONS AND GEOTECHNICAL ENGINEERING CONSIDERATIONS – 19 DECEMBER, 2014

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REPORT ON ENVIRONMENTAL PRECHARACTERIZATION PROGRAM PROPOSED SCIENCE AND ENGINEERING BUILDING – DECEMBER, 2014
REVISED FEBRUARY 2015

1) Vibration and Sound Management

It is the requirement of this Contractor to adhere to the Vibration and Sound management practices as described in Specification Section 31 09 13 and to be aware of the location and proximity of the underground Vivarium. Traffic MUST be diverted around and at no time can any traffic drive directly over its location. Cost's associated with said monitoring will be paid by the Owner

2) Description of Work:

a. The following requirements are in addition to those contained within the contract drawings, specifications, and bidding instructions and shall serve to amend, clarify, or supplement the requirements of those sections:

Cast-in-Place Concrete and Accessories; Concrete Forms; Shores and Re-Shores; Admixtures; Curing Materials and Compounds; Bonding Agents; Adhesives; Interior Pads for Mechanical/Electrical Equipment per the MEP drawings; Housekeeping Pads; Concrete Reinforcement; welding of reinforcement, Wire Welded Mesh, Slabs on Grade; Slabs on Metal Deck; Concrete Fill for Metal Pan Stairs; Vapor Barriers; Opening Blockouts; Water Stops; Anchor Bolt Placement and Layout; Grouting of Columns Bases; Grouting of Bearing and/or Leveling Plates; Installation of Embedded Items; Concrete Haunches; Lightweight Concrete; Drilling and Grouting of Reinforcing; Drilling and Epoxy of Reinforcing; Slab Expansion Joints; Sawcutting of Slab Control Joints; Setting of Anchor Bolts; Grouting of Base Plates; Rubbing of Exposed Concrete; Winter Protection of Concrete Placements; Masonry Shear Wall Footings; etc.

3) Vapor Barriers:

The Concrete Contractor shall provide all Under-slab Vapor Barriers and vapor retarders and accessories as noted on the Contract Documents.

4) Sumps and Pits:

This Concrete Subcontractor is responsible for all sump pits and elevator pits. Excavation and backfill will be by the Site Work Subcontractor.

5) Metal Pan Stairs & Decks:

a. The Concrete Contractor shall install Concrete Fill, Wire Mesh, Reinforcing Bar, Nosing (if applicable) to all Metal Pan Stairs and Platforms and decks in accordance with the Contract Documents. The placement of concrete for the above mentioned work must be scheduled as a separate placement from any concrete/slab placements. The Concrete Contractor is responsible for providing, installing, removing and disposing of temporary wood slip resistant stair treads in all stairs/landings and cleaning (include vacuuming to a spotless condition) of pans prior to placement of concrete. The temporary treads shall be installed immediately after steel stair erection and will remain in place until concrete fill is ready to be placed.
b. The Concrete Contractor must provide protection, barricades, etc., for the entire process of the above work. This includes protecting and cleaning stair components including any adjacent surfaces from concrete splatter. This also includes repairing any resulting damage to the satisfaction of the CM.
c. The Concrete Contractor shall provide concrete and reinforcing at all Cast in Place Concrete Stairs, Metal Pan Stairs, and Ramps, and include all Cast in Nosings (note also indicated in Structural Steel) and embeds with the exception of any Site Concrete Stairs

as shown on the Contract Documents. All Site Work Concrete not shown on structural drawings shall be provided by Sitework Contractor.

6) Structural Steel Coordination and Embeds:

a. The Concrete Contractor shall layout and install Leveling Plates, Bolts, Inserts and other Structural Elements (including grouting of same) that are to be incorporated into the concrete work. The above steel materials shall be provided by others for installation by the Concrete Contractor.
b. This Subcontractor shall coordinate the location of and include the unloading and installing of all embeds, bolts, anchor bolts, inserts and/or sleeves with the appropriate trade Subcontractor to ensure that they are installed in the proper locations.
c. This Subcontractor will coordinate and install all embedded hardware, inserts and blockouts required to connect the structural members to foundation system.
d. The Structural Steel Contractor will provide a certified survey of installed anchor bolts and bearing plates and/or leveling nuts prior to scheduled start of structural steel erection. This Contractor will correct any errors immediately upon notification of any work that must be corrected so that the Structural Steel Contractor will not be delayed.
e. The Concrete Contractor is responsible to unload, receive, inventory (verify quantities on the spot), store (as approved by CM) and then install all embeds, anchor bolts, base plates (as required) nuts and washers, angles, frames, plates, channels, or any other steel component noted to be cast into the concrete as an embedded item, provided by others to be installed in the work of this bid package.
f. The Concrete Contractor shall properly store, maintain and turn over the proper quantity of nuts and washer to the Steel Contractor/Erector.

7) Grouting and Dry-Packing:

The Concrete Contractor shall provide all grouting and/or dry-packing throughout, including but not limited to grouting of column bases, bearing and leveling plates.

8) Pipe and Tube Railings:

The Concrete Contractor shall install Inserts, Anchors, etc. as provided by others, into the concrete to allow for the installation of pipe railings, tube railings, and guard rails provided by others.

9) Winter Protection, Dewatering and Runoff Control:

a. The Site Subcontractor shall provide and maintain all winter protection up to the point where the area is taken over by the Concrete Subcontractor. The Sitework Subcontractor shall include preparation, protecting and/or pre-heating/thawing (including but not limited to blankets, ground heaters, etc.) required to complete its Work and will provide the Concrete Subcontractor with “non-frozen” conditions.
b. The Concrete Subcontractor will be responsible for Winter Protection and Dewatering its own Work once turned over to the this Contractor. This Contractor shall include Cold/Hot Weather Concrete placing procedures per current revision to ACI 306-88 including all required temporary heat, fuel, ground heaters, and blankets. This shall include time to stay late and complete the winter conditions Work. This Subcontractor includes all labor, materials, and equipment necessary to provide snow, ice and water removal that affects the performance of this Scope of Work.

10) Housekeeping Pads:

The Concrete Contractor shall include in the Contract Value all Housekeeping and Equipment Pads as noted on the Contract Documents. The Concrete Contractor shall coordinate the size and location of all pads with the respective trade contractor supplying that equipment.

House Keeping Pad design shall be the responsibility of the Subcontractor whose equipment is placed on the pad and in accordance with the Contract Documents. The Concrete Subcontractor shall form, place, install any embeds and finish the concrete housekeeping pads and curbs as shown on all Contract Documents. Any necessary seismically designed work that needs to be incorporated into the pads shall be the responsibility of the Subcontractor who requires the seismically designed housekeeping pad.

11) Sleeves:

The Concrete Contractor shall install all sleeves and/or inserts as indicated on the Contract Documents or provided by others into the Work. Sleeves and Sealing of same shall be provided by the Contractor providing the Sleeve. This includes coordinating and providing all openings in formwork for other trades as required. This includes penetrations in walls and slabs for MEP items and any related equipment as noted on the contract documents. Sleeves and/or Inserts at Metal Decks shall be furnished and installed by the contractor requiring that sleeve or insert.

12) Joint Sealant/Fillers:

The Concrete Contractor shall provide Joint Sealant, Joint Fillers and Premolded Joint Fillers at Construction Joints, and Control Joints within the Concrete Contractors Scope of Work and as shown and as required for all Concrete-to-Concrete work. This includes but not limited to the construction of Joints by saw cutting, forming of cold pours, etc.

13) Concrete Delivery:

a. This Subcontractor shall be responsible for cleaning and blowing off all surfaces prior to Concrete Delivery and Placement, including but not limited to, metal deck.
b. This Subcontractor is responsible for transporting all concrete from source to final destination. This includes, but not limited to, the use of crane buckets, concrete chutes, concrete pumps, slick lines, conveyors, buggies, etc. which shall be provided by this Subcontractor where and as required. Staging and location of concrete trucks, etc. will be coordinated with, and approved by Fusco Corporation.
c. This Concrete Subcontractor will work closely with the Site Work Subcontractor to coordinate the scheduling and excavation for concrete footing/foundations as shown.
d. This Concrete Subcontractor shall provide the specified vapor barrier before placing the slab on grade.
e. This Concrete Subcontractor shall provide all water stops as required.
f. This Concrete Subcontractor shall provide all shoring and re-shoring, as required whether shown or not shown, to complete the Work and to eliminate excessive deflection of Slab on Deck.
g. This Subcontractor is responsible for providing concrete to the jobsite that meets or exceeds the specified concrete mix, and the guarantee of test results meeting 28 day strength. This Subcontractor includes all costs of testing for defective concrete and rebar placement where and when directed by Fusco Corporation. Any extra cylinders, coring, Windsor Probe (etc.) or testing of any kind required for non-conforming items will be at this Subcontractor's cost.
h. This Concrete Subcontractor will assist the testing agency taking the necessary concrete ready-mix samples to be tested. This Subcontractor will be responsible for providing the

testing agency with an area large enough for cylinder slump testing, next to the designated/specified testing location, whether at point of discharge from the concrete truck, end of chute from pump truck or slick line, or at point of placement. Also provided and maintained by this Subcontractor shall be two (2) insulated concrete curing boxes with inside dimensions of 5' x 3' x 2'-6" high. Each curing box will be equipped with a Hi/Low thermometer and an interior outlet for heaters and lighting. Heaters, lighting and Hi/Low thermometers are to be provided by this Subcontractor. Each curing box will be insulated to maintain specified temperatures of 60-80 degrees prior to transfer of molds to testing lab. It will be this Subcontractor's responsibility to locate these boxes to the required location prior to the start of concrete placement. It is also this Subcontractor's responsibility to provide concrete pour cards designating locations, elevations, outside temperature and weather conditions, and expected quantities prior to placement.

14) Reinforcement:

a. The Concrete Contractor shall provide and install all Concrete Reinforcement for their work as noted on the Contract Documents.
b. The Concrete Contractor shall <u>drill and epoxy</u> all reinforcing bars and hooks into existing substrates abutting new concrete as noted on the Contract Documents. The Concrete Subcontractor shall drill and epoxy for all items indicated to be imbedded in new or existing concrete.
c. All reinforcing entirely in Masonry Walls and/or Partitions shall be provided and installed by the Masonry Contractor with the exception of rebar to extend from the Slab on Grade and deck into masonry walls spliced by others
d. The Concrete Contractor is responsible for supplying and installing all reinforcing steel, wire welded mesh, any necessary or required supports and required shop drawings to complete this scope of work.
e. All reinforcing steel from any concrete placement must be tied in place and inspected prior to placement of any concrete. Additionally, all reinforcing steel from any concrete structure to any unit masonry or to any other concrete structure (I.E. concrete footing to concrete wall, etc.) shall be installed by the Concrete Contractor and not drilled in by the Mason or the Concrete Contractor unless specifically noted. If for any reason the Concrete Trade Contractor misses any reinforcing steel, anchors, dowels or accessories, the Concrete Trade Contractor at his or her expense shall make any necessary corrections or changes as approved by the Engineer.
f. All reinforcing steel must be kept organized and out of any soil or mud. Additionally, all cutoffs, scraps, etc. must be disposed of on a DAILY basis.
g. All reinforcing causing a safety issue of falling upon or walking into shall be protected by the Concrete Contractor.

15) Concrete Finishing:

a. This Subcontractor includes all labor, materials, and equipment necessary to strip all forms, and break off ties. All concrete forms must be in like-new condition and free of any defects. All excess slag, concrete or slurry spills, will be removed and rubbed smooth. Walls, columns, slab on grade, slab of deck or ramps not conforming to specified and or ACI tolerances will be removed and replaced at this Subcontractor's cost.
b. It shall be the responsibility of this Subcontractor to check and accept excavations and sub grades established by the Sitework Subcontractor, to ensure they were established within the required tolerances prior to placing concrete. All site work shall be graded within ½". Any deviation or issues with the sub grade needs to be reported to Fusco Corporation prior to placing concrete.

c. All dowels and dovetail for CMU to be coordinated and placed by this Subcontractor and provided by others.
d. This Subcontractor includes all labor, material and equipment necessary to saw cut control joints.
e. This Subcontractor shall coordinate, supply and install all construction/control joint material as shown on Contract Drawings and/or as described in the Specifications, and as required for all concrete-to-concrete work and concrete-to-steel work at column diamond locations and concrete-to-masonry or any and all existing substrates, and shall coordinate and perform all saw cuts for control joints for SOG as indicated on the drawings, including all caulking and sealants.
f. This Subcontractor includes all labor, materials, and equipment necessary to furnish and install admixtures, curing materials and compounds, bonding agents, adhesives and concrete sealers as specified.
g. Exposed Concrete Walls shall be finished in accordance with Contract Documents.

16) Concrete Washouts and Debris:

The Concrete Contractor shall remove and properly dispose of all concrete debris, formed concrete demo, spoils, and concrete accumulated from truck/pump wash outs to a designated located agreed upon with the Construction Manager.

This Contractor is responsible for cleaning and /or washing down the tires of his or her construction/concrete vehicles and equipment including but not limited to visitors and vendors exiting the site at the anti-tracking aprons located at each construction entrance to avoid tracking mud, dust, and etc. from the site and onto public streets.

17) Concrete Haunches and Thickened Slabs:

The Concrete Contractor shall provide any concrete haunches and thickened slabs as noted on the contract documents or as required by code under CMU walls.

18) Floor Recesses:

The Concrete Contractor shall provide and coordinate with the General Trades Subcontractor and Flooring Subcontractor any and all recess in any concrete slab as required for floor finishes.

19) Waterstop:

The Concrete Contractor shall provide all Waterstop as noted on the Contract Documents.

20) Substrates:

a. The Concrete Contractor shall prepare substrates so that they meet or exceed the requirements of the specification for the final finishes. The Substrate shall meet or exceed flatness, levelness and/or surface texture required per the contract documents.
b. The Concrete Contractor shall review the Specification Divisions related to all Finished Flooring and verify that the substrate and substrate finish anticipated is achievable and there are no conflicts with the contract documents as it related to the Flooring Contractor floor finishes. It is the responsibility of the Concrete Contractor to coordinate all curing and sealing compounds with the Flooring Contractor to verify compatibility with all flooring adhesives and installation methods. This Contractor shall notify the Fusco Corporation of any conflicts or deficiencies prior to placing of any slabs.
c. The Concrete Contractor shall coordinate the Work, including but not limited to additives and curing methods, for compatibility with the Flooring Contractors, the Architect and specified Flooring Adhesives.

21) Duct / Equipment, Slab Edges and Openings:

a. Any closures or bulkheads required for the placement of concrete shall be constructed of wood and shall be furnished and installed by the Concrete Contractor. This shall include, but not limited to, mechanical/electrical box-outs, chase spaces, curbs, mechanical pads, box-outs for drainage, etc., that are shown on the contract documents. It shall be the responsibility of the Mechanical, Plumbing, Electrical and Fire Protection Contractors to furnish and install all required floor sleeves and appropriate fire seal ratings.

b. The Structural Steel Subcontractor shall furnish and install framing and support steel for Ducts, Equipment and other openings as indicated on the Contract Drawings. The Structural Steel Subcontractor shall coordinate framing for these openings with the appropriate Contractor.

22) Expansion Joint Assemblies:

The Concrete Contractor shall perform all box-out work as required for floor and wall expansion joint assemblies.

23) Elevator Sills:

This Contractor shall form/boxout for elevators sills and grout sill in place once installed by the Elevator Contractor.

24) Food Service Freezer / Cooler:

The Walk in Cooler Contractor shall coordinate with the Sitework Subcontractor and Concrete Subcontractor for the size and locations of all depressions.

25) Concrete Pumping and Concrete Tickets:

a. The Concrete Contractors shall be responsible for any and all concrete pumping including any approved necessary means to place concrete for their work. Additionally, original copies of concrete tickets after every concrete delivery shall be provided to the Construction Manager.

26) Additional Concrete:

The Concrete Contractor shall include any and all additional concrete required to compensate for the deflection of beams and metal deck.

27) Concrete Slab Finish / Curing:

All slabs shall be wet cured in addition to and prior to any other specified curing methods not in the Contract Documents. The Concrete Contractor shall also coordinate the slab finish as specified and depicted in the flooring specifications.

28) Keyways:

The Concrete Contractor shall provide wood keyways that are fixed into any form and shall be removed with or when the forms can be contractually removed. No dragging of Angle Irons or any other material can be used as keyways.

29) Tower Crane:

This Contractor shall provide a cast in place 5000 psi concrete foundation including rebar for a Tower Crane with inserts provided by others. The approximate dimension of the foundation will be 20’ x 20’ x 5’ deep with double mat of #8 rebar 12” on center and #6 vertical rebar 12” on center.

CLARIFICATIONS

1. The Fusco Corporation will furnish a Tower Crane and Operator for the Concrete and Steel duration of the project. During erection of Structural Steel, the Concrete Contractor shall schedule required picks with the Fusco Corporation at a minimum of 48 hours' notice.

2. *This Contractor shall furnish and install all Cast in Place Concrete sumps shown on FD 1.0 and Structural Drawing. Coordinate invert of sleeves with BP-32.0 Sitework for installation of drainage pipe.*

3. *This Contractor shall provide the shoring, saw cutting of existing concrete and new concrete associated with the connection to the existing utility tunnel and referenced on drawing S-202.*

EXCLUSIONS:

1) Sale and Use Taxes.

ALTERNATE BIDS

Provide Alternate Bids as requested on Bid Form.

UNIT PRICES

Provide Unit Prices as requested on Bid Form.

ALLOWANCES

This Contractor shall include within the Subcontract Price Allowances as listed below. Allowances shall include all necessary material, cost for delivery, installation, machinery, insurance, and applicable taxes.

Allowances shall appear as a line item on the Contractor's Schedule of Values. The allowance amount covers the cost of the Contractor's labor/material/equipment delivered to the project plus all taxes less any trade discounts to which the contractor may be entitled with respect to the item of work. The Contractor's costs for supervision, overhead, profit and other administrative expenses with respect to the allowance item are included in the base contract amount - not in the allowance amount.

All increases to an Allowance shall be by Change Order. Any unused portion of an allowance shall be returned to the Owner by deduct Change Order.

EXHIBIT "B"
Scope of Work

New Engineering & Science Building
UCONN Storrs Campus
Storrs, CT
UCONN Project No. 901376

Bid Package No. 5.0-Structural Steel, Metal Decking and Miscellaneous Metals

THE FOLLOWING WORK IS INCLUDED IN THE SUBCONTRACT:

The Scope of Work shall include but not limited to labor, materials, equipment and all incidental work associated with **Structural Steel, Metal Decking and Miscellaneous Metals** as described in the Contract Documents and as outlined below. It is the intent of this Subcontractor to provide for the complete coordination, furnishing and installation of all **Structural Steel, Metal Decking and Miscellaneous Metals** as required, shown, described and specified under this Bid Package, and all related scope and services required to complete the Project.

This Subcontractor shall be responsible to perform all Work not expressly specified or indicated by the Contract Documents but as required for a thorough and complete execution of the Work of this Bid Package/Subcontract in every respect. Note that the word "provide" if, and when used herein shall mean furnish and install completely, including all costs for labor, materials, and equipment. It is further understood that the Project Drawings, Specifications and other Documents listed in Exhibit B, may not be fully developed, and that the total Subcontract Agreement Price will include whatever is required beyond same to provide a complete and functional installation and scope to the satisfaction of the Owner and Construction Manager. Should a conflict occur within the Contract Documents, the most restrictive, greatest quantity and highest value shall prevail.

SCOPE OF WORK

1) **BID PACKAGE No. 5.0- Structural Steel, Metal Decking and Miscellaneous Metals:** This Subcontractor is responsible to provide all coordination, manufacturing, fabrication, labor, materials, tools, equipment and appurtenances of every kind for the complete execution to furnish, install and complete the **Structural Steel, Metal Decking and Miscellaneous Metals** and related work as described in the Specifications, Drawings, Existing Site Plans and herein. The Scope of Work shall include, but not be limited to, the General Conditions, all **Division One Specification Sections** and all of the Work of this Bid Package in the following Specification Section(s) and those related Specification Sections, as shown and indicated on the Contract Documents, as shown and as further described herein:

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Entitled: Bid Documents **Volume 00** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Fusco Corporation 555 Long Wharf Drive New Haven, CT 06511 Dated February 20, 2015

Schedule of Drawings: See drawing list included in Manual 00

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019113	Building Commissioning Requirements

DIVISION 3 - CONCRETE

033000	Cast-In-Place Concrete (As Applicable)

DIVISION 5-METALS

051200	**Structural Steel**
051250	**Architecturally Exposed Structural Steel**
053000	**Metal Decking**
055000	**Miscellaneous Metals**
055100	**Steel Pan Stairs**
055117	**Aluminum Slotted Framing System**
055200	**Decorative Rail System**
057000	**Ornamental Metals**
057100	**Ornamental Stairs**
057770	Structural Glass Canopy (As Applicable)

DIVISION 11-EQUIPMENT

112423	**Façade Maintenance System**

APPENDICES

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Appendix 2
REPORT ON ENVIRONMENTAL PRECHARACTERIZATION PROGRAM PROPOSED SCIENCE AND ENGINEERING BUILDING – DECEMBER, 2014
REVISED FEBRUARY 2015

2) Description of Work:

a. The following requirements are in addition to those contained within the contract drawings, specifications, and bidding instructions and shall serve to amend, clarify, or supplement the requirements of those sections:

i. All Structural Steel; Metal Deck; Steel Bar Joist; Steel Floor and Roof Framing; Steel Roof Dunnage; Steel Columns; Steel Tube Columns/Beams/Girders/Window Heads; Steel Shapes/Plates/Angles; Shear Studs/Connectors; Steel Angles and Pour Stops at all Concrete Edges; Leveling Plates; Bearing Plates; Hangers and Relieving Angles; Framing for Overhead Supported Items; All Joist Reinforcing; Steel Loose Lintels and Steel Hung Lintels at all openings; Masonry Relieving Angles; Overhead Door Frames; Elevator Sill Angles; Slab and Roof Openings; Framing Anchors and Accessories; Any Steel Support for Pipe Grid at Stage Ceiling; Rooftop Units Screening; Anchor Bolts; Inserts; Corrosion Protection; All Steel Galvanizing; Touch-up Painting at Field Welds. Installation of OSHA Compliant Perimeter Protection Cables at all Decks including the Roof; Miscellaneous Metals, Metal Fabrications; Metal Stairs. Stair Railings; Hand Rails; Ramp Rails; Guard Rails; Bollards; Removable Bollards; Site Handrails; Aluminum Slotted Overhead Support System; Decorative Rail System; Ornamental Metals; Ornamental Stair System; Façade Maintenance System; Shop Drawings and Closeout Documents.

3) Equipment Framing:

This Contractor is responsible to furnish, install and coordinate all steel equipment framing for rooftop equipment, Roof Drains and all other steel supported equipment. In addition to the Structural Drawings, the Steel Contractor shall refer to other Drawings provided for coordination of equipment locations.

4) Elevator Sill Angles:

This Subcontractor shall furnish and install elevator sill angles as indicated on the Drawings and Specifications.

5) Elevator Hoist Beams:

The Structural Steel Contractor shall provide the Elevator Hoist Beams.

6) Seismic Bracing, Clips and Angles at Top of Partitions:

This Subcontractor shall provide any and all <u>top of wall</u> miscellaneous metal bracing (except the Durawall DA2200 or equal) to the structure typical and as noted on the Contract Documents, including ALL masonry clip angles and anchors.

7) Winter Protection:

This Subcontractor will be responsible for Winter Protection for its Work.

8) Perimeter Cable Protection:

The Structural Steel Contractor shall install and maintain OSHA-compliant perimeter protection cables at all decks, where required by OSHA. Removal of perimeter cable protection at all levels (except the roof) shall be by the General Trades Contractor. Removal of perimeter cables at the roof shall be by the Roofing Contractor.

9) Temporary Pads for Crane:

The Site Work Contractor shall provide Six (6) separate compacted (90% compaction) dry pads suitable for the crane that will be used in erecting the building structural steel from outside of building foot print as located and as prescribed by the CM. These compacted pads shall be a minimum of thirty-five feet by thirty five feet.

10) Leveling and Bearing Plates, Bolts and etc.:

The Structural Steel Contractor shall furnish all interior and exterior loose materials such as but not limited to inserts, frames, anchor bolts, bolts, bearing and leveling plates to the appropriate Contractor for installation into the appropriate assembly.

These items are required to be on site at the start of concrete operations along with a complete set of approved layout drawings and templates.

11) Survey:

The Steel Trade Contractor shall provide all other layout required to perform and complete his or her Work. The cost to replace or repair lost or damage control points shall be the charged to the offending Contractor. The Sitework Trade Contractor shall provide 4 control lines and 4 benchmark grades.

The Structural Steel Trade Contractor shall submit (7 copies and 1 digital copy) a detailed As-Built Survey of all Anchor Bolts, Base Plates, embedded items, etc., by a Connecticut Licensed Land Surveyor to the Fusco Corporation/Engineer prior to any steel erection. Submission shall be in AutoCAD and shall highlight any deviations. All cost regarding these submissions is to be included in the Structural Steel Trade Contractor lump sum proposal. Each Submission must be submitted within 3 days of the foundation and bearing plates completion. This survey shall be done in a timely fashion so that any discrepancies can be corrected prior to the start of steel work. Failure to notify the Construction Manager shall be construed as acceptance of the existing condition. If any anchor bolt(s) is not located in its intended position, and the Structural Trade Contractor agrees that it can remain where it is located and with the approval of the Engineers, the anchor bolt(s) can remain, but the Concrete Trade Contractor shall bear any and all costs related to any adjustment or modifications necessary to the column bearing plate(s) or

structural steel member to rectify the situation. If the anchor bolt(s) need to be relocated, the Concrete Trade Contractor and the Mason Contractor shall immediately do so without delaying the installation of the structural steel and/or the project schedule.

Additionally the Structural Steel Contractor shall provide a certified (by a Connecticut Licensed Land Surveyor) survey of the plumpness of all columns as well as the elevations of all column splices for submission to the engineer. This survey must be submitted immediately upon the completion of structural steel leveling, plumbing, squaring, etc. (7 copies and 1 digital copy)

12) Metal Deck:

The Structural Steel Contractor shall furnish and install a complete Metal Deck system regardless of details. The Structural Steel Contractor shall also provide for all pour stops, edge forms, cover plates, closure strips, roof sump pans, ridge plates, edge angles, and cell closures, shear connectors, framing for all openings, galvanizing and shop priming accordingly.

The Structural Steel Contractor shall install metal decking over all mechanical openings (both new and abandoned). Cutting and removal of the new metal deck at new openings shall be performed by the Trade Contractor using the opening.

<u>The Structural Steel Contractor shall coordinate with the Roofing Contractor for the installation of the Acoustical Deck installation to be installed by the Roofing Contractor when the roof is installed.</u>

13) Duct/Equipment, Slab Edges and other Openings:

The Steel Trade Contractor shall furnish and install all metal closures at the edges of slabs, around columns, framed openings, and as required to prevent concrete from passing through any deck or closure. Any additional closures or bulkheads required for the placement of concrete shall be constructed of wood and shall be furnished and installed by the Concrete Contractor. This shall include but not limited to mechanical/electrical box-outs, chase spaces, curbs, mechanical pads, that are shown on the contract documents. It shall be the responsibility of the Mechanical, Plumbing and Electrical Contractors to furnish and install all required floor, wall and roof sleeves.

14) Welded Steel Masonry Anchors

The Structural Steel Contractor shall furnish and install all masonry anchors that are to be welded to any steel. (i.e., columns, beams, etc.) The Structural Steel Trade Contractor must weld anchors onto the structural steel and must make any accommodations to these anchors/ties and/or welds to make sure the anchor or tie projects pass the finished coat of the spray fireproofing. This must be done so that the male anchor or tie furnished and installed by the Masonry Trade Contractor does not disrupt the spray fireproofing finish coat. The Structural Steel Contractor shall be responsible for any cost associated with

patching of spray fireproofing if the welded anchor is supplied on site and does not protrude past the spray fireproofing finish coat.

Additionally this Contractor shall install (weld) re-enforcing steel furnished by the Masonry Contractor required to complete the Masonry Scope of Work.

15) Lintels/Embeds

The Structural Steel Contractor shall provide all interior and exterior loose hung lintels, loose lintels, angles, sill angles, steel embeds, and plates as noted on the Contract Documents for installation by others. Adhesive anchors from steel into masonry shall be installed by the Structural Steel Contractor.

The Structural Steel Contractor shall coordinate with all contractors (Window, General Trades, Mason, etc.) for elevation, line, grade typical and as noted on the contract documents prior to installations.

16) Shoring/Bracing and Temporary Connections

The Structural Steel Contractor will provide all necessary shoring, bracing, temporary connections required for this work.

17) Touch Up Paint/Shop Priming

The Structural Steel Contractor shall be responsible for touch up painting of field welds. The Steel Fabricator shall be responsible for all shop priming. Additionally, the Structural Steel Contractor shall touch-up paint any damage in the field especially to the steel receiving High Performance Coatings.

18) Temporary Power:

Temporary power may not be available at the building when the steel work begins, include any generators required to provide temporary power for the steel work operations. Regardless if the power is available or not, this Contractor is to furnish, supply and pay for **all** gas/diesel or generator driven equipment to erect the steel. If a temporary generator is the erectors choice, any and all cost associated with this option is ***to be included*** in this Contractor's proposal.

19) Roof/Slab Openings:

The Structural Steel Contractor is responsible to carry all slab and roof frame openings as shown on the Contract Documents, including but not limited to architectural, mechanical and structural drawings.

20) Hangers/Supports/Dunnage:

The Structural Steel Contractor shall furnish and install all supporting steel work shown on the contract documents for support of rooftop equipment and rooftop units. The Mechanical/HVAC/Plumbing Contractor shall be responsible for providing any loose dunnage required for proper installation of any rooftop equipment and rooftop mechanical units.

21) Framing:

The Structural Steel Contractor shall provide all steel framing as noted on the Contract Documents to support Exterior Building Skins and Soffits.

The Structural Steel Contractor shall provide all structural steel and steel framing incidental to soffits, windows, Aluminum Storefronts, Aluminum Curtain-walls, skylights, parapets and other components as indicated on the Contract Documents. –

22) Anchor Bolt Templates:

The Structural Steel Contractor shall furnish steel anchor bolt templates (1 per each anchor bolt configuration) to the Concrete Trade Contractor prior to placing of concrete foundations with anchor bolts.

23) Roof Drain Sumps:

The Structural Steel Contractor shall furnish, install and cut roof drain sumps to accommodate the roof drains.

24) Supplementary Steel and Miscellaneous Support Steel

The Structural Steel Contractor is responsible to furnish and install any and all "supplementary" bent plates, channel, angles, etc. that are indicated on the Contract documents for installation and support of surrounding construction, i.e. bent plates attached to perimeter beams, metal deck, etc., for masonry and drywall wall supports, and masonry wall bracing supports shown on the Contract Documents. All steel shown architecturally only shall be included as part of this bid. If size is not shown steel is not noted, this contractor shall figure at a minimum a 6 x 6 x 5/8 galvanized angle. This also includes any welding of deformed bars to tops of metal beams for masonry wall supports or reinforcing.

25) Steel Ladders:

a. This Subcontractor shall be responsible for furnishing and installing **ALL** steel ladders **(Interior and Exterior)** with associated clips as indicated on the Drawings and Specifications.

b. This subcontractor shall coordinate all embeds and connecting plates to concrete/masonry with the appropriate subcontractor and any other trades associated with this Work.

26) Site and Building Stair and Guard Rails:

a. This Subcontractor shall be responsible for furnishing and installing **ALL** stair rails **(Interior and Exterior)**, and associated mounting hardware, including all coring into concrete/masonry stairs, walls, footings or slabs.
b. This subcontractor shall coordinate all embeds and connecting plates to concrete/masonry with the appropriate subcontractor and any other trades associated with this Work.
c. This Subcontractor shall provide touch-up painting on all field welds satisfactory to the Architect and Construction Manager.

27) Stair Railing Erection:

This Subcontractor shall install stair railings as the Structural Steel Subcontractor erects stairs simultaneously with structural steel erection. If the Metal Fabrications Subcontractor is not able to install the stair guardrails and handrails after the steel installation of the stairs it is responsible to install temporary guardrails and handrails at the steel stair installation and remove prior to the installation of the permanent guardrails and handrails.

28) Minor Work/Provisions:

The Structural Steel, Metal Decking and Miscellaneous Metals Subcontractor shall carry in their base bid an **additional allowance of $25,000 to cover additional detailing time, additional steel material, fabrication, shop priming, delivery and erection of steel elements not depicted on the Contract Documents.** This allowance shall be for minor work not indicated and as directed by the Construction Manager in addition to all other work indicated in this scope.

29) Tower Crane:

The Fusco Corporation will furnish a Tower Crane and Operator for the Concrete and Steel duration of the project. During erection of Structural Steel, the Concrete Contractor shall schedule required picks with the Fusco Corporation at a minimum of 48 hours' notice.

CLARIFICATIONS

The Structural Steel & Metal Deck Contractor shall:

1) Include all frames for roof drains.
2) Separate waste and place in labeled dumpsters as required by State of Connecticut HPGB requirements.
3) Provide welding of rebar dowels to the steel beams typical and as indicated.
4) Include all metal shown in the "S" drawings except for the masonry and concrete rebar and as noted in this Clarifications section. Include all anchor bolts for steel.
5) Include grating shown on F8/S-201.
6) Provide 3D CAD files from Tekla or an equivalent program for all work to Construction Manager for coordination and for the use of other trades. Shop drawings for all work must be provided within 30 calendar days from Notice of Award. In addition to the requirements indicated elsewhere Subcontractor shall provide a digital copy and 5 full sized hard copies of erection drawings to the Construction Manager for coordination.
7) ERECTORS MUST BE AISC-CSE CERTIFIED ERECTORS
8) Include wide flange beams for structural glass canopy system. All stainless steel work at the glass canopy system will be by others.
9) Include loose lintels over all openings in exterior and interior masonry walls.
10) Referring to Drawing A5.01 provide typical and as noted "sill support system" at the all elevator doors.
11) Referring to Drawing A5.01 provide typical and as noted "divider beams."
12) Referring to Drawing A5.01 provide typical and as noted "Intermediate Rail Support Required Through Out the Full Height of the Shaft."
13) Construction Parking & Material Storage Location: There is no Contractor parking on site and limited material storage. This Contractor shall include in his/her price offsite parking and storage of bulk material off site should you deem necessary.
14) Furnish and install all metal ladders, alternating tread devices, and metal bar gratings at sump pit.
15) Include all guardrails, hand rail, all other site railings and vehicular gates and bollards and removable bollards. Layout and install all site items in concrete footings provided by Sitework Subcontractor and install all required bracing and embeds. Include all coordination. All site metal under this scope must be galvanized and shop primed unless specifically noted otherwise.
16) Include all welding, sleeves, inserts and other work required for attachment.
17) Include all access ladders and ladder safety doors and rails. All exterior access ladders and related items shall be galvanized as indicated.
18) Any metal that is exposed that will received painting or a finished coating must be of high architectural grade quality with true members and welds ground smooth. Burrs are not acceptable.
19) Include all welding required for the metal include in this scope.
20) Include all adhesive anchors, drilling, doweling and epoxying, for items in this scope attaching to concrete or masonry.
21) Include any calculations and shop drawings prepared and stamped by a qualified professional engineer required for this scope of work.

22) Include all metal supports and backing for toilet compartment and dressing compartment overhead braces.
23) Furnish all interior and exterior stair and step nosings.
24) Include all bollards and removable bollards.
25) Include elevator pit ladders.
26) Referring to Detail 6 on Drawing L4.00A furnish and install typical and as noted "Guard Rail Post."
27) Referring to Detail & on Drawing L4.00A furnish and install typical and noted "Guardrail."
28) Referring to Detail 8 on Drawing L4.00A furnish and install typical and as noted "handrail at Accessible Concrete Ramp." Include "Core Drill 3" dia. Mortar set with non-shrink grout and ¼" watertight epoxy."
29) Referring to Detail 8 on Drawing L4.00A comply with "Notes #1, #2 and #3."
30) Referring to Detail 9 on Drawing L4.00A furnish and install typical and as noted "Ramp @ Chemistry Building."
31) Referring to Detail 10 on Drawing L4.00A provide typical and as noted Ramp and Retaining Wall at Pharmacy Building" specifically "3" x3" square S.S. tube buried sleeves" to be provided to the Site Concrete Subcontractor along with shop drawings that clearly indicate the layout and dimensions for proper installation.
32) Referring to Detail 10 on Drawing L4.00A provide typical and as noted "3/8" mortar grout water tight epoxy, typ."
33) Referring to Detail 10 on Drawing L4.00A provide typical and as noted "Carl Stahl 2.0 MM X-Tend S.S. Mesh."
34) Referring to Drawings A2.00 through A2.06 provide typical and as noted "Stair A and B."
35) Referring to Drawing A2.06 provide typical and as noted "Galvanized Metal Steps."
36) Referring to Drawing A2.07 provide typical and as noted "Painted Metal Guardrail" however painting will be Bid Package 9.6.
37) Referring to Drawing A3.01 provide typical and as noted "Roof Guardrail." Painting Color P-3 shall be by Bid Package 9.6.
38) Referring to Drawing A3.02 provide typical and as noted "Metal Fence Enclosure W/Shed Roof."
39) Referring to Drawing A3.02 provide typical and as noted bollard as it relates to "Ptd. Stl. Door Activation Bollard."
40) Referring to Drawing A3.02 provide typical and as noted "S.S. Grating" and as further defined in Detail 6 on Drawing A4.02.
41) Referring to Drawing A3.02 provide typical and as noted "Roof Guardrail." Painting Color P-3 shall be by Bid Package 9.6.
42) Referring to Drawing A3.03 provide typical and as noted "Roof" and Metal Fence Enclosure."
43) Referring to Detail 5 on Drawing A4.02 provide typical and as noted "Support Stanchion."
44) Referring to Drawing A4.03 provide typical and as noted "St. Stl. Bar Grating."
45) Referring to Drawing A4.03 provide typical and as noted bollard as it relates to "Ptd. Stl. Door Activation Bollard."

46) Referring to Details 1 and 4 on Drawing 4.05 provide typical and as noted bollard as it relates to "Ptd. Stl. Door Activation Bollard."
47) Referring to Drawing A5.01 provide typical and as noted "pit ladder" and "Perforated Removable Galvanized Stl. Plate Cover." Also provide a frame for the cover that will be installed by Bid Package 03.0-Concrete.
48) Referring to Drawing A5.03 provide typical and as noted all stairs, integral stair railings, stair guard rails, stair wall handrails.
49) Referring to Drawing A5.03 provide typical and as noted "Wall Mounted S.S. Handrail, Rail W/Ptd. Steel Posts, Ptd. Steel Guardrail, S.S. Handrail & Metal Mesh." Painting will be by Bid Package 09.6-Painting.
50) Referring to Detail 5 on Drawing A5.04 provide typical and as noted "S.S. Handrail."
51) Referring to Detail 5 on Drawing A5.04 provide typical and as noted "steel pans."
52) Referring to Detail 5 on Drawing A5.04 provide typical and as noted "Rail W/Ptd. Steel Posts, Ptd. Steel Guardrail, S.S. Handrail & Pickets." Painting will be by Bid Package 09.6-Painting.
53) Referring to Detail 1 on Drawing A5.06 provide typical and as noted "Pre-Cast Terrazzo Treads W/grooves for Traction."
54) Referring to Detail 3 on Drawing A5.06 provide typical and as noted "Channel Support."
55) Referring to Detail 3 on Drawing A5.06 provide typical and as noted "Terrazzo Treads and Landings"
56) Referring to Detail 8 on Drawing A5.06 provide typical and as noted "1/4" x 7" Stl. Plate."
57) Referring to Detail 3 on Drawing A6.00 provide typical and as noted "Cont. St. Stl. Angle."
58) Referring to Details 1, 2, and 3 on Drawing A6.14 furnish and install typical and as noted "Cont. PTD. Alum. Structural Carrier, Typ."
59) Referring to Detail 3 on Drawing A6.14 furnish and install typical and as noted "Galvanized Metal Steps."
60) Referring to Detail 6 on Drawing A6.30 furnish and install typical and as noted "Steel Support Angle at Louver Angle Locations."
61) Referring to Detail 6 on Drawing A6.30 furnish and install typical and as noted "Alum. Clip Angle."
62) Referring to Detail 12 on Drawing A6.30 furnish and install typical and as noted "Cont. St. Stl. Angle."
63) Referring to Detail 4 on Drawing A6.31 furnish and install typical and as noted "Alum. Clip Angle" and "Steel Support Angle."
64) Referring to Detail 9 on Drawing A6.31 furnish and install typical and as noted "Ptd. Metal Guardrail, Typ."
65) Referring to Detail 11 on Drawing A6.31 furnish and install typical and as noted "Galvanized Steel Steps."
66) Referring to Details 3 and 5 on Drawing A6.50 furnish and install typical and as noted "St. Stl. Roof Anchor Welded Directly to Structure. Provide Leveling Plate So That Anchor is Plumb. See Structural For Welding and Loading Regmts."
67) Referring to Details 3 and 5 on Drawing A6.50 furnish and install typical and as noted "Anchor Sleeve."

68) Referring to Details 3 and 5 on Drawing A6.50 furnish and install typical and as noted "Fill Anchor Void with Spray-In-Place Rigid Insulation."
69) Referring to Details 3 and 5 on Drawing A6.50 furnish and install typical and as noted "St. Stl. Flashing Welded to Anchor."
70) Referring to Details 3 and 5 on Drawing A6.50 furnish and install typical "St. Stl. Roof Anchor."
71) Referring to Detail 3 and 5 on Drawing A6.50 furnish and install typical as noted "St. Stl. Cap and Flashing."
72) Referring to Details 3 and 5 on Drawing A6.50 furnish and install typical and as noted "St. Stl. U-Bolt and attachment.'
73) Referring to Detail 7 on Drawing A7.01 furnish and install typical and as noted "Custom SS Corner Guard."
74) Referring to Details 8 and 9 on Drawing A7.03 furnish and install typical and as noted "Custom SS Corner Guard."
75) Referring to Detail 1 on Drawing A7.03 furnish and install typical and as noted "Custom St. Stl. Corner Guard."
76) Referring to Detail 1 on Drawing A7.10 furnish and install typical and as noted "Custom St. Stl. Corner Guard."
77) Referring to Detail 3 on Drawing A7.10 furnish and install typical and as noted "Welded Stainless Steel Plate With Returns, #4 Finish on St. Stl."
78) Referring to Detail 11 on Drawing A7.10 furnish and install typical and as noted "Custom St. Stl. Corner Guard. #4 Finish."
79) Referring to Detail 13 on Drawing A7.25 provide typical and as noted "Custom St. Stl. Profile, 16 Gauge."
80) Include all permanent roof anchor systems and install at the time of the metal deck. Include all U-bolts, caps, insulation inside the anchors, welding, etcetera for a complete system.
81) Include all wall corner guards including all stainless steel corner guards.
82) Include all stainless steel surrounds at openings including but not limited to as shown in detail 4/A9.22, typical.
83) Referring to Detail 1 on Drawing A9.04 provide typical and as noted "Mobile Steel for Gantry Hoist."
84) Referring to Detail 1 on Drawing A9.04 provide typical and as noted "Fixed Ladder."
85) Referring to Detail 5 on Drawing A9.05 provide typical and as noted "Type 316l Stainless Steel Ladder Bolted to Wall at Area of Solid Fiberglass Marked By Manufacturer."
86) Referring to Detail 3 on Drawing A9.06 provide typical and as noted "Custom Stainless Steel Surround, Typical at Openings."
87) Referring to Drawing FM-101-provide typical and as noted "Galvanized Steel U-Bar Safety Tieback Anchor (Ground Mounted)."
88) Referring to Drawing S-606 provide typical and as noted as per the schedule "Lintels for Masonry Walls" to the Masonry Subcontractor.

EXCLUSIONS

1) Sale and Use Taxes.

UNIT PRICES

Indicated below, the following unit price's shall be used in calculating Hazardous containing materials for additions and deductions from the original contract amount. These prices shall reflect all work practices required to remove and dispose the material in accordance with the project specifications and State and Federal regulations:

Bids shall include the following Unit-cost's:

ALLOWANCES

Allowances shall appear as a line item on the Contractor's Schedule of Values. The allowance amount covers the cost of the Contractor's labor/material/equipment delivered to the project plus all taxes less any trade discounts to which the contractor may be entitled with respect to the item of work. The Contractor's costs for supervision (non-working foreman), overhead, profit and other administrative expenses with respect to the allowance item are included in the base contract amount - not in the allowance amount.

All increases to an Allowance shall be by Change Order. Any unused portion of an allowance shall be returned to the Owner by deduct Change Order.

Bids shall include the following Lump Sum Allowances:

ALLOWANCE NO. 1:

Minor Work Provisions:

The Structural Steel, Metal Decking and Miscellaneous Metals Subcontractor shall carry in their base bid an **additional allowance of $25,000 to cover additional detailing time, additional steel material, fabrication, shop priming, delivery and erection of steel elements not depicted on the Contract Documents.** This allowance shall be for minor work not indicated and as directed by the Construction Manager in addition to all other work indicated in this scope.

EXHIBIT "B"
Scope of Work

New Engineering & Science Building
UCONN Storrs Campus
Storrs, CT
UCONN Project No. 901376

Bid Package No. 7.0-Roofing

THE FOLLOWING WORK IS INCLUDED IN THE SUBCONTRACT:

The Scope of Work shall include but not limited to labor, materials, equipment and all incidental work associated with **Roofing a**s described in the Contract Documents and as outlined below. It is the intent of this Subcontractor to provide for the complete coordination, furnishing and installation of all **Roofing** as required, shown, described and specified under this Bid Package, and all related scope and services required to complete the Project.

This Subcontractor shall be responsible to perform all Work not expressly specified or indicated by the Contract Documents but as required for a thorough and complete execution of the Work of this Bid Package/Subcontract in every respect. Note that the word "provide" if, and when used herein shall mean furnish and install completely, including all costs for labor, materials, and equipment. It is further understood that the Project Drawings, Specifications and other Documents listed in Exhibit B, may not be fully developed, and that the total Subcontract Agreement Price will include whatever is required beyond same to provide a complete and functional installation and scope to the satisfaction of the Owner and Construction Manager. Should a conflict occur within the Contract Documents, the most restrictive, greatest quantity and highest value shall prevail.

SCOPE OF WORK

1) **BID PACKAGE No. 7.0- Roofing:** This Subcontractor is responsible to provide all coordination, manufacturing, fabrication, labor, materials, tools, equipment and appurtenances of every kind for the complete execution to furnish, install and complete the **Roofing** and related work as described in the Specifications, Drawings, Existing Site Plans and herein. The Scope of Work shall include, but not be limited to, the General Conditions, all **Division One Specification Sections** and all of the Work of this Bid Package in the following Specification Section(s) and those related Specification Sections, as shown and indicated on the Contract Documents, as shown and as further described herein:

   Project Manuals:

   Entitled: Bid Documents **Volume 1** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Mitchell Giurgola Architects, LLP. 630 Ninth Avenue New York, NY 10036 Dated February 20, 2015

   Entitled: Bid Documents **Volume 2** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Mitchell Giurgola Architects, LLP. 630 Ninth Avenue New York, NY 10036 Dated February 20, 2015

Entitled: Bid Documents **Appendix 1** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Mitchell Giurgola Architects, LLP. 630 Ninth Avenue New York, NY 10036 Dated February 20, 2015.
REPORT ON GEOTECHNICAL ENGINEERING ASESSMENT AND PRELIMINARY ENVIRONMENTAL PRECHARACTERIZATION PROGRAM – AUGUST, 2014
ADDITIONAL SUBSURFACE EXPLORATIONS AND GEOTECHNICAL ENGINEERING CONSIDERATIONS – 19 DECEMBER, 2014

Entitled: Bid Documents **Appendix 2** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Mitchell Giurgola Architects, LLP. 630 Ninth Avenue New York, NY 10036 Dated February 20, 2015.
REPORT ON ENVIRONMENTAL PRECHARACTERIZATION PROGRAM PROPOSED SCIENCE AND ENGINEERINGBUILDING – DECEMBER, 2014

Entitled: Bid Documents **Volume 00** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Fusco Corporation 555 Long Wharf Drive New Haven, CT 06511 Dated February 20, 2015

Schedule of Drawings: See drawing list included in Manual 00

Specification Sections of the Project Manual:

DIVISION 1 - GENERAL REQUIREMENTS

SECTION	
01-1000	Summary
01-2200	Unit Prices
01-2300	Alternates
01-2500	Substitution Procedures
01-2600	Contract Modification Procedures
01-3100	Project Management and Coordination
01-3200	Construction Progress Documentation
01-3233	Photographic Documentation
01-3300	Submittal Procedures
01-4000	Quality Requirements
01-5000	Temporary Facilities and Controls
01-5639	Temporary Tree and Plant Protection
01-5719	Temporary Environmental controls
01-6000	Product Requirements
01-6100	University Product Standard
01-7300	Execution
017419	Construction Demolition Waste Management
01-7700	Closeout Procedures
01-7823	Operation and Maintenance Data
01-7839	Project Record Documents
01-7900	Demonstration and Training
018113	VOC Limits for Adhesives, Sealants, Paints and Coatings
018119	Construction Indoor Air Quality
019113	Building Commissioning Requirements

DIVISION 6 - WOOD, PLASTICS AND COMPOSITES

062000 Carpentry (As Applicable)

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

075625 Fluid Applied Roofing System
076200 Sheet Metal Work
077100 Roof Specialties and Accessories

DIVISION 21, 22, 23, 26 & 28 – (AS APPLICABLE)

APPENDICES

Appendix 1
REPORT ON GEOTECHNICAL ENGINEERING ASESSMENT AND PRELIMINARY ENVIRONMENTAL PRECHARACTERIZATION PROGRAM – AUGUST, 2014
ADDITIONAL SUBSURFACE EXPLORATIONS AND GEOTECHNICAL ENGINEERING CONSIDERATIONS – 19 DECEMBER, 2014

Appendix 2
REPORT ON ENVIRONMENTAL PRECHARACTERIZATION PROGRAM PROPOSED SCIENCE AND ENGINEERING BUILDING – DECEMBER, 2014
REVISED FEBRUARY 2015

2) Description of Work:

a. The following requirements are in addition to those contained within the contract drawings, specifications, and bidding instructions and shall serve to amend, clarify, or supplement the requirements of those sections:

Roofing Systems; Canopy Roofs; Roof Insulation; Snow Guards; Gutters, Leaders and Down Spouts; Primers and Adhesives; Clips and Accessories; Splash Blocks; Reglets; Tapered Roof Insulation; Roof Cants; Roof Edge System; Roof Walkways; Nail Base with Slip Sheet and Membrane Barrier Underlayment; Metal Flashing and Trim; Roof Edge Flashings; Roof Hatches; Underlayments; Roof Expansion Joints; Fasteners and Plates; Wall Flashing and Trim; Metal Copings; Membrane Flashing; Metal Soffits and Fascias, Parapet Flashing; Roof Accessories; Pipe Flashings; Skylights; Sealants; Cant Strips and Accessories; Exterior Plywood Coverboard on Roofing Insulation: Exterior Plywood Coverboard on Metal Deck; Metal Fascia; Metal Trims and Flashings; Coordination of Roof Drains; Flashing of Electrical and Mechanical Roof Penetrations. Coordination with project schedule and other trades; Submittals, Samples, Product Data and etc.

3) Sealants and Caulking:

The Roofing and Moisture Protection Contractor shall furnish and install all sealants and caulking as required to complete his or her scope of work.

4) Miscellaneous Rough Carpentry and Sheathing

The Roofing and Moisture Protection Contractor shall provide all blocking that is shown on the Contract Documents and/or that is required by the roof Manufacturer that is integral with the roofing system including plywood sheathing where: (1) plywood sheathing is directly fastened to the Roof and or Metal Deck; and (2) plywood sheathing is directly fastened to roofing insulation.

5) Building Insulation:

a. The Roofing Contractor shall furnish and install all insulation associated with the Roofing Systems.
b. The Roofing Contractor shall provide cover board on roofing insulation as noted on the Contract Documents.

6) Roofing Coordination:

a. The Roofing Contractor shall coordinate the installation of the roofing with the Construction Manager, Window Contractor, General Trades Contractor, Steel Contractor, Masonry Contractor, Mechanical and Electrical Contractors to allow for the proper sequence of the work.
b. The Roofing and Moisture Protection Contractor shall provide unlimited return visits to the site to patch the new roofing system as required after installation of Electrical and Mechanical conduits, piping, and equipment by the MEP Contractors.
c. This roofing coordination responsibility shall be ongoing for the duration of the project.
d. This Contractor shall make for provisions to maintain the water tightness of the roof at mechanical curbs installed for packaged rooftop mechanical unit, in advance of the delivery and during the installation of the rooftop units.

7) Perimeter Cable Protection:

The Structural Steel Contractor shall install and maintain OSHA-compliant perimeter protection cables at all decks, where required by OSHA. Removal of perimeter cable and supporting steel protection at all levels **(except the roof)** shall be by the General Trades Contractor. Removal of perimeter cables and supporting steel **(at the roof)** shall be by the Roofing Contractor.

8) Temporary Roofing:

The Roofing Contractor shall provide, maintain and eventually remove any temporary roofing required to complete its scope of work and any other trades scope of work at the Roof. <u>The Roofing Contractor shall be solely responsible any and all water infiltration from the existing roof during the re-roofing (from Roof Demolition to Permanent Roofing) process.</u>

The Roofing Contractor shall provide and eventually remove temporary roofing over any and all roof penetrations as directed by the Construction Manager.

The Roofing Contractor shall provide draping of the roof in a temporary manner for a watertight condition while others complete work including but not limited to exterior walls, parapets, curbs and temporary flashings up vertical surfaces requiring coordination with other trades.

9) Roof Top Equipment Curbs:

The Roofing Contractor shall furnish and install all Roof Flashing as indicated to complete the installation for Roof Top Equipment Curbs. The Roofing Contractor shall furnish and install all required flashings as it pertains to the installation of the roof system and roof curbs. All Contractors should note that if the roof slopes all consideration must be considered in shop drawings and fabrication of any unit, curb, etc., being installed in these sloped areas.

10) Roof Drains, Vent and other Through Roof Penetrations:

The Roofing Contractor shall furnish and install all flashing and other materials required to seal all Roof Drains, Vents and other through Roof Penetrations.

11) Expansion Joints:

The Roofing Contractor shall furnish and install all Expansion Joints associated with the Roofing systems including contiguous non wood blocking, firestopping, flashings as shown on the Contract Documents.

12) Insulation:

The Roofing Contractor shall furnish and install all insulation associated with the Roofing Systems.

13) Sheet Metal and Fabric Flashings:

The Roofing Contractor shall furnish and install all Sheet Metal Flashings, Metal Copings, Trim and Roof Accessories as described in the Contract Documents and furnish all exposed Metal through Wall Flashings, including metal reglets for installation by the Mason Contactor.

a. Any concealed and exposed (partially into **NEW** masonry) flashings and any metal flashing requiring a fabricated bend shall be supplied by the Roofing Contractor and installed by the Masonry Contractor at Cavity Walls, Unit Masonry Steel Lintels, Relieving Angle and other areas in contact with Masonry as indicated on the Contract Documents.
b. The Roofing Contractor shall furnish and install all Prefinished Fascia and/or Prefinished Aluminum Flashings, Counter Flashings, Copings, Metal Gravel Stops and other Sheet Metal contiguous with the Roofing system.
c. The Roofing Contractor shall furnish to the Masonry Contractor, for installation into the Mason's **NEW** work, all other Metal Flashing and Metal Thru Wall Flashings as noted in the Contract Documents. This includes soldering of joints as required by specifications.
d. Membrane Flashings contiguous to the Mason's work shall be provided and installed by the Mason Contractor.
e. The Windows, Glazing and Storefronts Contractor shall furnish and install all Flashings and Sheet Metal that is contiguous with his or her work; such as but not limited to: Flashings required to be installed prior to window or Panel installations.
f. The Roofing Contractor shall supply to the Masonry Contractor all flashings and reglets and accessories into new masonry and necessary to accept Roofing Contractor's cap flashing that goes over Roofing Contractor's termination bar. The Roofing Contractor shall supply the receiver (reglet) to the Masonry Contractor.
g. The Roofing Contractor shall supply to the Window Contractor all flashings and reglets and accessories into Window System and necessary to accept Roofing Contractor's cap

flashing that goes over Roofing Contractor's termination bar. The Roofing Contractor shall supply the receiver (reglet) to the Window Contractor.

h. All metal drip flashings shall be furnished by the Roofing Contractor and installed by the Masonry Contractor.

14) Roof Installation:

This Contractor shall include the cost to temporarily adhere all new roof edges for water tight seal until completion of parapets, masonry, and all final roof terminations can be completed.

This Contractor will be required to make any and all mobilizations in order to meet the project schedule. No additional compensation will be issued for any and all mobilizations.

This Contractor's manufacturer's representative for the roofing system shall certify in writing, along with applicator's acceptance that the substrate to receive their system is acceptable and approved. It is understood that this manufacturer's representative will be required to visit the jobsite on a periodic basis during the installation operations to verify conformance of the application and shall issue site visit reports to the installer and directly to the Construction Manager for each trip acknowledging same.

This Contractor will install and flash all roof curbs which are provided by the MEP Contractors, with exception of the Roof Air Handling Unit curbs which will be installed by the HVAC Contractor and flashed by the Roofing Contractor.

This Contractor shall provide OSHA required fall arrest of prevention systems required to perform his or her work. At the direction of the Construction Manager this Contractor shall remove all roof perimeter safety cable systems and deliver to the Construction Manager. This Contractor shall also include patching the roof at all locations where perimeter safety cable stanchions or supports are removed.

This Contractor shall provide all roof hatches, smoke vents, as noted on the Contract Documents.

15) Protection of Masonry Work:

When a masonry wall is topped off to the roof line, it shall become the responsibility of the Roofing Contractor to keep all water, snow and ice from entering into the concrete masonry unit or the cavity until the permanent or temporary cap or cover is installed by the Roofing Contractor.

22) Snow, Ice and Water Removal

The Roofing Contractor shall be responsible for all snow, ice and water removal from the roof and roof deck and staging provided by the Roofing Contractor before, during and after the installation of the roof and as directed by the Construction Manager.

16) Down Spouts:

The Roofing Contractor shall include any roofing work related to down spout nozzles.

17) Roof Edge Protection:

The Roofing Contractor shall provide all OSHA Approved temporary roof edge protection acceptable to the Construction Manager. Provide adequate amount of sturdy stanchions and counterweights with bright colored flagging strung along all perimeter edges. The Roofing Contractor shall maintain the roof edge protection for the duration of the Project. The Roofing Contractor shall remove the roof edge protection at the direction of the Construction Manager.

18) Metal Deck Penetrations:

The Roofing Contractor shall include all cutting and removing of metal deck for Roofing Contractor's own Scope of Work installations as noted on the Contract Documents.

CLARIFICATIONS

a.) The Roofing Contractor shall:

1) Include all work described in specification section 075625, 076200 and 077100.
2) Provide **all** wood blocking required for attachment of roofing material.
3) Include all crickets shown and necessary to provide the required slope.
4) The roofer will be required to place roofing material over all roof top equipment openings including exhaust fans. Once the equipment curbs are ready for installation the roofer will be required to return to the project and remove the roofing at these locations and then install roofing material at the curbs, place temporary roofing over the curb/equipment openings. The equipment contractor will remove the temporary roofing when setting the equipment.
5) Provide all non-shrink grout at roof including at the roof drains, overflow drains and pitch pockets.
6) Include all cold applied flashings, gravel stops and scuppers.
7) Include vegetated roof membrane, insulation and system.
8) Include all precast concrete pavers.
9) Construction Parking & Material Storage Location: There is no Contractor parking on site and limited material storage. This Contractor shall include in his/her price offsite parking and storage of bulk material off site should you deem necessary.
10) *This Contractor shall include the Stainless Steel Drain Inspection Chambers and Gravel Mesh Bags in 1' x 1" Welded Wire Gabion Mats as shown in detail 5/A6.50 included in Addendum No. 3*

EXCLUSIONS

1) Sale and Use Taxes.

UNIT PRICES

Indicated below, the following unit price's shall be used in calculating Hazardous containing materials for additions and deductions from the original contract amount. These prices shall reflect all work practices required to remove and dispose the material in accordance with the project specifications and State and Federal regulations:

Bids shall include the following Unit-cost's:

ALLOWANCES

Allowances shall appear as a line item on the Contractor's Schedule of Values. The allowance amount covers the cost of the Contractor's labor/material/equipment delivered to the project plus all taxes less any trade discounts to which the contractor may be entitled with respect to the item of work. The Contractor's costs for supervision (non-working foreman), overhead, profit and other administrative expenses with respect to the allowance item are included in the base contract amount - not in the allowance amount.

All increases to an Allowance shall be by Change Order. Any unused portion of an allowance shall be returned to the Owner by deduct Change Order.

Bids shall include the following Lump Sum Allowances:

EXHIBIT "B"
Scope of Work

New Engineering & Science Building
UCONN Storrs Campus
Storrs, CT
UCONN Project No. 901376

Bid Package No. 8.0-Glass & Glazing & Terra Cotta

THE FOLLOWING WORK IS INCLUDED IN THE SUBCONTRACT:

The Scope of Work shall include but not limited to labor, materials, equipment and all incidental work associated with **Roofing a**s described in the Contract Documents and as outlined below. It is the intent of this Subcontractor to provide for the complete coordination, furnishing and installation of all **Glass & Glazing & Terra Cotta** as required, shown, described and specified under this Bid Package, and all related scope and services required to complete the Project.

This Subcontractor shall be responsible to perform all Work not expressly specified or indicated by the Contract Documents but as required for a thorough and complete execution of the Work of this Bid Package/Subcontract in every respect. Note that the word "provide" if, and when used herein shall mean furnish and install completely, including all costs for labor, materials, and equipment. It is further understood that the Project Drawings, Specifications and other Documents listed in Exhibit B, may not be fully developed, and that the total Subcontract Agreement Price will include whatever is required beyond same to provide a complete and functional installation and scope to the satisfaction of the Owner and Construction Manager. Should a conflict occur within the Contract Documents, the most restrictive, greatest quantity and highest value shall prevail.

SCOPE OF WORK

1) **BID PACKAGE No. 7.0- Glass & Glazing & Terra Cotta:** This Subcontractor is responsible to provide all coordination, manufacturing, fabrication, labor, materials, tools, equipment and appurtenances of every kind for the complete execution to furnish, install and complete the **Roofing** and related work as described in the Specifications, Drawings, Existing Site Plans and herein. The Scope of Work shall include, but not be limited to, the General Conditions, all **Division One Specification Sections** and all of the Work of this Bid Package in the following Specification Section(s) and those related Specification Sections, as shown and indicated on the Contract Documents, as shown and as further described herein:

   Project Manuals:

   Entitled: Bid Documents **Volume 1** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Mitchell Giurgola Architects, LLP. 630 Ninth Avenue New York, NY 10036 Dated February 20, 2015

Entitled: Bid Documents **Volume 2** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Mitchell Giurgola Architects, LLP. 630 Ninth Avenue New York, NY 10036 Dated February 20, 2015

Entitled: Bid Documents **Appendix 1** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Mitchell Giurgola Architects, LLP. 630 Ninth Avenue New York, NY 10036 Dated February 20, 2015.
REPORT ON GEOTECHNICAL ENGINEERING ASESSMENT AND PRELIMINARY ENVIRONMENTAL PRECHARACTERIZATION PROGRAM – AUGUST, 2014
ADDITIONAL SUBSURFACE EXPLORATIONS AND GEOTECHNICAL ENGINEERING CONSIDERATIONS – 19 DECEMBER, 2014

Entitled: Bid Documents **Appendix 2** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Mitchell Giurgola Architects, LLP. 630 Ninth Avenue New York, NY 10036 Dated February 20, 2015.
REPORT ON ENVIRONMENTAL PRECHARACTERIZATION PROGRAM PROPOSED SCIENCE AND ENGINEERINGBUILDING – DECEMBER, 2014

Entitled: Bid Documents **Volume 00** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Fusco Corporation 555 Long Wharf Drive New Haven, CT 06511 Dated February 20, 2015

Schedule of Drawings: See drawing list included in Manual 00

Specification Sections of the Project Manual:

DIVISION 1 - GENERAL REQUIREMENTS

SECTION	
01-1000	Summary
01-2200	Unit Prices
01-2300	Alternates
01-2500	Substitution Procedures
01-2600	Contract Modification Procedures
01-3100	Project Management and Coordination
01-3200	Construction Progress Documentation
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01-4000	Quality Requirements
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01-6000	Product Requirements
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01-7300	Execution
017419	Construction Demolition Waste Management
01-7700	Closeout Procedures
01-7823	Operation and Maintenance Data
01-7839	Project Record Documents
01-7900	Demonstration and Training
018113	VOC Limits for Adhesives, Sealants, Paints and Coatings

018119	Construction Indoor Air Quality
019113	Building Commissioning Requirements

DIVISION 4 - MASONRY

042800	Terra Cotta Assembly

DIVISION 5 - METALS

054000	Cold Formed Metal Faming (As Applicable)
057700	Structural Glass Canopy

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

072100	Thermal Insulation (As Applicable)
072700	Air and Vapor Barrier Membrane (As Applicable)
076200	Sheet Metal Work (As Applicable)
079200	Joint Sealers (As Applicable)

DIVISION 8 – OPENINGS

081000	Door Schedule (As Applicable)
084413	Curtain Walls, Storefronts and Entrances (CWSE)
084510	Interior Glazed Walls
087100	Finish Hardware (As Applicable)
088000	Glass and Glazing
088813	Fire-Rated Glass and Framing System

2) Description of Work:

a. The following requirements are in addition to those contained within the contract drawings, specifications, and bidding instructions and shall serve to amend, clarify, or supplement the requirements of those sections:

All Aluminum Frames; All Aluminum-Framed Entrances, All Storefronts and Accessories; Glazed Aluminum Curtain Walls and Accessories; Aluminum Windows; Aluminum Trim; Aluminum In-Fills at Column Lines and at Steel Columns; Glazing; Special Function Glazing; Fire-Rated Glazing; Fasteners and Accessories; Float Mirrors; All Hardware associated with your Scope of Work; Aluminum Thresholds/Saddles/Sills; Firestopping and Safing; Flashings; Aluminum Closure Pieces; Insulation within its Scope of Work; Screens; Caulking and Sealants (in and out); Exterior Fabrications Made of Laser-Cut Formed Metal Sheet Aluminum.

3) Exterior Assemblies and Façade:

It is the intent of this scope of work to have this Contractor furnish and install the exterior vertical building envelope in its entirety from the substrate out to finish product. This shall include but not be limited to AVB, subgirts, aluminum channels, terracotta, metal/composite panels, trim, aluminum shapes, flashings and unitized glazing.

4) Shimming:

This Contractor shall coordinate the shimming to assure proper installation. All shimming, whether it is wood, plastic or any other material is to be furnished and installed by the Aluminum Windows, Storefronts, Metal Wall Panel Assemblies & Curtain Wall Contractor.

5) Window and Storefront Blocking:

a. This Contractor shall coordinate the Blocking requirements for its Work with the General Trades Contractor.
b. Any Blocking indicated on the Contract Documents or as required by the manufacturer and Window, Glazing and Storefront Contractor shall be furnished and installed by the General Trades Contractor.
c. The blocking coordination responsibility amongst this Contractor and General Trades Contractor shall be ongoing for the duration of the project.
d. This Contractor shall provide all Clip Angles, Steel Angles, Furring Channels, Miscellaneous Metal Framing and Shims to complete installation of the Work before and after the General Trades Contractor has provided coordinated Blocking.

6) Sealants and Caulking:

This Contractor shall provide all sealants and caulking as required to complete his or her scope of work.

a. This Contractor shall provide the appropriate Backer Rod, Joint Sealant/Caulking at all exterior and interior Windows, Curtain Walls, Entrances and others surfaces contiguous to your Scope of Work, as described and noted on the Contract Documents.
b. The Intent of this Joint Sealant/Caulking Scope of Work is for this Contractor is to provide a complete and weather tight system in all respects.

7) Window Flashing and Sheet Metal:

This Contractor shall furnish and install all Flashings and Sheet Metal that is contiguous with its Work; such as but not limited to: Flashings required to be installed after roofing work and prior to Window or Panel installations; Prefinished Aluminum Flashing at transitions and the like.

a. This Contractor shall provide all Flashings and Sheet Metal that is contiguous with his or her work, such as but not limited to: Flashings required to be installed prior to window or Panel installations, Prefinished Aluminum Flashing.
b. Prefinished Aluminum Flashings, Counter Flashings, Sill Closure Pieces and other Sheet Metal contiguous with the Window systems shall be provided by this Contractor.
c. This Contractor shall provide all Flashings and Sheet Metal that is contiguous with his or her work; such as but not limited to: Flashings required to be installed prior to window or Panel installations.
d. This Contractor shall provide all Flashings and Sheet Metal above the receiver (reglet) and install the receiver (reglet) provided by others.

8) Sheet Metal and Fabric Flashings:

The Roofing Contractor shall furnish and install all Sheet Metal Flashings, Metal Copings, Trim and Roof Accessories as described in the Contract Documents and furnish all exposed Metal through Wall Flashings, including metal reglets for installation by the Mason Contactor.

a. Any concealed and exposed (partially into **NEW** masonry) flashings and any metal flashing requiring a fabricated bend shall be supplied by the Roofing Contractor and installed by the Masonry Contractor at Cavity Walls, Unit Masonry Steel Lintels, Relieving Angle and other areas in contact with Masonry as indicated on the Contract Documents.
b. The Roofing Contractor shall furnish and install all Prefinished ZINC Cap, ZINC Fascia and/or Prefinished Aluminum Flashings, Counter Flashings, Copings, Metal Gravel Stops and other Sheet Metal contiguous with the Roofing system.
c. The Roofing Contractor shall furnish to the Masonry Contractor, for installation into the Mason's **NEW** work, all other Metal Flashing and Metal Thru Wall Flashings as noted in the Contract Documents.
d. Membrane Flashings contiguous to the Mason's work shall be provided and installed by the Mason Contractor.
e. The Windows, Glazing and Storefronts Contractor shall furnish and install all Flashings and Sheet Metal that is contiguous with his or her work; such as but not limited to: Flashings required to be installed prior to window or Panel installations.
f. The Roofing Contractor shall provide all flashings and reglets and accessories into existing masonry as noted on the Contract Documents. This shall include cutting and patching of all reglets into existing masonry necessary to provide a complete system.
g. The Roofing Contractor shall supply to the Masonry Contractor all flashings and reglets and accessories into new masonry and necessary to accept Roofing Contractor's cap flashing that goes over Roofing Contractor's termination bar. The Roofing Contractor shall supply the receiver (reglet) to the Masonry Contractor.
h. The Roofing Contractor shall supply to the Window Contractor all flashings and reglets and accessories into Window System and necessary to accept Roofing Contractor's cap flashing that goes over Roofing Contractor's termination bar. The Roofing Contractor shall supply the receiver (reglet) to the Window Contractor.
i. The Roofing Contractor shall supply to the General Trades Contractor all flashings and reglets and accessories into DAFS System and necessary to accept Roofing Contractor's cap flashing that goes over Roofing Contractor's termination bar. The Roofing Contractor shall supply the receiver (reglet) to the General Contractor.
j. All metal drip flashings shall be furnished by the Roofing Contractor and installed by the Masonry Contractor.

8) Saddles, Thresholds and Sills:

This Contractor shall provide all saddles, thresholds and sills that are a component of your assembly.

9) Anchorage:

This Contractor shall furnish and install all appropriate anchorage systems for his or her Scope of Work.

This Contractor shall furnish and install any additional structural members necessary for the installation of all items in this bid package that are not shown on the contract documents.

This Contractor shall provide and include all necessary attachments (clips, angle, reinforcement, hardware, shims, aluminum shapes, fasteners, or anything that is industry standard to this work, etc.) as required, whether or not shown on Contract Documents, to properly erect and install this work.

10) Glass and Glazing:

This Contractor shall furnish and install all Glass and Glazing for but not limited to Hollow Metal Doors, Sidelights, Borrowed Lights and Wood Doors and Mirrors in addition to the Metal Windows, Curtainwall and Aluminum Entrances.

This Contractor shall provide all safety laminated and fire rated glass shown on the Contract Documents.

11) Finish Hardware:

This Contractor shall provide all Finish Hardware required for your Scope of Work.

For clarification, this Contractor shall also provide factory electrified hardware for your Scope or Work including but not limited to electric locks, electric strikes, transformers and any and all necessary accessories as noted on the Contract Documents, including but not limited to all necessary prep work for security, technology, operators, etc., for this bid package and any other bid package.

The Electrical Trade Contractor shall provide to the General Trades and Window & Curtainwall Trade Contractors complete information, layout requirements and templates or actual samples of the door contacts as it relates the Security System. The General Trades and Window & Curtainwall Trade Contractors shall receive this information and have all doors and frames **factory** prepared in order to receive this material. The installation of the actual door contact shall be provided by the Electrical Contractor.

This Contractor shall install the magnetic door hold open contact plate (furnished by the Electrical Contractor) on its doors as noted on the Contract Documents.

12) Insulation:

This Contractor shall furnish and install all Insulation as noted on the Contract Drawings associated with the Aluminum Doors, Windows, Storefront, and Curtainwall.

This Contractor shall furnish and install all rigid insulation shown at header and sill conditions between Storefront / Curtainwall and Masonry as noted on the Contract Documents.

13) Aluminum Closure Pieces, Break metal and Miscellaneous Items:

This Contractor shall provide all Channels, Closure Pieces, Break metal, Anchors, Angle Clips, Sills, and Soffits associated with your Work as specified by the Contract Documents.

This Contractor shall provide all support clips that anchor your Work to Structural Steel or other contiguous substrate.

14) Weatherstripping:

This Contractor shall provide all Weather stripping for your Scope of Work.

15) Temporary Exterior Opening Enclosures Removal and Disposal:

This Contractor shall review, coordinate and approve all window plywood, protection, framing, furring, plastic wrap and/or plywood wrap temporarily installed (by others) in and adjacent to the openings prior to the time of field measuring and the installation of your Work.

16) Insulation/Expansion:

This Contractor shall furnish and install any insulation and expansion assemblies that are shown within the Contract Documents for your Scope of Work.

CLARIFICATIONS

The Glass & Glazing & Terra Cotta Subcontractor Shall:

1. Provide all Pre Finished Metal Closure pieces that are attached to or adjacent to Curtain Wall
2. Provide all expansion joints that are contained or adjacent to Curtain Walls.
3. Furnish and install all exterior sunshade systems.
4. Furnish and install all aluminum sills.
5. Furnish and install the complete structural glass canopy system. Include all stainless steel and all work attached to wide flange beams. Include work indicated in both the architectural and structural drawings.
6. Provide a complete Terra Cotta Assembly system. Include all work indicated in specification section 042800. Include aluminum clip and sub-girts system, extruded hollow clay tile panels, flashings, weather-seals, cover plates and formed metal trim, anchors, fasteners, adhesives, insulation, vapor barriers, gaskets, sealants and related accessories, aluminum closure pies at windows, curtain wall and door perimeters, etcetera for a complete system. Include all work including the air and vapor barrier system outward at locations with the Terra Cotta Assembly system. Include all engineering and calculations.
7. Include temporary enclosures and heat as necessary to install the Terra Cotta Assembly system at any time of year.
8. Furnish and install all painted aluminum panels in the curtain wall system.
9. Furnish and install all glass fin systems.
10. Include all flashings at or adjacent the Terra Cotta Assembly system. Include all flashings at louvers including but not limited to the flashing indicated in detail 6/A6.30 and 4/A6.31.
11. Furnish and install hinged glass door assemblies including but not limited to the assembly depicted on sheet A7.11 over electrical panels.
12. Include performance mock-up testing as specified in specification 084413 under item 1.05 and 4.01 for the curtain walls, storefronts and entrances.
13. Include all dichroic glass fin systems "X-G" including but not limited to as identified on A3.01, A3.02 and A3.03.
14. Construction Parking & Material Storage Location: There is no Contractor parking on site and limited material storage. This Contractor shall include in his/her price offsite parking and storage of bulk material off site should you deem necessary.
15. *This Contractor shall furnish all applicable insulation and AVB that is behind or within the curtainwall, metal panel or terracotta system including but not limited to Peel and Stick, Spray Foam, Blanket Insulation, Thermafiber, etc. as specified in Specification section 072100 and 072700*

16. *This Contractor shall provide the Mullion Wrap Insulation (Typical) as detailed on 5/A6.11 issued with Addendum No. 3*

ALLOWANCES

This Contractor shall include within the Subcontract Price, the allowances as listed below per Specifications Section 012100. Allowances as listed below shall include all necessary material, cost for delivery, installation, machinery, insurance, applicable taxes.

Allowances shall appear as a line item on the Contractor's Schedule of Values. The allowance amount covers the cost of the Contractor's labor/material/equipment delivered to the project plus all taxes less any trade discounts to which the contractor may be entitled with respect to the item of work. The Contractor's costs for supervision, overhead, profit and other administrative expenses with respect to the allowance item are included in the base contract amount - not in the allowance amount.

All increases to an Allowance shall be by Change Order. Any unused portion of an allowance shall be returned to the Owner by deduct Change Order.

EXCLUSIONS

1) Sale and Use Taxes.

UNIT PRICES

Indicated below, the following unit price's shall be used in calculating Hazardous containing materials for additions and deductions from the original contract amount. These prices shall reflect all work practices required to remove and dispose the material in accordance with the project specifications and State and Federal regulations:

Bids shall include the following Unit-cost's:

ALLOWANCES

Allowances shall appear as a line item on the Contractor's Schedule of Values. The allowance amount covers the cost of the Contractor's labor/material/equipment delivered to the project plus all taxes less any trade discounts to which the contractor may be entitled with respect to the item of work. The Contractor's costs for supervision (non-working foreman), overhead, profit and other administrative expenses with respect to the allowance item are included in the base contract amount - not in the allowance amount.

All increases to an Allowance shall be by Change Order. Any unused portion of an allowance shall be returned to the Owner by deduct Change Order.

Bids shall include the following Lump Sum Allowances:

EXHIBIT "B"
SCOPE OF WORK
New Engineering & Science Building
UCONN Storrs Campus
Storrs, CT
UCONN Project No. 901376

Bid Package No.22.0 Plumbing

THE FOLLOWING WORK IS INCLUDED IN THE SUBCONTRACT:

The Scope of Work shall include but not be limited to labor, materials, equipment and all incidental work associated with **Plumbing & HVAC** as described in the Contract Documents and as outlined below. It is the intent of this Subcontractor to provide for the complete coordination, furnishing and installation of all **Plumbing & HVAC** as required, shown, described and specified under this Bid Package, and all related scope and services, required to complete the Project.

This Subcontractor shall be responsible to perform all Work not expressly specified or indicated by the Contract Documents but as required for a thorough and complete execution of the Work of this Bid Package/Subcontract in every respect. Note that the word "provide" if, and when used herein shall mean furnish and install completely, including all costs for labor, materials, and equipment. It is further understood that the Project Drawings, Specifications and other Documents listed in Exhibit B, may not be fully developed, and that the total Subcontract Agreement Price will include whatever is required beyond same to provide a complete and functional installation to the satisfaction of the Owner and Construction Manager. Should a conflict occur within the Contract Documents, the most restrictive, greatest quantity and highest quality shall prevail.

SCOPE OF WORK

1) **BID PACKAGE #22.0 – Plumbing:** This Subcontractor is responsible to provide all coordination, manufacturing, fabrication, labor, materials, tools, equipment and appurtenances of every kind for the complete execution to furnish and install the **Plumbing** and related work as described in the Specifications, Drawings, Site Logistics Plans and herein. The Scope of Work shall include, but not be limited to, the General Conditions, all Division One Specification Sections and all of the Work of this Bid Package in the following Specification Section(s) and those related Specification Sections, as shown and indicated on the Contract Documents, as shown and as further described herein:

Project Manuals:

Entitled: Bid Documents **Volume 1** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Mitchell Giurgola Architects, LLP. 630 Ninth Avenue New York, NY 10036 Dated February 20, 2015

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Entitled: Bid Documents **Appendix 2** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Mitchell Giurgola Architects, LLP. 630 Ninth Avenue New York, NY 10036 Dated February 20, 2015.
REPORT ON ENVIRONMENTAL PRECHARACTERIZATION PROGRAM PROPOSED SCIENCE AND ENGINEERINGBUILDING – DECEMBER, 2014

Entitled: Bid Documents **Volume 00** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Fusco Corporation 555 Long Wharf Drive New Haven, CT 06511 Dated February 20, 2015

Schedule of Drawings: See drawing list included in Manual 00

DIVISION 1 - GENERAL REQUIREMENTS

SECTION

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01-5639	Temporary Tree and Plant Protection
01-5719	Temporary Environmental controls
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01-6100	University Product Standard
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017419	Construction Demolition Waste Management
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ADDITIONAL SUBSURFACE EXPLORATIONS AND GEOTECHNICAL ENGINEERING CONSIDERATIONS – 19 DECEMBER, 2014

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REVISED FEBRUARY 2015

2) Description of Work:

a. The following requirements are in addition to those contained within the contract drawings, specifications, and bidding instructions and shall serve to amend, clarify, or supplement the requirements of those sections:

All Service from five feet outside building into the building unless otherwise noted in the Clarifications Section of this Scope of Work; Plumbing, Supply Connections to equipment of other trades and/or furnished by Owner; Connections to Lab Equipment and components Fume Hoods (including all service connections); Access Doors, Booster Pumps, Starters and Disconnects; Hangers, Anchors, Pipe supports: Cleaning, Lubrication, Coordination Drawings; Record Drawings; Operating and Maintenance Manuals; Instructions; Tests on: all system under your Scope of Work; Commissioning; Coordination with project schedule and other trades; Submittals, Samples, Product Data and etc.

All Plumbing Work; Sanitary Piping Systems; Venting Systems; Waste Systems; Domestic Water Piping; Piping Systems; Storm Piping Systems; Trap Primers and Cleanouts; Water Hammer Arrestors; Plumbing Fixtures ; Plumbing Equipment; Domestic Water Heater Equipment and Accessories; Gas Service and piping; Vibration Isolation; Insulation; Pipe and Pipe fittings; Motors and Starters for applicable equipment; Storm and Roof Drainage Systems; Temporary Roof Drains; Domestic Hot and Cold Water Systems; Water Service; Connections and Support systems for Equipment furnished by others; Gas Connections to Equipment and Lab Casework, Hangers and Supports; Insulation; Valves; Pipes; Drains; Water Heating Equipment; Vibration Control; Pumps and Controls; Hose Bibbs and Wall Hydrants; Miscellaneous Plumbing Specialties; Coordination Drawings; Core Boring; Floor and Through Wall

Sleeves' Down Spout Nozzles; and Joint Sealants for your scope of work; non plumbing Mechanical Connections to Equipment provided by others. Mock-ups; Submittals; Product Data and Samples and Etc; Record Drawings; Identification Tags and Drawings; Operating and Maintenance Instructions; Testing and Commissioning

The Plumbing Contractor shall provide starters and disconnects for pumps; motors; equipment and etc.; provided under your scope of work; unless specifically noted to be furnished by others. Interconnecting wiring (including controls) shall be the responsibility of the Plumbing Contractor, as noted on the Contract Documents.

3) Seismic Bracing:

a. This Subcontractor shall furnish and install all seismic bracing as required and indicated in the Contract Documents including state of CT PE stamped calculations.
b. This Subcontractor shall furnish and install all flexible joint assemblies associated with any mechanical restraint collars as indicated in the Contract Documents.

4) Underground Ducts and Utilities

The Site Contractor and/or Utility Company shall provide water, storm and sanitary service from point of origin to within 5' of the building line. The Site Contractor shall also provide Trenching, Bedding, Backfilling, Concrete Anchors, Thrust Blocks and Encasement as required for your work and the work of other trades.

The Plumbing Contractor shall be responsible for connections to each service within your Scope of Work provided by the Site Contractor and/or Utility Co. to complete the installation. Inserts, sleeve and the like required to enter/penetrate Foundation Wall and/or slabs shall be provided and sealed/Waterproofed by the Plumbing Contractor

5) Service Connections:

The Plumbing Contractor shall be responsible for all final connections, including, shut off valves, disconnects and etc. for all Equipment, (furnished by others) as it relates to your scope of work, including but not limited to: Millwork and Casework Services, Kitchen Equipment, Owner Supplied Equipment, and etc.

The Plumbing Contractor shall coordinate with the appropriated Contractor to assure that all services are complete in all respects. Failure to notify the Construction Manager of any discrepancies shall be construed as acceptance of the connection locations.

6) Wall-Hung Lavatories and Toilets:

The Plumbing Contractor shall coordinate with the Masonry and General Trades Contractor for installation of any wall anchors required during masonry or drywall wall construction for support of wall-hung lavatory systems and toilets. The Plumbing and HVAC Contractor will be responsible for furnishing and installing all necessary wall anchors or carries in strict accordance with the manufacturer's specification for their wall-hung lavatory systems.

7) Casework:

The Millwork Contractor shall coordinate and be responsible for all locations of rough-ins for the Casework. The Millwork Contractor shall submit detailed shop drawings within 45 days of award that include a detailed point to point location of all MEP rough-ins. These shop drawings shall be accompanied with a digital copy in AutoCAD and shall be used for all Contractor coordination. These drawings will be used by the Plumbing and HVAC and Electrical Contractors to locate penetrations/sleeves that will be core bored by them (Plumbing and HVAC and Electrical Contractors) for this work. All cost associated with core boring shall be included in this bid proposal.

The Plumbing Contractor shall furnish and set all faucets and sinks and make all appropriate final connections to these items.

8) Temporary Roof Drain Systems, Pans, Metal Deck openings

The Plumbing Contractor shall provide temporary roof drains SYSTEM for the proposed roof drains.

The Plumbing Contractor shall provide temporarily running and maintaining the roof drains/roof leaders to the exterior of the building to locations as directed by the Construction Manager.

The Plumbing Contractor shall provide and be responsible for cutting holes in all roof drain pans and cutting and removal of metal decking for all of their openings.

9) Under Slab Plumbing

<u>This Subcontractor shall complete ALL under slab plumbing three (3) days prior to the scheduled slab on grade pour time being of the essence.</u>

This Subcontractor shall expedite material submittals for all underslab piping and accessories to complete this Work.

This Subcontractor shall utilize sufficient manpower to complete this Work.

10) Heat Trace:

The Plumbing Contractor will furnish and install all electric heat trace cable systems as indicated on the Contract Documents for your work and the Electrical Contractor will provide all of the power wiring to these heating cables.

11) Gas Connections and Pressure Regulators:

The Plumbing Contractor shall install *all* interior and exterior gas piping and shall be responsible for the gas pressure required for all equipment. The Plumbing Contractor shall also be responsible for furnishing and installing all gas pressure regulators, shut off valves whether or not shown on

the Contract Documents required for correct operation of all equipment, meet code and to be coordinated and compliant with the gas company.

12) Access Doors:

The Plumbing Contractor shall provide access doors to the General Trades Contractor for installation. The access door provided shall be of compatible use for the finish assemble. Sizing shall be suitable to meet required access code.

13) BIM Modeling Coordination Drawings:

This Subcontractor shall participate and provide BIM Coordination files to the **Gate Keeper (HVAC Contractor)** and participate in weekly coordination meetings.

CLARIFICATIONS

1. **This Bidder may elect to submit a Bid Proposal combining Bid Packages 22.0 and 23.0 if the amount of the Bid Proposal offers a cost reduction. This combined Bid Packages "Offer" will be valid only if the Bidder submits an individual offer for each package involved. Bidders may offer this combined package proposal by submitting it on his or her business letterhead, as an added page to each Bid Form.**

EXCLUSIONS

1) Sale and Use Taxes.

ALTERNATE BIDS

Provide Alternate Bids as requested on Bid Form.

UNIT PRICES

Provide Unit Prices as requested on Bid Form.

ALLOWANCES

This Contractor shall include within the Subcontract Price Allowances as listed below. Allowances shall include all necessary material, cost for delivery, installation, machinery, insurance, and applicable taxes.

Allowances shall appear as a line item on the Contractor's Schedule of Values. The allowance amount covers the cost of the Contractor's labor/material/equipment delivered to the project plus all taxes less any trade discounts to which the contractor may be entitled with respect to the item of work. The Contractor's costs for supervision, overhead, profit and other administrative expenses with respect to the allowance item are included in the base contract amount - not in the allowance amount.

All increases to an Allowance shall be by Change Order. Any unused portion of an allowance shall be returned to the Owner by deduct Change Order.

EXHIBIT "B"
SCOPE OF WORK

New Engineering & Science Building
UCONN Storrs Campus
Storrs, CT
UCONN Project No. 901376

Bid Package No. 031.0

THE FOLLOWING WORK IS INCLUDED IN THE SUBCONTRACT:

The Scope of Work shall include but not be limited to labor, materials, equipment and all incidental work associated with **Site Work** as described in the Contract Documents and as outlined below. It is the intent of this Subcontractor to provide for the complete coordination, furnishing and installation of all **Site Work** as required, shown, described and specified under this Bid Package, and all related scope and services, required to complete the Project.

This Subcontractor shall be responsible to perform all Work not expressly specified or indicated by the Contract Documents but as required for a thorough and complete execution of the Work of this Bid Package/Subcontract in every respect. Note that the word "provide" if, and when used herein shall mean furnish and install completely, including all costs for labor, materials, and equipment. It is further understood that the Project Drawings, Specifications and other Documents listed in Exhibit B, may not be fully developed, and that the total Subcontract Agreement Price will include whatever is required beyond same to provide a complete and functional installation to the satisfaction of the Owner and Construction Manager. Should a conflict occur within the Contract Documents, the most restrictive, greatest quantity and highest quality shall prevail.

SCOPE OF WORK

1) **Bid Package 31.0 Site Work:** This Subcontractor is responsible to provide all coordination, manufacturing, fabrication, labor, materials, tools, equipment and appurtenances of every kind for the complete execution to furnish and install the **Site Work** and related work as described in the Specifications, Drawings, Site Logistics Plans and herein. The Scope of Work shall include, but not be limited to, the General Conditions, all Division One Specification Sections and all of the Work of this Bid Package in the following Specification Section(s) and those related Specification Sections, as shown and indicated on the Contract Documents, as shown and as further described herein:

Project Manuals:

Entitled: Bid Documents **Volume 1** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Mitchell Giurgola Architects, LLP. 630 Ninth Avenue New York, NY 10036 Dated February 20, 2015

Entitled: Bid Documents **Volume 2** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Mitchell Giurgola Architects, LLP. 630 Ninth Avenue New York, NY 10036 Dated February 20, 2015

Entitled: Bid Documents **Appendix 1** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Mitchell Giurgola Architects, LLP. 630 Ninth Avenue New York, NY 10036 Dated February 20, 2015.
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Entitled: Bid Documents **Appendix 2** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Mitchell Giurgola Architects, LLP. 630 Ninth Avenue New York, NY 10036 Dated February 20, 2015.
REPORT ON ENVIRONMENTAL PRECHARACTERIZATION PROGRAM PROPOSED SCIENCE AND ENGINEERINGBUILDING – DECEMBER, 2014

Entitled: Bid Documents **Volume 00** Project # 901376 University of Connecticut New Engineering and Science Building Prepared by: Fusco Corporation 555 Long Wharf Drive New Haven, CT 06511 Dated February 20, 2015

Schedule of Drawings: See drawing list included in Manual 00

Specification Sections of the Project Manual:

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

Document 000968	Soil Nail Wall Movement/ Support of Excavation/ Shotcrete Facing

DIVISION 1 - GENERAL REQUIREMENTS

SECTION

01-1000	Summary
01-2200	Unit Prices
01-2300	Alternates
01-2500	Substitution Procedures
01-2600	Contract Modification Procedures
01-3100	Project Management and Coordination
01-3200	Construction Progress Documentation
01-3233	Photographic Documentation
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01-4000 Quality Requirements
01-5000 Temporary Facilities and Controls
01-5639 Temporary Tree and Plant Protection
01-5719 Temporary Environmental controls
01-6000 Product Requirements
01-6100 University Product Standard
01-7300 Execution
017419 Construction Demolition Waste Management
01-7700 Closeout Procedures
01-7823 Operation and Maintenance Data
01-7839 Project Record Documents
01-7900 Demonstration and Training
018113 VOC Limits for Adhesives, Sealants, Paints and Coatings
018119 Construction Indoor Air Quality
019113 Building Commissioning Requirements

DIVISION 2 - EXISTING CONDITIONS

024100 Site Demolition
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321216 Asphalt Paving
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321443 Permeable Clay Brick Paver
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329001 Transplanting
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REVISED FEBRUARY 2015

2) Vibration and Sound Management

It is the requirement of this Contractor to adhere to the Vibration and Sound management practices as described in Specification Section 31 09 13 and to be aware of the location and proximity of the underground Vivarium. Traffic MUST be diverted around and at no time can any traffic drive directly over its location. Cost's associated with said monitoring will be paid by the Owner.

3) Description of Work:

a. The following requirements (if applicable) are in addition to those contained within the contract drawings, specifications, and bidding instructions and shall serve to amend, clarify, or supplement the requirements of those sections:

Layout; Temporary construction and associated work; Sedimentation and Erosion Control; Cast in Place Concrete; Footings and Foundations for Site Walls; Crane Pads; Utility Pads; Removal and Replacement of Unsuitable Material; Excavation and Backfilling; Demolition and Tree Removal; Rock Removal; Soil Retentions Systems; Radon Pits; Trenching and installation both outside and inside the Buildings (including but not limited to Gas, Water, Electrical, Grounding, Telephone/Data/Cable TV, Storm, Sewer, Fire Protection; Ductwork, Heating and Cooling); Concrete Thrust Blocks for All Utilities/Systems; Sheeting and Shoring; Dewatering for all trades; Earthwork; Anti-Tracking Pads; Site Water Distribution & Drainage; Foundation Drainage; Processed Aggregate Base; Soil & Materials Management; Site Storm Sewer Systems, (including Storm Water Discharge Permit); Site Sanitary Sewer System; Gas Utility System; Water Systems; all other Site Utilities as noted; Bituminous Concrete Pavement; Portland Cement Concrete Pavement & Curbs; Wheel Stops; Pavers; Temporary Protection and weatherproofing; Concrete Encasements; Concrete Formwork (For Site Concrete Work only); Concrete Reinforcement (For Site Concrete Work only); Structural Concrete (For Site Concrete Work only); Site/Traffic Control Signage; Flagpoles; Joint Sealers and Caulking (as it applies to your scope of work) and as described in the Specifications Divisions and Sections listed below.

4) Site Preparation:

a. This Subcontractor shall relocate as necessary and remove a minimum of **six (6) construction signs and bases** at surrounding campus streets stating "Construction Equipment and Trucks Entering Road". Additional signs may be required by the **University** and is included in the Subcontract price.
b. This Subcontractor shall relocate as necessary and eventually remove a minimum of **ten (10) temporary wayfinding signs and bases** as directed by the Construction Manager.

c. This Subcontractor shall include protection of site appurtenances, lawns and plantings adjacent to work areas. This Subcontractor shall be required to provide tree protection for existing trees to remain. All protection to be removed by this Subcontractor at the completion of the Work.

d. This Subcontractor shall provide and maintain and eventually remove all erosion control measures as required including, but not limited to, inlet protection at manholes, silt fence, hay bales, anti-tracking pads at the construction entrance and exit including all associated filter fabric and large stone, as detailed and approved in the aforementioned Logistics Plan. All truck tires are to be free of dirt, dry and clean before leaving the construction site.

e. This Subcontractor shall provide dust control (watering trucks) as required by the Construction Manager and/or by any state or local agency.
f. This Subcontractor shall protect all asphalt, concrete and existing site improvements. In the event asphalt, concrete or other site improvements intended to remain, this

Subcontractor shall repair and restore the asphalt, concrete and site improvements to its original condition.

g. This Subcontractor is responsible for maintenance and eventual removal of crushed stone temporary roads to adequately support loading and withstand exposure to heavy construction traffic. Obtain approval from the Construction Manager to locate temporary roads, storage and parking areas. Extend temporary roads in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration and supervisory personnel during later phases.

h. This Contractor shall be responsible for all costs to eventually remove the water line taps and any other work related to the new water services to the Office Trailers. The water authority will provide a list of qualified Contractors who can be used for the Taps, disconnects, and any other work that needs qualifications.

i. This Subcontractor shall remove and restore the following areas depicted on the Site Logistics Plan:

   i. Construction Parking and Material Storage Location

   ii. Construction Manager's Office Trailer

j. This Subcontractor shall remove conduit and wire for all Power and Telecom and Data for Construction Manager Trailer and Owner Trailer. Include removal of two (2) overhead poles and power backboard systems. Make final disconnections to trailers for power, telecom and data.

k. This Subcontractor shall provide all Site Preparation, Sediment Erosion Control Protection, and Clearing and Grubbing to remove all Trees, Tree Roots, Stumps, Shrubs and other existing Plant materials with the exception of those specifically noted in the Contract Documents to remain.

5) Site Demolition

A. Subcontractor shall furnish all labor, equipment, materials and refuse removal for all clearing, grubbing, site preparation and site demolition in accordance with contract documents. Subcontractor to provide dumpsters for its work. Subcontractor is responsible for cartage of all debris generated.

B. This Subcontractor shall include the demolition and removal of all items scheduled to be demolished in accordance with construction documents. Items, which are to be salvaged and stockpiled, shall be coordinated with the Construction Manager and Owner.

C. Include all site demolition outside the footprint of the building as depicted on the site demolition drawings to include but not limited to removal and proper disposal of pavements, existing utilities, concrete walks and pads, fencing, flag poles.

D. Contractor is responsible for demolition permits as required by Authorities having Jurisdiction.

E. This Contractor shall remove the existing Old Warehouse foundation that has been left in place. This is not shown on the contract documents but is visible by visiting the site.

6) Temporary Roads, Paving, Access

It is understood that all final paving (top course/finish course) can take place up to several months after the binder course is installed including binder installed by others and all associated cost to install a tack coat shall be included in this Contractor's bid proposal.

The Site Contractor shall construct and maintain temporary roads and paving that will adequately support loading and withstand exposure to traffic and equipment during the construction period. Locate temporary roads, storage, staging and parking areas where the same permanent facilities will be located whenever possible. Extend temporary roads in and around the construction area as necessary to accommodate concrete trucks, concrete pumps, structural steel deliveries, and all other deliveries, storage of materials, and access for equipment and for administration and supervisory personnel. This Contractor must maintain a compacted surface that slightly slopes away from building around the entire perimeter of the building at a minimum of 10 feet wide suitable for staging of the exterior of the building. Provide and maintain suitable pumps and drains to keep the excavated areas of the building free from water and sufficiently dry at all times. This Contractor shall provide **five (5) separate compacted (90% compaction) dry pads suitable for the cranes that will be used from outside of building foot print as located and as prescribed by the CM. These five (5) separate compacted pads shall be a minimum of thirty-five feet by thirty five feet.**

This Contractor shall be responsible to professionally sweep clean the campus roads around the project site on a daily basis as result of construction traffic. Additionally, this Contractor shall professionally sweep all pavement, sidewalks, and entry steps as directed by the Construction Manager from the time this Contractor mobilizes until the issuance of the Certificate of occupancy.

6) Soil Erosion and Sediment Control

This Contractor is responsible for the furnishing, maintenance and removal of Erosion and Sedimentation Controls including anti-tracking pads as shown on the Contract Documents. This Contractor will also be responsible to maintain the anti tracking pads as shown on the Contract Documents. Please Note, anti tracking pads are shown for count only and it is possible that these pads could be located in others areas as directed by the Construction Manager.

This Contractor is responsible for cleaning and /or washing down the tires of his or her construction vehicles and equipment including but not limited to visitors and vendors exiting the site at the anti-tracking aprons located at each construction entrance to avoid tracking mud, dust, and etc. from the site and onto public streets.

Sedimentation and erosion control shall be properly installed and maintained. The silt fence specified utilizes an 8' post spacing. The posts are to be hardwood posts with the fabric prefabricated on the posts from the factory. The fabric specified does exceed the specifications of some other manufacturers in regards to strength. The control includes two rows of fabric as a means of a second defense mechanism.

A breach in the erosion control systems shall be deemed a lack of oversight from this Contractor to properly ensure the systems are installed correctly and are being inspected and maintained regularly. In the event of a breach, this Contractor shall immediately repair and replace the breach and repair and restore the neighboring property.

It is essential that the site work be performed in a staged progression to minimize the potential for soil loss through erosion as stated in the Contract Documents. The Contract Documents are not intended to show every erosion control measure necessary to coordinate with the Project Schedule (this is identified in the Erosion Control Narrative Specification). Erosion control logs shall be required by this Contractor that clearly and accurately identifies the status of the erosion control measures in place, this item shall be on the agenda of every construction meeting.

Furthermore, this Contractor will be required to submit on a weekly basis, formally sign and follow requirements of the Water Pollution Control Plan for the project.

7) Survey / Layout:

The Site Work Trade Contractor shall provide **column location control lines and 10 benchmark grades.** This information shall be provided by a Connecticut Licensed Land Surveyor who shall install permanent offset points and bench marks that will allow for the reproduction of lines and grades by other trades.

This Contractor shall provide all other layout required to perform and complete his or her Work. The cost to replace or repair lost or damage control points shall be the charged to the offending Contractor.

Contractor shall furnish at the completion of its work an A-2 as-built survey for all work performed under this bid package.

8) Temporary Works:

The Site Work Contractor shall provide:

l. The Site Work Contractor shall provide the Temporary walks, parking, and drives and their associated work.

m. This Subcontractor shall include protection of site appurtenances, lawns and plantings adjacent to work areas. The Site Contractor shall be required to provide tree protection for existing trees to remain. The Site Contractor shall be required to provide reparations of site appurtenances, lawns and plantings adjacent to work areas.

n. This Subcontractor shall include protection of utilities to remain within the work areas as indicated in the Contract Documents.

o. This Contractor shall also provide and maintain suitable pumps, drains, and etc. to keep the site and building excavations free from water and sufficiently dry at all times.

p. This Subcontractor shall remove all Temporary Works below grade, including but not limited to, temporary power conduits, temporary water piping, temporary gas piping and other temporary systems not indicated to remain.

q. This Subcontractor shall provide any and all temporary ramps over foundations for access by any trade.

9) Tower Crane Pad:

This Contractor shall excavate a hole for the Tower Crane pad that is aproximatley 25' x 25' x 5' deep. Once the Tower Crane is removed, this Contractor shall remove the concrete pad poured by others.

10) Under-slab Utilities within the Structure:

The Site Contractor shall include all trenching, bedding and backfilling within the building footprint for installation of any and all MEP under-slab work depicted on the Contract Documents and Reference Documents. Soil compaction shall be restored and tested as noted on the Contract Documents. It shall be noted that the contract documents are diagrammatic only and trenching required for unground utilities within the building footprint may be much larger then shown. This Contractor shall reference all MEP documents for this requirement.

11) Removal of Mock-Ups:

The Site Contractor shall remove and dispose in the General Trades dumpster all Mock-ups (any trade) constructed in and around the Site when directed by the Construction Manager.

12) Site Utilities:

Site Contractor shall provide all Site Utilities as shown on the Contract Documents, including but not limited to:

a. Trenching, Bedding, Pipe, Fittings, Valves, Concrete Anchors, Thrust Blocks, Concrete Encasements, Backfilling, and etc. as required to complete all systems as noted such as, Gas, Storm, Sanitary, Water, Fire Protection, Under Drains, CATV, Fiber, Electrical, Telecom, Data and Pole Mounted Security Cameras.

b. Site Water Distribution & Drainage, Site Storm Sewer Systems (including Storm Water Discharge Permit), Site Sanitary Sewer System; Gas Utility System; Fire Protection Service; Water Systems; all other Site Utilities as noted;

c. This Contractor shall provide the above services from the point of origin into the building and coordinate same with the appropriate utility.

d. This Subcontractor shall provide and install all thrust concrete blocking associated with all systems including fire protection lines and labor and material for concrete encased ductbanks.

e. This Contractor will be responsible for coordination with the appropriate utility and provide and pay for all Permit, Fees, etc. and the coordination of inspections within the Contractor's Scope of Work as required by the service provider and/or the authority having jurisdiction.

f. It is the intent of this document that the Site Contractor shall provide all utilities noted as complete in all respects, including but not limited to, providing Utility Pads as shown or required.

g. The Site Contractor shall include in the Scope of Work any costs associated with shut downs that may be required to complete the Work.

h. The Site Contractor shall be responsible for cleaning, flushing and disinfecting all water service piping prior to any Plumber or Fire Protection Trade Contractor's attaching to the new services. The Site Contractor shall employ a licensed Plumbing Contractor for any water service piping that is required to have a licensed contractor to install this above mentioned work by code. Site Subcontractor shall ensure everyone on site has appropriate licenses in regards to this subcontract.

i. The Site Work Contractor shall furnish, install and coordinate with the Construction Manager and authority having jurisdiction when performing Domestic and Fire Protection water systems. It shall be the responsibility of the Site Work Contractor to make certain that the Water Distribution Services (Fire and Domestic) is complete in all respects at no additional cost to the Project. This includes but not limited to all tapping fees.

j. The Site Contractor shall be responsible for all costs and coordination of water line taps and any other work related to the new water services. The water authority will provide a list of qualified Contractors who can be used for the Taps, disconnects, and any other work that needs qualifications.

k. The Site Contractor shall provide excavation, Bedding and backfill for the new gas service to the new gas meter.

l. The Site Contractor shall be responsible for connections to each utility service including the Gas Service, and coordinate work with other trades. Excavation, Bedding and backfill for all other trades shall be the responsibility of this Site Contractor. Inserts, sleeves and the like required to pass through the foundation and/or slabs shall be provided by the Contractor requiring the opening.

m. The Site Contractor shall include in the Scope of Work any costs associated with shut downs to complete his or her work for the entire length of the project.

n. The Site Work Contractor is responsible for all excavation, Bedding and backfill required within the new building and on the entire site for, all Trade Contractors. Each Trade Contractors shall provide line and grade for Site Contractor. It will be the responsibility of the Site Contractor to obtain the proper depth and location required for each excavation.

o. This Contractor is to furnish all labor, materials, equipment and incidentals necessary for the demolition and disconnection and lawful disposal of existing underground and above ground utilities and appurtenances servicing structures to be demolished as indicated on drawings and as necessary to perform work in the Scope of Work, as specified, and as directed by Engineer. This Contractor is to contact and coordinate with all utilities prior to the start of Work. Subcontractor to verify all existing utilities that are to remain that

are in Subcontractor's area of work. Subcontractor is required to employ, at their expense, professional underground utility locating services for their onsite work. Any utility damaged due to Subcontractor's negligence will be fixed appropriately and costs passed on to Subcontractor. Stake, flag, and protect all existing utilities to remain.

13) Site Security:

The Site Contractor shall be responsible for security of the site with temporary gates, chains, locks, etc. Any associated cost shall be included in their base bid (distribution of keys free of charge as directed by the Construction Manager. Provide locks and chains on gates in fence as indicated on the Site Logistics Plan and as directed by the Construction Manager.

The Site Contractor shall be responsible on a ***daily basis*** to secure all access points to the site at the direction of the Construction Manager.

14) Office Trailer Locations:

This Subcontractor shall remove conduit and wire for all required Power and Telecom/Data for **Fusco** Site Offices.

This Subcontractor shall remove wastewater sewer connection for **Fusco** Site Offices.

This Subcontractor shall remove water service connection for **Fusco** Site Offices.

15) Construction Parking and Material Storage Location:

There is no Contractor parking on site and limited material storage. This Contractor shall include in his/her price offsite parking and storage of bulk material off site should you deem necessary

16) Building and Site Excavation, Bedding, Backfill:

The Site Contractor shall provide Excavation, Bedding, Backfill, waterproofing, and etc. where indicated for all structures including: Site Retaining Walls, Structures, Site Concrete and Sidewalks and Utilities, The Site Contractor shall provide Bases for all Site Lighting.

This Contractor shall be responsible for the Removal and required Replacement of Unsuitable Material as described in the Appendices and Specifications. Quantities noted are estimated and for reference only. It is the responsibility of this Contractor to hire a Soil Management Company for proper disposal of all categories of soil based on the information provided. This bid should include excavation and removal of all material to proposed grades as shown.

This Contractor shall install the Soil Retention System as indicated in Volume 00 specification No. 00968.

This Contractor shall coordinate with the Fusco Superintendent and Concrete company on the location of a ramp exiting the foundation for removal of material and access to inside the foundation.

This Contractor shall provide the excavation and installation and furnishing of the exterior Light Pole bases. Anchor bolts will be provided by the Electrical Contractor.

17) Underground Ducts and Utility Structures:

The Site Work Contractor shall provide Excavation, Dewatering, Bedding and Backfill, and installation of all Underground Conduits, Ducts, Grounding System and all other Utilities. Additionally the Site Contractor shall furnish and install Manholes, Handholds, Power Boxes Underground Structures and Pads, Transformer Vault/Pad, Concrete Anchors & Concrete Encasements, including Reinforcing Steel and Identification for same for all Underground Conduits, Ducts and all other Utilities.

The Electrical Contractor shall provide all Conduits, Ducts, Electrical Wire Accessories, connections and other materials as required to complete the Underground Conduits, Cables, Ducts, Grounding systems and Utilities installation per the Electrical Divisions.

This Contractor shall include all dewatering including all excavations, trenches, pits, open foundations, footings, etc., for the duration of the project.

18) Rigid Foundation Insulation and Waterproofing:

All Extruded-Polystyrene Insulation and Waterproofing outside the Foundation walls and footings, blind side foundations, Slab On Grade, tunnels and where indicated on the Contract Documents, shall be furnished and installed by the Site Contractor. The elevator pit waterproofing will be furnished and installed by the Concrete Contractor.

19) Sheeting, Shoring, Underpinning and Open Hole Protection:

In addition to that required by the Contract Documents, the Site Contractor is responsible to provide all Sheeting, Shoring, Bracing, and Underpinning as required to complete his or her Scope of Work and the work of other Trades, whether shown or not on the Contract Documents.

20) Site Concrete:

The Site Contractor shall provide all Concrete Formwork (for Site Concrete Work only), Concrete Reinforcement (for Site Concrete Work only) and Structural Concrete (for Site Concrete Work only) to complete all Site Concrete as indicated on the Contract Documents.

21) Site Signage:

The Site Contractor shall provide all Site Signage, Traffic Signage, Parking Signage, and associated Posts and/or Concrete Bases as noted in the Contract Documents.

22) Transformer & Lightning Protection Grounding Loop:

The Site Contractor shall provide Trenching, Bedding and Backfilling for the installation of the Ground Loop for the Transformer and the Lighting Protection System as indicated in the drawings.

23) Winter Protection, Dewatering and Runoff Control:

a. The Site Contractor shall provide removal of snow, ice and mud from Construction Roads, Permanent Driveways & Roads, City Sidewalks, Construction Trailer Office Locations, Office Trailer stairs and access and Construction Parking and Material Storage Areas as may be required for accessibility, safety, protection and prosecution of all trade work. These operations shall be performed for the duration of the Project. In addition to removing the snow, this Contractor shall spread ice melt as needed or at the Construction Manager's discretion. This Contractor will be responsible to sweep up all sand used in the above process. Site Subcontractor also to provide all removal of snow, ice and mud to complete its own work.

b. This Subcontractor shall include and maintain all rainwater runoff control and shall sign and agree to the Storm Water Pollution Control Plan.

c. This Subcontractor shall include ALL dewatering and surface water control for all open excavations, foundations, footings, access and haul roads, and staging areas as required for the duration of the Project. All erosion controls shall be inspected weekly and before every anticipated rain event and after every rain event.

d. This Subcontractor shall provide and maintain all winter protection up to the point where the area is taken over by the Concrete Foundation Subcontractor. This Subcontractor shall include preparation, protecting and/or pre-heating/thawing (including but not limited to blankets, ground heaters, etc.) required to complete its Work and will provide the Concrete Subcontractor's with "non-frozen" conditions. This Contractor shall remove any water, frozen soil, snow, etc. before backfilling foundations once forms are stripped. For excavations that receive concrete, the Concrete Contractor will take over the dewatering requirements once formally turned over and accepted from the Site Contractor.

24) Dust Control:

The Site Contractor shall provide all Dust Control for the duration of the Project. This Contractor will provide dust control (watering trucks) as required or as requested by the Construction Manager and/or by any state or local agency.

This Contractor is responsible for all pavement and field markings/painting, curb and wheel stops, speed bumps, undulations, and sealers. Include the complete removal of existing striping in lieu of just painting over existing with black paint.

25) Dumpsters, Clean-up, Wash-Out & Waste Removal:

a. The Site Work Contractor shall responsible to compact down ALL TRADES dumpsters w/ a machine equivalent to or greater than a John Deere 410 on an as needed basis per the Construction Manager.

b. The Site Work Contractor shall be responsible for washing out concrete trucks, pumping trucks, pipe lines, etc., off-site (take back to plant) or at a designated place on site which can be cleaned and disposed of at his or her expense. Additionally, the cost of cleaning of all concrete, mortar, and grout splatter from all surfaces immediately after placement of

these materials, and repairing any resulting damage to the satisfaction of the Construction Manager shall be included in this Contractor's bid proposal. Also include a location for the Concrete Subcontractor to wash out its trucks on the project site. NO WASHING OF TOOLS, EQUIPMENT, ETC. OR ANY MATERIALS INTO STORM OR SANITARY SYSTEMS WILL BE PERMITTED.

c. This Contractor will provide, maintain, and remove at project completion a washout area for his or hers and the Concrete/Mason Contractor's concrete trucks, pump trucks, pipe lines, etc., delivering to the site. Including periodically relocating the washout area as dictated by the Construction Manager and/or Engineer.

26) Traffic Control

This Contractor shall provide traffic control and a flagman to direct incoming and outgoing trucks and to protect pedestrian traffic when entering from North Eagleville Road.

27) Topsoil

This Subcontractor shall respread all existing topsoil as indicated on the Contract Documents. Topsoil cannot be stockpiles on site.

CLARIFICATIONS

1. The Enabling Contractor will install bituminous binder course up to the North wall of the CUP building. This contractor shall saw cut, remover binder course and install new proposed concrete sidewalk as indicated including bollards as shown.

2. This Contractor shall include the Building Isolation Drainage System at the tunnel connection including the lien concrete as shown on Drawing FD 1.0 Addendum No. 3

3. Cast in Place Concrete sump pits are by Bid Package 03.0

EXCLUSIONS:

1) Sale and Use Taxes.

ALTERNATE BIDS

Provide Alternate Bids as requested on Bid Form.

UNIT PRICES

Provide Unit Prices as requested on Bid Form.

ALLOWANCES

This Contractor shall include within the Subcontract Price Allowances as listed below. Allowances shall include all necessary material, cost for delivery, installation, machinery, insurance, and applicable taxes.

Allowances shall appear as a line item on the Contractor's Schedule of Values. The allowance amount covers the cost of the Contractor's labor/material/equipment delivered to the project plus all

taxes less any trade discounts to which the contractor may be entitled with respect to the item of work. The Contractor's costs for supervision, overhead, profit and other administrative expenses with respect to the allowance item are included in the base contract amount - not in the allowance amount.

All increases to an Allowance shall be by Change Order. Any unused portion of an allowance shall be returned to the Owner by deduct Change Order.

SECTION 042000

UNIT MASONRY

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 LEED BUILDING GENERAL REQUIREMENTS

A. Implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ 2009 New Construction Silver rating. Specific project goals which may impact this and the other sections of this specification include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; use of certified wood products; construction waste recycling; and the implementation of a construction indoor air quality management plan. Ensure that the requirements related to these goals, as defined in this Section and other Sections of the contract documents, are implemented to the fullest extent. Substitutions or other changes to the work shall not be allowed if such changes substantially compromise the stated LEED Building criteria.

B. Comply with LEED (Leadership in Energy and Environmental Design) Green Building Rating System BD+C, Version 3, Silver.

1.3 SECTION INCLUDES

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the unit masonry work as shown on the drawings and/or specified herein, including, but not necessarily limited to, the following:

1. Concrete masonry non-bearing partitions.

2. Stone base in masonry construction.

3. Brick masonry veneer site walls.

4. Metal joint reinforcing, anchors, ties, weeps, closures and related accessories for masonry.

5. Control and expansion joints in masonry, filled with joint fillers.

6. Chases, recesses, pockets and openings in masonry as required for installation of work by others.

7. Building in of items furnished by others into masonry, including access doors, door frames, anchors, sleeves and inserts, and other similar items to be embedded in masonry.

8. Grouting in of metal items built into masonry work.

9. Protection, pointing and cleaning of masonry.

1.4 RELATED SECTIONS

A. Construction and Demolition Waste Management – Section 017419.

B. VOC Limits for Adhesives, Sealants, Paints and Coatings – Section 018113.

C. Construction Indoor Air Quality (IAQ) Management – Section 018119.

D. Concrete - Section 033000.

E. Terra cotta assembly - 042800.

F. Steel lintels - Section 055000.

G. Air and vapor barrier membrane - Section 072700.

H. Building insulation - Section 072100.

I. Metal flashing - Section 076200.

J. Firestops and smokeseals - Section 078413.

K. Sealant - Section 079200.

L. Aluminum curtain wall - Section 084413.

M. Tile - Section 093000.

1.5 SUBMITTALS

A. Submit shop drawings for the following:

1. Anchoring details.

2. Control and expansion joint locations and details.

B. Submit samples of the following:

1. Joint reinforcing, each type, width and proposed location (labeled).

2. Anchors, wedges and ties, each type, width and proposed location (labeled).

3. Joint filler, each type.

4. Granite stone.

5. Brick masonry veneer unit.

C. Submit technical and installation information for the following:

1. Mortar materials, each material and mortar type.

2. Certification of mortar mix.

3. Concrete block, joint reinforcing, anchors, ties and joint filler; submit manufacturer's technical and descriptive literature.

4. Block manufacturer shall submit certifications of compliance with ASTM C 90, C 331 and UL 618 prior to any job site delivery. Field sampling of concrete block may be tested by an Independent Testing Laboratory retained by the Owner according to the requirements of ASTM C 140.

D. Construction Procedures: Submit proposed procedures and materials for cleaning masonry work; including certification that cleaner will not adversely affect stone, gaskets, sealants, etc.

E. Provide letter from air/barrier manufacturer confirming thru wall flashing material is compatible with air/barrier.

F. LEED Building Submittal Requirements: The Contractor or subcontractor shall submit the following LEED Building certification items:

1. A completed LEED Building Materials Certification Form, per Section 013300, "Submittals," under the LEED Building Submittal Requirements article of these specifications. Information to be supplied includes:

   a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
   b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s).
   c. Material costs for the materials included in the Contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.

2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

3. Product Cut Sheets for all materials that meet the LEED Performance Requirements this Section.

4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to, adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted. (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer's literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content.)

1.6 QUALITY ASSURANCE

A. Conform to the following non-cumulative tolerances (any masonry work not meeting these standards shall be re-built as directed by the Architect).

1. Variation from the plumb:

a. In lines and surfaces of columns, walls and arrises:
1). In 10 feet 1/8"
2). In any story of 25 feet maximum 1/4"
b. For external corners, expansion joints and other conspicuous lines:
1). In any story of 25 feet maximum 1/4"

2. Variation from the level or the grades indicated on the drawings; for exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines:

a. In any bay or 20 feet maximum 1/4"

3. Variation of the linear building lines from established position in plan related portion of columns and partitions:

a. In any bay or 20 feet maximum 1/4"
b. In 40 feet or more 1/2"

4. Variation in cross-sectional dimensions of columns and in thickness of walls:

a. Minus 1/8"
b. Plus 1/8"

5. Variation in dimensions of masonry openings:

a. Horizontal dimension -0" + 1/16"
b. Vertical dimension +0" - 1/16"

B. Job Mock-Up

1. Prior to installation of masonry work, erect sample wall panel mock-up using materials, bonding patterns and joint tooling required for final work and including cavity wall, masonry sill, typical pier with returns and stone base, window unit and sill, projecting courses, anchors and reinforcement as detailed. Provide special features as directed by the Architect for caulking and contiguous work. Build mock-up at the site, 4' x 4' size as directed by the Architect, indicating the proposed range of colors, textures and workmanship to be expected in the completed work. Reconstruct mock-up if directed by the Architect until it meets with Architect's approval. Obtain Architect's acceptance of visual qualities of the mock-up before start of masonry work. Retain mock-up during construction as a standard for judging completed masonry work. Do not alter, move or destroy mock-up until work is completed and accepted by the Architect. Use sample panels to test proposed cleaning procedures after sample panel meets with Architect's approval.

2. Approved sample panel shall remain on view at the site until completion of face brick work.

3. Architect shall direct distribution of brick color and texture variation within mock-up.

C. Work of this Section shall conform to the requirements of the following:

1. 2011 ACI 530/ASCE 5/TMS 402 Building Code Requirements for Masonry Structures.

2. 2011 ACI 530-1/ASCE 6/TMS 602 Specifications for Masonry Structures.

D. Pre-Construction Conference: Prior to installation of masonry and associated work, Contractor shall arrange a meeting with Masonry Subcontractor, installers of related work, and other entities concerned with masonry wall performance, including the Architect and Owner. Contractor shall record discussions and agreements and furnish copy to each participant. Provide at least seventy-two (72) hours' advance notice to participants prior to convening conference. Review methods and procedures related to masonry work, including, but not limited to, the following:

1. Review masonry requirements (drawings, specifications and other Contract Documents).

2. Review required submittals, both completed and yet to be completed.

3. Review and finalize construction schedule related to masonry work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.

4. Review required inspection, testing, certifying and material usage accounting procedures.

5. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.

E. LEED Building Performance Requirements

1. Adhesives or sealants used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113, "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings," where applicable.

2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the LEED Building Submittal Requirements of this Section.

3. Materials that contain recycled content shall be documented in accordance with the LEED Building Submittal Requirements of this Section.

1.7 PRODUCT HANDLING

A. General: Deliver, store, handle and protect all materials from damage, moisture, dirt and intrusion of foreign matter. Store all masonry units and mortar materials on raised platforms and under ventilated and waterproof cover. Store packaged materials in manufacturer's unopened containers, marked with manufacturer's name and product brand name. Immediately reseal containers after partial use. Remove and replace damaged materials.

B. Masonry Units: Pack, deliver and store to prevent breakage, cracking, chipping, spalling or other damage. Store, protect and ventilate units at project site.

C. Aggregate: Store with provisions for good drainage.

D. Reinforcement and Anchors: Store and protect so that when placed, joint reinforcement and anchors will be free of soil, dirt, ice, loose rust, scale, or other coatings which would destroy or reduce bond with mortar, and will not be disfigured or bent out of shape.

1.8 JOB CONDITIONS

A. In cold weather, when the outside temperature is below forty (40) degrees F., conform to the requirements of "Cold Weather Masonry Construction and Protection Recommendations" publication by Brick Industry Association (BIA). No anti-freeze admixtures are permitted.

B. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg. F. and above.

C. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24" down both sides and hold cover securely in place.

2. Where one wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24" down face next to unconstructed wythe and hold cover in place.

D. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.

2. Protect sills, ledges, and projections from mortar droppings.

3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.

4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt on completed masonry.

PART 2 PRODUCTS

2.1 MATERIALS

A. Standard Concrete Block

1. Portland cement, ASTM C 150, Type 1, one source.

2. Aggregates, ASTM C 331, lightweight expanded shale, clay or slate aggregates, manufactured by the rotary kiln process equal to "Solite," "Norlite," or "Haydite."

   a. All block shall be from one aggregate type and from one manufacturer.

3. Concrete Masonry Units: Load bearing lightweight aggregate concrete masonry units conforming to the requirements of ASTM C 90.

   a. Block behind terra cotta stone and block for rated walls shall be 50% maximum solid units.
   b. All other block may be hollow units.

4. The producer of the concrete masonry units shall furnish certification from an independent testing laboratory confirming that all 8" or larger masonry units meet all of the UL 618 requirements for two (2) hours or better (as required), referencing full scale fire test reports (ASTM E 119). All 4" and 6" units shall conform to "National Bureau of Standards" and "National Research Council" full scale fire tests.

5. Sizes and Shapes: Nominal face size 8" x 16" by thickness as indicated on drawings, with stretcher units, jamb units, header units, square corner units (at ends and corners of exposed or painted work), sash units (at control joints within masonry wall), lintel units and other special shapes and sizes required to complete the work.

6. Finish: For exposed or painted block surfaces. In addition to ASTM requirements, block shall have uniformly dense, flat, fine grain texture, with no cracks, chips, spalls, or other defects which would impair appearance. For concealed CMU, surfaces shall be free from deleterious materials that would stain plaster or corrode metal.

7. Curing: All concrete block shall be steam cured, and air dried for not less than thirty (30) days before delivery.

8. Density of concrete block shall not exceed one hundred and five (105) lbs. per cubic foot.

9. Shrinkage: Shrinkage of concrete blocks shall not exceed 0.065% when tested in accordance with ASTM C 426-99.

10. Water Content

    a. At the time of delivery to the job site, concrete masonry units shall have a value, in weight of contained water, of not more than thirty (30) percent of the fully saturated content for the unit tested.
    b. Ship all units from the factory, and store at the job site, with all necessary protection to prevent increase of water content from rain and other sources.

B. Stone: Granite conforming to ASTM C 615, of size and thickness shown on drawings.

1. Finish: Stone shall have thermal finish on all exposed surfaces; concealed surfaces may be sawn. Edges to receive grout or sealant shall be sawn.

2. Type: Jet Mist.

3. Size: Height per elevation drawings; 8" minimum exposed and 8" below grade, typical; 2" thick; joints per elevation drawings.

4. Corner Type: Per detail drawings.

C. Brick Masonry Veneer at Site Walls

1. Size, Color and Texture: As selected by Architect.

2. Acceptable Manufacturers: As selected by Architect.

D. Joint Reinforcing for Masonry Walls

1. For block walls forming part of exterior wall construction behind exterior stone veneer and behind terra cotta rain screens, provide super heavy duty reinforcing fabricated of 3/16" dia. side and cross rods, truss or ladder design, ties, spaced every block course. Provide prefabricated pieces at corners and intersections of walls or partitions.

    a. Reinforcing assembly shall be hot dip galvanized steel finish conforming to ASTM A 153 with zinc coating of 1.5 oz. of zinc per sq. ft., after fabrication.

2. For interior block walls and partitions, provide standard reinforcing fabricated of 9 ga. side and cross rods, truss or ladder design, no ties, spaced every other block course. Provide prefabricated pieces at corners and intersections of walls or partitions. Reinforcing shall be hot dip galvanized steel finish conforming to ASTM A 153, with zinc coating of 1.5 oz. of zinc per sq. ft. after fabrication.

3. Wire used in assemblies noted above shall be cold drawn steel wire conforming to ASTM A 82.

4. Approved Joint Reinforcing Manufacturers

    a. Hohmann & Barnard
    b. Dur-O-Wal
    c. Heckmann Building Products
    d. National Wire Products Industries, Inc.

E. Anchors and Ties

1. Dovetail Anchor Slots: Hot-dip galvanized steel equal to No. 305 anchor slot made by Hohmann & Barnard, or approved equal by other manufacturers noted above.

2. Flexible Metal Ties for Dovetail Slots: Hot-dip galvanized steel, 16 gauge by 1" wide by Heckmann Building Products Inc., or approved equal.

   a. No. 106 Dovetail Corrugated Anchor.
   b. No. 129 Dovetail Triangle Tie.

3. Wire Mesh: Hot-dip galvanized sixteen (16) gauge steel wire, square mesh, width 3" by length to suit condition; No. 268 by Heckmann Building Products, or approved equal by Hohmann & Barnard.

4. For anchoring CMU wall, at the exterior masonry cavity wall, to the underside of the concrete beam, provide dovetail slot as noted above and the following:

   a. No. 121 galvanized steel dowel anchor and No. 421 tube as manufactured by Heckmann Building Products. Galvanized to conform to ASTM A 153, Class B-2 or
   b. No. PTA-310 galvanized steel dowel anchor and No. NS-TA joint filler as manufactured by Hohmann & Barnard or approved equal. Galvanizing to conform to ASTM A 153, Class B-2.

5. For anchoring masonry to structural steel, provide hot-dip galvanized steel, as listed, or approved equal:

   a. Made by Heckmann Building Products. Galvanizing shall conform to ASTM A 153, with zinc coating of 1.5 oz. of zinc per sq. ft.
      1). No. 195 Column Anchors
      2). No. 197 Column Anchors
      3). No. 315 Weld-On Anchor Rods with No. 316 Triangle Ties
      4). No. 315-B Weld-On Anchor Straps with No. 316 Triangle Ties
   b. Made by Hohmann & Barnard or approved equal. Galvanizing shall conform to ASTM A 153, with zinc coating of 1.5 oz. of zinc per sq. ft.
      1). No. 355 Column Anchors
      2). No. 356 Column Anchors
      3). No. 357 Beam Anchors
      4). No. 359 F anchor straps with VWT tie.

6. For anchoring CMU interior partitions to underside of steel beams, provide stainless steel tube anchors, No. PTA-420 made by Hohmann & Barnard, or approved equal.

7. For anchoring CMU interior partitions to underside of structural deck, provide 4" x 4" x 1/4" galvanized steel angles (ASTM A 36), 3'-0" long spaced 3'-0" o.c. alternately on each side of partition. Anchor partition securely to structural deck.

F. Reinforcing Bars and Rods: ASTM A 615, Grade 60. See Drawings for size.

G. Control and Expansion Joint Fillers

1. Vertical Installation Within Concrete Masonry Wall: Extruded rubber, cross shape, for use with concrete masonry sash units, which shall provide a force fit in the grooves of the sash block, and shall have 1/2" diameter tubular ends (compressed 25% when installed in 3/8" wide joint). Acceptable product shall be "#RS Series - Rubber Control Joint" as manufactured by Hohmann & Barnard, Inc., or approved equal.

   a. Provide the following sizes:
      1). 2-5/8" wide control joint fillers for 4" block walls.
      2). 4-5/8" wide for 6" block walls.
      3). 6-5/8" wide for 8", 10" and 12" block walls.
   b. Provide backer rod and sealant joint over joint filler as per drawings and Section 07900 of these specifications.

2. Isolation Joint Filler at Abutting Construction and at Intersecting CMU Walls: Compressible and resilient closed cell neoprene gasket with pressure sensitive adhesive backing, thickness 30% greater than thickness of joint. Acceptable joint filler shall be "Everlastic, Type NN-1" by Williams Products, Inc., or approved equal. Recess joint filler and install backer rod and sealant as per drawings and Section 07900 of these specifications.

H. Non-Rated Joint Fillers: Provide closed cell neoprene conforming to ASTM D 1056, Grade 2A1, "#NS Closed-Cell Neoprene Sponge" as manufactured by Hohmann & Barnard, Inc., or approved equal.

2.2 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type 1, standard color, one source.

B. Hydrated Lime: ASTM C 207, Type S.

C. Sand: Clean, washed, buff colored sand, graded per ASTM C 144.

D. Water: Clean, fresh and suitable for drinking.

2.3 MORTAR MIX

A. Exterior Block Back-Up Construction: Provide Portland cement/lime mortar as noted above conforming to ASTM C 270, Type N.

B. Interior Masonry Construction: Provide Portland cement/lime mortar conforming to ASTM C 270, Type N, for load bearing conditions, mortar shall conform to ASTM C 270, Type M.

C. Mortar for Cement Cants: One (1) part Portland cement and four (4) parts sand, by volume.

D. Grout for Unit Masonry: Comply with ASTM C 476 for grout for use in construction of unit masonry. Use grout of consistency (fine or coarse) at time of placement which will completely fill all spaces intended to receive grout.

E. Mixing

1. General: Add cement just before mixing and mix dry. Use sufficient amount of water as necessary to produce workable mix. Mix in small batches to make plastic mass.

2. Mixing: Machine mix all mortars in approved type mixer with device to accurately and uniformly control water. Add hydrated lime dry. Mix dry materials not less than two (2) minutes. Add water, then mix not less than three (3) minutes. Mix only amount of mortar that can be used before initial set. Do not use mortar which has reached its initial set or two (2) hours after initial mixing, whichever comes earlier. Mortar may not be re-tempered. Clean mixer for each batch, whenever mortar type is changed, and at end of each day's work.

3. Acceleration or other admixtures not permitted.

4. Mortar shall have a flow after suction of not less than seventy-five (75) percent of that immediately after mixing as determined by ASTM C 91.

F. Admixtures

1. No air-entraining admixtures or cementitious materials containing air-entraining admixtures shall be used in the mortar.

2. No antifreeze compounds or other substances shall be used in the mortar to lower the freezing point.

3. Calcium chloride or admixtures containing calcium chloride shall not be used in mortar.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection

1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

2. Verify that masonry may be completed in accordance with all pertinent codes and regulations, the referenced standards, and the original design.

3. Do not start any work until mock-ups are approved by the Architect.

B. Discrepancies

1. In the event of discrepancy, immediately notify the Architect in writing.

2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 COORDINATION

A. Carefully coordinate with all other trades to ensure proper and adequate interface of the work of other trades with the work of this Section.

3.3 PREPARATION

A. Concrete Block: Do not wet concrete block units.

3.4 INSTALLATION

A. General

1. Build walls to the full thickness shown. Build single wythe walls to the actual thickness of the masonry units, using units of nominal thickness shown.

2. Build chases and recesses as shown or required for the work of other trades.

3. Leave openings for equipment to be installed before completion of masonry work. After installation of equipment, complete masonry work to match work immediately adjacent to the opening.

4. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to properly locate openings, movement type joints, returns and off-sets. Avoid the use of less than half size units at corners, jambs, and wherever possible.

5. Lay up walls plumb and true with courses level, accurately spaced, and coordinated with other work.

6. Provide templates made of steel studs for plumbing of two story masonry openings.

7. Pattern Bond: Lay exposed masonry in pattern bond noted in Part 2. Lay concealed concrete block with all units in a wythe bonded by lapping not less than two (2) inches. Bond and interlock each course of each wythe at corners. Do not use units of less than four (4) inches horizontal face dimensions at corners or jambs.

8. Where possible, masonry walls and partitions shall be built after all overhead ducts, pipes and conduits are in place and tested. Masonry shall be neatly built around the items above. Walls and partitions shall be plumb, true to line and free from defects such as open cells, voids, dry joints and other similar defects. In rooms and spaces scheduled to have concrete block finish, all such surfaces including upper wall surfaces up to termination of structural ceiling in spaces without suspended ceilings, shall be made suitable for paint application. Cutting

of openings in walls and partitions in place shall be done only with the approval of the Architect.

B. Mortar Bedding and Jointing

1. Lay concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on exterior walls and in all courses of piers, columns and pilasters, where solid CMU is used and where adjacent to cells or cavities to be reinforced or filled with concrete or grout.

2. Lay masonry walls with 3/8" joints unless otherwise shown on drawings.

3. Tool exposed joints slightly concave. Concealed joints shall be struck flush.

4. CMU wall joints scheduled to receive air and vapor barrier specified in Section 072700 shall be struck flush per manufacturer's requirements.

~~4.~~**5.** Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

C. Stopping and Resuming Work: Rake back 1/2 block length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly (if required) and remove loose masonry units and mortar prior to laying fresh masonry.

D. Built-In Work

1. As the work progresses, build in items specified under this and other Sections of these specifications. Fill in solidly with masonry around built-in items.

2. Mortar in door frames, access doors, louvers and other metal items embedded or built into masonry work solidly with mortar as the masonry units are laid up.

3. Grout under lintels, bearing plates, and steel bearing on masonry with solid bed grout.

4. Sleeves, pipes, ducts and all other items which pass through masonry walls shall be caulked with interior grade sealant meeting requirements of Section 07900, so as to be air tight and prevent air leakage. Refer to Section 07840 for packing of voids in rated masonry walls.

5. Fill vertical cells of masonry units solid with grout which have anchoring, reinforcing rods, supporting or hanging devices embedded in the cell including stone anchors and window or curtain wall anchors.

6. Fill vertical cells of masonry units solid with mortar on each side of door frames to sixteen (16) inches beyond.

7. Unless otherwise noted, fill vertical cells of masonry units solid with grout which are below steel bearing plates, steel beams, and ends of lintels, to eight (8) inches beyond bearing and from floor to bearing.

8. Place wire mesh in horizontal joint below masonry unit cells to be filled with mortar, to prevent mortar from dropping into unfilled cells below.

9. Masonry indicated as being reinforced shall have all voids filled solid with grout. Grout shall be consolidated in place by vibration or other methods which insure complete filling of cells. When the least clear dimension of the grouted cell is less than two (2) inches, the maximum height of grout pour shall not exceed twelve (12) inches. When the least clear dimension is two (2) inches or more, maximum height of grout pour shall not exceed forty-eight (48) inches. When grouting is stopped for one (1) hour or longer, the grout pour shall be stopped 1-1/2" below the top of a masonry unit. Vertical bar reinforcing shall be accurately placed and held in position while being grouted, and shall be in place before grouting starts. All such reinforcing shall have a minimum clear cover of 5/8". Lap all bars a minimum of forty (40) bar diameters and provide steel spacer ties (not to exceed 192 bar diameter) to secure and position all vertical steel and prevent displacement during grouting. Provide continuous horizontal reinforcement embedded in mortar joints every second course.

E. Cutting and Patching

1. All exposed masonry which requires cutting or fitting shall be cut accurately to size with motorized carborundum or diamond saw, producing cut edges.

2. Do not saw cut any masonry openings in face brick construction without Architect's approval and after a procedure has been reviewed and approved.

3. Holes made in exposed masonry units for attachment of handrail brackets and similar items shall be neatly drilled to proper size.

4. All masonry which requires patching in exposed work, if approved by Architect, shall be patched neatly with mortar to match appearance of masonry as closely as possible and to the Architect's satisfaction. Rake back joints and use pointing mortar to match as required.

F. Solid Wall Construction

1. Fill the vertical longitudinal joint between wythes solidly with mortar by parging the in-place wythe and shoving units into the parging.

2. Tie wythes with continuous horizontal reinforcement embedded in mortar joints sixteen (16) inches o.c. vertically.

G. Cavity Walls

1. Where stone veneer is used, per Section 04400, in cavity wall configuration, back-up block shall be reinforced every block course.

2. Refer to Section 072100, "Building Insulation," for material and installation of exterior wall insulation.

H. Interior Block Partitions

1. Build to full height unless otherwise shown on drawings. At non-rated partitions, fill void between CMU and structural deck with continuous neoprene filler conforming to the requirements of Paragraph 2.1, G, herein. At fire rated partitions, fill void with fire stop material meeting the requirements of Section 078413. Fasten to structure at top of partition using Hohmann & Barnard HB Partition Top Anchors or approved equal.

2. Provide continuous horizontal joint reinforcing every other block course, except as otherwise noted. Fully embed longitudinal side rods in mortar for their entire length with a minimum cover of 5/8". Lap reinforcement a minimum of six (6) inches at ends of units.

3. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

4. Corners

   a. Provide interlocking masonry unit bond in each course at corners.
   b. Provide continuity at corners with prefabricated "L" reinforcement units, in addition to masonry bonding.

5. Intersecting and Abutting Walls

   a. Unless vertical control joints are shown as part of structural frame, provide interlocking masonry bond. Provide starters and special shapes as shown on the drawings to bond these walls.
   b. In addition to masonry bonding, provide horizontal reinforcement using prefabricated "T" units at interior partitions.

I. Ties and Anchors for Masonry Construction

1. Provide ties and anchors as shown or specified, but not less than one metal tie, spaced not to exceed sixteen (16) inches o.c. horizontally and/or vertically. Provide additional ties within 1'-0" of all openings and spaced not more than 24" apart around perimeter of openings.

2. Where anchoring masonry to structure, provide an open space not less than 1/2" in width between masonry and structural member, unless otherwise shown. Keep open space free of mortar or other rigid materials.

J. Control and Expansion Joints

1. Provide vertical expansion, control and isolation joints in masonry as shown. Build in related items as the masonry work progresses.

2. CMU Control Joint Spacing: If location of control joints is not shown, place vertical joints spaced not to exceed 20'-0" o.c. In addition, locate joints at points of natural weakness in the masonry work, including the following:

   a. At structural column or joint between bay.

b. Above control joints in the supporting structure.
c. Above major openings at end of lintels upward and below at ends of sills downward. Place at one side of jamb for openings not less than 7'-0" wide and at both sides for openings over 6'-0" wide.
d. At reduction of wall thickness.
e. Where masonry abuts supporting structure.
f. If additional joints are required, indicate same on approved shop drawings.

K. Lintels

1. Install loose steel lintels furnished by Section 05500, allowing eight (8) inch bearing at ends.

2. For concrete block walls, use specially formed U-shaped concrete block lintel units with reinforcing bars in accordance with the Structural Drawings, filled with grout.

3.5 CANTS

A. Provide specified mortar for cement cants at beams and other projections in elevator shafts, where adjoining wall is of masonry construction. Cants shall slope seventy (70) degrees from the horizontal.

3.6 CLEANING, PROTECTION, ADJUSTMENT

A. Protection

1. The Contractor shall take adequate precautions for the protection of all surfaces against mortar spatter, and shall immediately remove any such spatter should it inadvertently occur, leaving no stain or discoloration.

2. Excess mortar shall be wiped off the masonry surfaces as the work progresses.

3. Wood coverings shall be placed over all such masonry surfaces as are likely to be damaged during the progress of the entire project.

4. Protective measures shall be performed in a manner satisfactory to the Architect.

5. Damaged masonry units shall be replaced to satisfaction of the Architect.

6. Exterior masonry walls shall be draped with waterproof covering until copings are in place, to prevent water penetration in cavity.

B. Cleaning of Masonry: Upon completion, all exposed masonry shall be thoroughly cleaned following recommendations of the IMI Technical Note No. 20. Before applying any cleaning agent to the entire wall, it shall be applied to a sample wall area of approximately 4' x 4' in a location approved by the Architect. No further cleaning work may proceed until the sample area has been approved by the Architect, after which time the same cleaning materials and method shall be used on the remaining wall area. If stiff brushes and water do not suffice, the surface shall be thoroughly saturated with clear water and then scrubbed with a solution of an approved detergent masonry cleaner, equal to "Vana Trol" made by ProSoCo Inc. or equal made by Diedrich or

approved equal, mixed as per manufacturer's directions, followed immediately by a thorough rinsing with clear water. All lintels and other corrodible parts shall be thoroughly protected during cleaning.

C. Clean polished ground faced units per manufacturer's recommendations. Do not use acids or abrasives on finished walls.

D. Pointing: Point any defective joint with mortar identical with that specified for that joint.

END OF SECTION

SECTION 062000

CARPENTRY

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 LEED BUILDING GENERAL REQUIREMENTS

A. Implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ 2009 New Construction Silver rating. Specific project goals which may impact this and the other sections of this specification include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; use of certified wood products; construction waste recycling; and the implementation of a construction indoor air quality management plan. Ensure that the requirements related to these goals, as defined in this Section and other Sections of the contract documents, are implemented to the fullest extent. Substitutions or other changes to the work shall not be allowed if such changes substantially compromise the stated LEED Building criteria.

B. Comply with LEED (Leadership in Energy and Environmental Design) Green Building Rating System BD+C, Version 3, Silver.

1.3 SECTION INCLUDES

A. Work of this Section includes all labor, materials, equipment and services necessary to complete the carpentry work as shown on the drawings and/or specified herein, including but not limited to, the following:

1. Blocking and miscellaneous wood.

2. Plywood at electrcal rooms.

3. Rough hardware.

4. Installation only of finish hardware.

5. Installation only of doors and hollow metal frames.

1.4 RELATED SECTIONS

A. Construction and Demolition Waste Management – Section 017419.

B. VOC Limits for Adhesives, Sealants, Paints and Coatings – Section 018113.

C. Construction Indoor Air Quality (IAQ) Management – Section 018119.

D. Architectural woodwork - Section 064023.

E. Roofing - Section 075200.

F. Steel doors and frames - Section 081113.

G. Wood doors - Section 081416.

H. Finish hardware - Section 087100.

1.5 QUALITY ASSURANCE

A. Lumber Standard: Comply with PS 20.

B. Plywood Standard: Comply with PS 1 and American Plywood Assoc. (APA).

C. Shop fabricate carpentry work to the extent feasible and where shop fabrication will result in better workmanship than feasible for on-site fabrication.

D. Grade Marks: Identify lumber and plywood by official grade mark.

1. Lumber: Grade stamp to contain symbol of grading agency certified by Board of Review, American Lumber Standards Committee, mill number or name, grade of lumber, species grouping or combination designation, rules under which graded where applicable, and condition of seasoning at time of manufacture.

a. S-Dry: Maximum nineteen (19) percent moisture content as per ASTM D 2016.

E. Installation of doors, frames and hardware shall conform to the minimum standards of "Installation Guides for Doors and Hardware" of the Door and Hardware Institute.

F. LEED Building Performance Requirements

1. Materials that contain recycled content shall be documented in accordance with the LEED Building Submittal Requirements of this Section.

2. Steel materials used for work in this section shall contain a minimum of 35% (combined) pre-consumer/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the LEED Building Submittal Requirements of this Section.

3. Engineered wood, not including salvaged wood, shall contain a minimum of 10% (combined) pre-consumer/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the LEED Building Submittal Requirements of this Section.

4. All composite wood, engineered wood, or agrifiber products (e.g., plywood, particleboard, medium density fiberboard) to be permanently installed on the interior of project shall contain no added urea-formaldehyde resins. Acceptable resins and binders include, but are not limited to, phenol formaldehyde and methyl diisocyanate (MDI). Certification of these products shall be in accordance with the LEED Building Submittal Requirements of this Section.

5. Adhesives used for work in this section, including plastic laminating adhesives, shall contain no added Urea Formaldehyde.

6. Wood Materials manufactured, fabricated, and/or harvested within 500 miles (by air) of the project site shall be documented in accordance with the LEED Building Submittal Requirements of this Section.

7. Solid wood materials shall be FSC-certified by the Forest Stewardship Council as sustainably harvested. Documentation of FSC certification shall be in accordance with the LEED Building Submittal requirements of this Section.

8. Adhesives, sealants, paints and coatings used for work in this section shall meet the requirements of Division 1, Section 018113, "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings," where applicable. VOC Limits include, but are not limited to the following:

Clear Wood Varnish	350 g/l
Clear Wood Lacquer	550 g/
Wood Stains	250 g/l
Sanding Sealers	275 g/l
Clear Shellac	730 g/l
Pigmented Shellac	550 g/l

1.6 SUBMITTALS

A. Pressure Treatment: Include certification by treating plant stating chemicals and process used, net amount of salts retained and conformance with applicable standards.

B. Fire-Retardant Treatment: Include certification by treating plant that treatment material complies with governing ordinances and that treatment will not bleed through finished surfaces.

C. LEED Building Submittal Requirements: The Contractor or subcontractor shall submit the following LEED Building certification items:

1. A completed LEED Building Materials Certification Form, per Section 013300, "Submittals," under the LEED Building Submittal Requirements article of these specifications. Information to be supplied includes:

a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s).
c. Material costs for the materials included in the Contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.

2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

3. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify that no added urea formaldehyde is present in any composite wood materials, agrifiber material, or adhesive.

4. Documentation for all new wood products, including FSC Certified. Provide vendor invoices for all permanently installed wood products, FSC Certified or not. Each wood product must be identified on a line-item basis. FSC products must be identified as such on a line item basis. The dollar value of each line item must be shown. The vendor's Chain-of-Custody certificate number must be shown on any invoice that includes FSC products.

5. Product Cut Sheets for all materials that meet the LEED Performance Requirements this Section.

6. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to, adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted. (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer's literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content.)

1.7 PRODUCT HANDLING

A. Deliver carpentry materials to the site ready to use with each piece of lumber clearly marked as to grade, type and mill, and place in an area protected from the elements.

B. Deliver rough hardware in sealed kegs and/or other containers which shall bear labels as to type and kind.

C. Pile lumber for rough usage, when delivered to the site in stacks to insure drainage and with a minimum clearance of six (6) inches above grade. Cover stacks with tarpaulins or other watertight coverings. Store grounds and similar small sized lumber inside the building as soon as possible after delivery.

D. Do not store seasoned lumber in wet or damp portions of the building.

E. Protect fire retardant treated materials against high humidity and moisture during storage and erection.

F. Remove delivered materials which do not conform to specified grading rules or are otherwise not suitable for installation from the job site and replace with acceptable materials.

G. All items specified in Section 087100 of this specification entitled "Finish Hardware" shall be received, accounted for, stored and applied under this Section.

H. Hardware shall be sorted and stored in space assigned by Contractor and shall be kept at all times under lock and key. The safety and preservation of all items delivered will be the responsibility of the Contractor.

1.8 JOB CONDITIONS

A. Installer must examine the substrates and supporting structure and the conditions under which the carpentry work is to be installed, and notify the Contractor in writing of conditions detrimental to the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the Installer and the Architect.

B. Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds and similar supports to allow proper attachment of other work.

PART 2 PRODUCTS

2.1 WOOD MATERIAL

A. General

1. All wood shall be sound, flat, straight, well seasoned, thoroughly dry and free from all defects. Warped or twisted wood shall not be used.

2. For miscellaneous wood blocking, grounds, furring as required, use Utility Grade Coastal Douglas Fir or Southern Pine, free from knots, shakes, rot or other defects, straight, square edges and straight grain, air seasoned with maximum moisture content of nineteen (19) percent. Wood shall be S4S, S-Dry, complying with PS-20.

3. For closet shelving, provide 3/4" thick A-A INT-APA plywood with 1/4" thick hardwood edges, fire retardant treated as specified herein.

4. Plywood and rough carpentry for telephone and electric closets, provide 3/4" thick C-D EXT-APA plywood, fire retardant treated as specified herein.

B. Wood Treatment

1. All interior wood material specified herein shall be fire retardant treated to comply with the AWPA standards (C20 for lumber, C27 for plywood) for pressure impregnation with fire retardant chemical to achieve a flame spread rating of not more than 25 (UL Class "FR-S") when tested in accordance with UL Test 723 or ASTM E 84. The fire retardant chemicals used to treat the lumber must comply with FR-1 of AWPA Standard P17 and be free of halogens, sulfates and ammonium phosphate.

    a. After treatment, kiln dry to a moisture content of fifteen (15) percent; if wood is to be painted or finished, kiln dry to a moisture content of twelve (12) percent. Treatment shall be equal to "Dricon" made by Arch Wood Protection Inc. or approved equal. Provide UL approved identification on treated materials.

2. For exterior blocking, roofing and sheet metal, pressure treat wood with copper azole, Type A (CBA-A); ammoniacal copper quat (ACQ) or similar preservative product that contains no arsenic or chromium. Preservative shall comply with AWPA Standard C-2 for lumber and C-9 for plywood, (.25 lbs./cubic foot of chemical in wood).

    a. After treatment, kiln dry to a maximum moisture content of fifteen (15) percent. Treatment shall be equal to "Wolmanized Natural Select" made by Arch Wood Protection Inc. or approved equal.

3. Treated wood which is cut or otherwise damaged shall be further treated in accordance with the AWPA Standard M-4.

2.2 HARDWARE

A. Rough Hardware for Treated Woods and Exterior Use: ~~Hot-dipped galvanized or~~ Type 304 stainless steel.

B. Nails: Common steel wire, untreated for interior work as per ASTM F 1667.

C. Bolts: Standard mild steel, square head machine bolts with square nuts and malleable iron or steel plate washers or carriage bolts with square nuts and cut washers conforming to the following:

    1. Bolts: ASTM A 307, Grade A.

    2. Nuts: ASTM A 563.

    3. Lag Screws and Bolts: ASME B 18.2.1.

D. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2; use stainless steel for treated woods and exterior use.

E. Wood Screws: ASME B 18.6.1.

F. Concrete and Masonry Anchors: Standard expansion-shield self-drilling type concrete anchors where so shown or noted on the drawings, or where approved by the Architect.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions where carpentry is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION OF FINISH HARDWARE

A. All finishing hardware specified in Section 087100 of this specification entitled "Finish Hardware" shall be received, accounted for, stored and applied under this Section.

B. Hardware shall be sorted and stored in space assigned by Contractor and shall be kept at all times under lock and key. The safety and preservation of all items delivered will be the responsibility of the Contractor.

C. Hardware shall be carefully fitted and securely attached, in accordance with these specifications and the instructions of the various manufacturers.

D. Unless otherwise noted, mount hardware units at heights established in Section 081113.

E. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, install each item completely and then remove and store in a secure place during the finish application. After completion of the finishes, re-install each item. Do not install surface-mounted items until finishes have been completed on the substrate.

F. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

G. Drill and countersink units which are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

H. Cut and fit threshold and floor covers to profile of door frames, with mitered corners and hair-line joints. Join units with concealed welds or concealed mechanical joints. Cut smooth openings for spindles, bolts and similar items, if any.

I. All keys used shall be construction keys which are to be tagged with fiber discs as approved, clearly labeled with identifying inscriptions and then neatly arranged in a temporary cabinet. All construction keys shall be returned to the Owner.

J. Adjusting and Cleaning

1. Adjust and check each operating item of hardware and each door, to ensure proper operation and function of every unit. Lubricate moving parts with type lubrication recommended by manufacturer (graphite type if no other recommended). Replace units which cannot be adjusted and lubricated to operate freely and smoothly as intended for the application made.

2. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make a final check and adjustment of all hardware items in such space or area. Clean and re-lubricate operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

3.3 INSTALLATION OF DOORS AND FRAMES

A. Preparation

1. Remove welded-in shipping spreaders installed at factory.

2. Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

3. Drill and tap doors and frames to receive non-templated mortised and surface-mounted door hardware.

B. Installation

1. General: Provide doors and frames of sizes, thicknesses, and designs indicated. Install steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

2. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. Install frames in accordance with ANSI 250.11-20001, Recommended Erection Instructions for Steel Frames, unless more stringent requirements are specified herein.
    b. At fire-protection-rated openings, install frames according to NFPA 80.
    c. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    d. Install frames with removable glazing stops located on secure side of opening.
    e. Frames set in masonry walls shall have door silencers installed in frames before grouting.
    f. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    g. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

3. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with post-installed expansion anchors.

    a. Floor anchors may be set with powder-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.

4. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames conforming to the requirements of Section 072100 "Thermal Insulation."

5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar; refer to Section 042000 "Unit Masonry" for installation of frames in masonry walls.

6. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.

7. In-Place Gypsum Board Partitions: Secure frames in place with post-installed expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.

8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other

structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.

9. Installation Tolerances: Adjust steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

   a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
   c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

10. Steel Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

    a. Non-Fire-Rated Standard Steel Doors:
       1). Jambs and Head: 1/8 inch plus or minus 1/16 inch.
       2). Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
       3). Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
       4). Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
    b. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

11. Glazing: Comply with installation requirements in Division 8 Section "Glass and Glazing" and with standard steel door and frame manufacturer's written instructions.

    a. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c., and not more than 2 inches o.c. from each corner.

C. Wood Doors

1. Condition doors to average prevailing humidity in installation area prior to hanging.

2. Install doors in accordance with manufacturer’s instructions.

3. Fit door to frames and machine for hardware to whatever extent not previously worked at factory as required for proper fit and uniform clearance at each edge.

4. Clearances: Install doors to meet clearance requirements specified in Section 081416.

5. Fire-Rated Doors: Install in corresponding fire-rated frames in accordance with the requirements of NFPA No. 80. Provide clearances complying with the limitations of the authority having jurisdiction.

D. Adjustments: Check and readjust operating finish hardware items just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames which are warped, bowed or otherwise unacceptable.

3.4 BLOCKING AND MISCELLANEOUS WOOD

A. General

1. Erect rough carpentry true to line, levels and dimensions required; squared, aligned, plumbed, and securely fastened in place.

2. Shim where required to true up furring, blocking and the like. Use wood or metal shims only.

3. Do all cutting, fitting, drilling and tapping of other work as required to secure work in place and to perform the work included herein. Do all the cutting and fitting of carpentry work, for the work of other trades as required.

B. Blocking and Miscellaneous Wood

1. Furnish and install all wood grounds, furring, blocking, curbs, bucks, nailers, etc., that may be necessary and required in connection with the carpentry and with the work described for any other trades and including required carpentry for electrical fixtures. All blocking and nailers shall be continuous wherever required, whether or not so indicated.

2. Blocking shall be as required for the proper installation of the finished work and for items in mechanical sections as required. Blocking, edgings, stops, nailing strips, etc., shall be continuous, unless distinctly noted otherwise. Provide blocking as required to install all equipment. Provide blocking and nailers where shown or required to fasten interior sheet metal work.

3. Fastening for wood grounds, furring and blocking shall be of metal and of type and spacing as best suited to conditions. Hardened steel nails, expansion screws, toggle bolts, self-clinching nails, metal plugs, inserts or similar fastenings shall be used, of suitable type and size to draw the members into place and securely hold same.

C. Rough Lumber for Roofing and Sheet Metal

1. Furnish and install all wood nailing strips and wood blocking required in connection with respective types of roofing, fans, flashings, and sheet metal work, using preservative treated wood as herein before specified.

2. Wood blocking shall be of sizes and shapes as indicated on the drawings and/or designed for the reception of curb flashings for roof ventilators and similar items.

3. All nailing strips and blocking shall be carried out in accordance with the printed installation instructions, and/or recommendations of the accepted manufacturer of the roofing materials, and in coordination and cooperation with the sheet metal work trades.

4. All blocking and nailing strips shall be firmly secured in place using counter bored bolt and nut fastenings, or secured by any other proposed flush surfaced fastenings.

5. Wood nailing strips or blocking required to be embedded in concrete work shall be furnished in time due for placing, prior to start of concrete operations. Locations and spacings of nailing strips or blocking shall be performed in coordination with the concrete trades, as required for respective installations.

3.5 TELEPHONE AND ELECTRIC EQUIPMENT MOUNTING BOARDS

A. Furnish and install 3/4" thick plywood panels to the walls of the telephone and electric equipment rooms in accordance with the requirements of the local utility company.

B. Secure to wall using proper devices for substrates encountered, spaced twelve (12) inches o.c., maximum around the edges, 1-1/2" from corners, and in three (3) rows of three (3) each in the field. Recess fastening devices flush with the plywood surface. Adjacent panels shall be butted with 1/16" space between without lapping.

3.6 ROUGH HARDWARE

A. Securely fasten rough carpentry together. Nail, spike, lag screw or bolt as required by conditions encountered in the field and the Contract Documents.

B. Provide rough or framing hardware, such as nails, screws, bolts, anchors, hangers, clips, inserts, miscellaneous fastenings, and similar items of the best quality and of the proper size and kind to adequately secure the work together and in place, in a rigid and substantial manner.

C. Secure rough carpentry to masonry with countersunk bolts in expansion sleeves or other acceptable manner, with fastenings not more than sixteen (16) inches apart. Secure woodwork to hollow masonry with toggle bolts spaced not more than sixteen (16) inches apart.

D. Countersink bolts in nailers and other rough woodwork and include washers and nuts. Cut bolts off flush with surfaces and peen as may be required to receive finished work.

E. Inserts to secure wood nailers to concrete shall be malleable iron threaded inserts with 3/8" diameter bolts of length to allow for countersinking. Locate at end of each nailer and at intervals not exceeding thirty (30) inches o.c.

F. Furnish to the mason for building into the work, or attaching the work which is to be built in, anchors, bolts, wall plates bolted to masonry, corrugated wall plugs, nailing

blocks, etc., which are required for the proper fastening and installation for the work or other items as called for in this Section.

G. Detailed instructions with sketches of necessary requirements, shall be given to the masonry trade showing the location and other details of such nailing devices.

3.7 CLEANING UP

A. General: Keep the premises in a neat, safe and orderly condition at all times during execution of this portion of the work, free from accumulation of sawdust, cut-ends and debris.

B. Sweeping

1. At the end of each working day, or more often if necessary, thoroughly sweep all surfaces where refuse from this portion of the work has settled.

2. Remove the refuse to the area of the job site set aside for its storage.

3. Upon completion of this portion of the work, thoroughly broom clean all surfaces.

END OF SECTION

SECTION 072700

AIR AND VAPOR BARRIER MEMBRANE

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 LEED BUILDING GENERAL REQUIREMENTS

A. Implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ 2009 New Construction Silver rating. Specific project goals which may impact this and the other sections of this specification include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; use of certified wood products; construction waste recycling; and the implementation of a construction indoor air quality management plan. Ensure that the requirements related to these goals, as defined in this Section and other Sections of the contract documents, are implemented to the fullest extent. Substitutions or other changes to the work shall not be allowed if such changes substantially compromise the stated LEED Building criteria.

B. Comply with LEED (Leadership in Energy and Environmental Design) Green Building Rating System BD+C, Version 3, Silver.

1.3 SECTION INCLUDES

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the air and vapor barrier membrane as shown on the drawings and/or specified herein, including, but not necessarily limited to, the following:

1. Continuous air and vapor barrier applied over exterior face of CMU cavity wall back-up.

1.4 RELATED SECTIONS

A. Construction and Demolition Waste Management – Section 017419.

B. VOC Limits for Adhesives, Sealants, Paints and Coatings – Section 018113.

C. Construction Indoor Air Quality (IAQ) Management – Section 018119.

D. Unit masonry - Section 042000.

E. Terra cotta assembly - Section 042800.

1.5 QUALITY ASSURANCE

A. Submit in writing, a document stating that the applicator of the primary air/vapor barrier membranes specified in this section is recognized by the manufacturer as suitable for the execution of the Work.

B. Perform Work in accordance with the manufacturer's written instructions of the air/vapor barrier membrane and this specification.

C. Maintain one copy of manufacturer's written instructions on site.

D. At the beginning of the Work and at all times during the execution of the Work, allow access to Work site by the air/vapor barrier membrane manufacturers' representative.

E. Components used in this section shall be sourced from one manufacturer, including sheet membrane, air/vapor barrier sealants, primers, mastics, and adhesives.

F. Vertical and Lateral Fire Propagation Test Characteristics: The exterior wall assembly is required to comply with NFPA 285 "Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components." The base wall, stud cavity insulation, wall sheathing, air barrier, continuous wall rigid insulation and exterior cladding are components that are required to be to be evaluated as part of this specific assembly test.

~~F.~~**G.** LEED Building Performance Requirements

1. Adhesives or sealants used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113, "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings," where applicable.

2. The Volatile Organic Compound (VOC) content of any field applied interior sealant used as a filler (as opposed to a coating) shall not exceed 250 grams per liter (g/l).

3. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the LEED Building Submittal Requirements of this Section.

4. Materials that contain recycled content shall be documented in accordance with the LEED Building Submittal Requirements of this Section.

1.6 MOCK-UP

A. Construct typical exterior wall panel, 3'0" long by 3'0" wide, incorporating substrate, window frame, attachment of insulation, showing air barrier membrane application details.

B. Allow 24 hour for inspection of mockup by Architect before proceeding with air barrier work. Mockup may remain as part of the Work.

1.7 SUBMITTALS

A. Product Data: Submit manufacturer's product information for all materials to be used. Data shall indicate that the submitted products are the products installed in the project.

B. Samples: Submit 12" x 12" sample of cured air and vapor barrier membrane.

C. Provide letter from air/barrier manufacturer confirming thru wall flashing material is compatible with air/barrier.

D. LEED Building Submittal Requirements: The Contractor or subcontractor shall submit the following LEED Building certification items:

1. A completed LEED Building Materials Certification Form, per Section 013300, "Submittals," under the LEED Building Submittal Requirements article of these specifications. Information to be supplied includes:

   a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
   b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s).
   c. Material costs for the materials included in the Contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.

2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

3. Product Cut Sheets for all materials that meet the LEED Performance Requirements this Section.

4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to, adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted. (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer's literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content.)

1.8 PRODUCT HANDLING

A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.

1. Store air barrier membranes, adhesives and primers at temperatures of 40°F and above to facilitate handling.

2. Keep solvent away from open flames or excessive heat.

3. Protect rolls from direct sunlight until ready for use.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Subject to compliance with requirements, provide products manufactured by Henry Co., or equivalent.

1. Henry products are specified as basis for project design.

2. Acceptable Alternate: Perm-A-Barrier Liquid manufactured by W.R. Grace or Barriseal-S by Carlisle.

2.2 MATERIALS

A. Liquid Membrane: Air-Bloc 32MR as manufactured by Henry Company, a synthetic, spray applied to a wet film thickness of 75-115 mils and rubber based adhesive type; incorporating the following characteristics:

1. Air Leakage: 0.00012 CFM/ft^2 @ 1.6 psf.

2. Water Vapor Permeance: 0.08 perms (ASTM E 96 Method B).

3. Long Term Flexibility: Pass (CGSB 71-GP-24M).

B. Transition Membrane: Blueskin SA as manufactured by Henry, a SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film; incorporating the following physical properties:

1. Thickness: 40 mils minimum.

2. Air Leakage: <0.001 CFM/ft^2 @ 1.6 psf (ASTM E 283).

3. Water Vapor Permeance: 0.05 perms per ASTM E 96.

4. Low Temperature Flexibility: Pass -22°F (ASTM D 3111).

5. Elongation: 200% per ASTM D 412.

6. Provide transition membrane at inside and outside corners, cracks, masonry control joints, tie-ins to structural beams, columns, floor slabs and intermittent floors, parapet curbs, foundation walls, roofing systems and at the interface of dissimilar materials as indicated in drawings. Fiberglass tape is required at sheathing joints.

C. Thru-Wall Flashing Membrane: Blueskin TWF, SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film.

D. Substrate Cleaner: Mineral spirits or Xylol.

2.3 ADHESIVE AND PRIMERS

A. Primer for self-adhering membranes at temperatures above 25 degrees F shall be Aquatac™ Primer manufactured by Henry; a polymer emulsion based adhesive, quick setting. Primer shall have the following physical properties:

1. Colour: Aqua
2. Weight: 8.3 lbs/gal
3. Solids by weight: 53%
4. Water based, no solvent odours
5. Drying time (initial set): 30 minutes at 50% RH and 70 degrees F

B. Adhesive for self-adhering membranes at all temperatures shall be Blueskin® Adhesive manufactured by Henry, a synthetic rubber based adhesive, quick setting, having the following physical properties:

1. Color: Blue,
2. Weight: 6 lbs/gal,
3. Solids by weight: 35%,
4. Drying time (initial set): 30 minutes.

C. Adhesive with low VOC content for self-adhering membranes at all temperatures shall be Blueskin® LVC Adhesive manufactured by Henry, a synthetic rubber based adhesive, quick setting, having the following physical properties:

1. Color: Blue,
2. VOC: <240 g/L,
3. Solids by weight: 40%,
4. Drying time (initial set): 30 minutes.

2.4 JOINT TREATMENT, PENETRATION & TERMINATION SEALANT

A. Joint Treatment, penetration and termination Sealant shall be HE925 BES Sealant manufactured by Henry; a moisture cure, medium modulus polymer modified sealing compound having the following physical properties:

1. Compatible with sheet air barrier, roofing and waterproofing membranes and substrate,
2. Complies with Fed. Spec. TT-S-00230C, Type II, Class A
3. Complies with ASTM C 920, Type S, Grade NS, Class 25

4. Elongation: 450 – 550%

5. Remains flexible with aging

6. Seals construction joints up to 1 inch wide

B. Alternate joint treatment fabric: HE 183 yellow open weave glass fabric or approved.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine the areas and conditions where the air and vapor barrier materials are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected to permit proper installation of the work.

3.2 PREPARATION

A. All surfaces must be sound, dry, clean and free of oil, grease, dirt, excess mortar or other contaminants.

B. Cracks in masonry shall be sealed with a strip of Blueskin membrane lapped a minimum of 3" on both sides of the crack.

C. Apply transition membrane at exterior gypsum sheathing panel joints per manufacturer's installation instructions.

D. Ensure that CMU joints have been striked flush as specified in Section 042000.

3.3 PRIMER FOR TRANSITION AND THROUGH-WALL FLASHING MEMBRANE

A. Apply primer for self-adhering membranes at rate recommended by manufacturer.

B. Apply primer to all areas to receive transition sheet and/or through-wall flashing membrane, as indicated on drawings by roller or spray and allow minimum 30 minute open time. Primed surfaces not covered by Blueskin SA transition membrane or Blueskin TWF through-wall flashing membrane during the same working day must be re-primed.

3.4 TRANSITION MEMBRANE

A. Align and position Blueskin SA self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 4" overlap at all end and side laps.

B. Promptly roll all laps and membrane with a counter top roller to effect seal.

C. Ensure all preparatory work is complete prior to applying Air-Bloc ~~21S~~ **32MR**.

3.5 THROUGH-WALL FLASHING MEMBRANE

A. Align and position the leading edge of Blueskin TWF self-adhering through-wall flashing membrane with the front horizontal edge of the foundation walls or self angles, partially remove protective film and roll membrane over surface and up vertically.

B. Press firmly into place. Ensure minimum 4" overlap at all end and side laps.

C. Promptly roll all laps and membrane to effect the seal.

D. Ensure through-wall flashing membrane extends fully to the exterior face of the exterior masonry. Trim off excess as directed by the consultant.

E. Apply through-wall flashing membrane along the base of masonry walls, over windows, doors and all other wall openings. Membrane shall form continuous flashing and shall extend up a minimum of 8" up the back-up wall.

F. Configure TWF with end dams at jamb conditions.

G. Seal laps, seams, edges and penetrations in TWF with HE925 BES sealant or Polybitume by Henry, per Henry's installation requirements, or equal.

3.6 PRIMARY AIR/VAPOR BARRIER

A. Apply by spray or flat trowel a complete and continuous unbroken film of liquid air/vapor and rain barrier membrane.

1. For temperatures above 40 degrees F and rising, apply one component water based elastomeric emulsion air/vapor barrier membrane at a rate of 14 sq.ft/gallon to 22 sq.ft/gallon to a uniform wet film thickness of 75 - 115 mils.

B. Spray apply or trowel around all projections and penetrations ensuring a complete and continuous air barrier membrane. Lap liquid applied membrane 1 inch over self-adhering membranes to seal leading edge.

C. Allow air barrier membrane to dry as per manufacturers recommendations prior to placement of insulating materials.

3.7 APPLICATION OF TERMINATION SEALANT

A. Seal membrane terminations, heads of mechanical fasteners, masonry tie fasteners, around penetrations, duct work, electrical and other apparatus extending through the primary water resistive air barrier membrane and around the perimeter edge of membrane terminations at window and door frames with specified termination sealant.

3.8 INSPECTION

A. Notify Architect when sections of work are complete so as to allow for review prior to installation of cavity wall insulation (Section 042000).

3.9 PROTECTION

A. Protect all work of this section from excessive exposure to sunlight and other elements; comply with manufacturer's recommendations.

END OF SECTION

SECTION 075625

FLUID APPLIED ROOFING SYSTEM

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 LEED BUILDING GENERAL REQUIREMENTS

A. Implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ 2009 New Construction Silver rating. Specific project goals which may impact this and the other sections of this specification include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; use of certified wood products; construction waste recycling; and the implementation of a construction indoor air quality management plan. Ensure that the requirements related to these goals, as defined in this Section and other Sections of the contract documents, are implemented to the fullest extent. Substitutions or other changes to the work shall not be allowed if such changes substantially compromise the stated LEED Building criteria.

B. Comply with LEED (Leadership in Energy and Environmental Design) Green Building Rating System BD+C, Version 3, Silver.

1.3 SECTION INCLUDES

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the cold fluid applied reinforced polyurethane roofing and waterproofing membrane, and all other ancillary waterproofing work including but not limited to installation of drains, pipe flashings, penetration flashings, sealants and metal work as specified, and including but not limited to, the following:

1. Adhered cold fluid-applied reinforced polyurethane waterproofing system including, membrane, penetration flashings, base flashings, and expansion joints.

2. Substrate preparation, cleaning, leveling and patching.

3. Temporary waterproofing and priming.

4. Waterproofing membrane installation.

5. Flashing installation and expansion joint installation.

6. Protective surfacing.

7. Alkalinity protection.

8. Drainage board.

9. Insulation installation.

10. Precast concrete pavers.

11. Vegetated tray system.

1.4 RELATED SECTIONS

A. Construction and Demolition Waste Management – Section 017419.

B. VOC Limits for Adhesives, Sealants, Paints and Coatings – Section 018113.

C. Construction Indoor Air Quality (IAQ) Management – Section 018119.

D. Wood blocking and nailers – Section 062000.

E. Sheet metal flashing and trim – Section 076200.

1.5 REFERENCES

A. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual.

B. ACI-308 - Recommended Practice for Curing Concrete

C. ASTM D 638 - Test Methods for Tensile Properties of Plastics

D. ASTM D 4258 - Standard Practice for Surface Cleaning Concrete for Coatings

E. ASTM D 4259 - Standard Practice for Abrading Concrete

F. ASTM D 4541 - Method for Pull-Off Strength of Coatings using Portable Adhesion Tester

G. ASTM E 96(A) - Test Methods of Moisture Transmission of Material

H. ASTM E 108, ANSI/UL 790 for Fire Resistance

I. International Concrete Repair Institute Guideline 03732 Concrete Surface Preparation

J. Steel Structures Painting Council (SSPC)

K. FM Global RoofNav and wind uplift requirements. Data FM Global Property Loss Prevention Data sheets.

1. 1-28 Wind Design.

2. 1-29 Roof Deck Securement.

3. 1-35 Green Roof Systems.

4. 1-49 Perimeter Flashing.

1.6 SUBMITTALS FOR REVIEW

A. Membrane System Product Data: Provide current standard printed product literature indicating characteristics of membrane materials, flashing materials, components, and accessories product specification and installation.

B. Vegetated System Product Data: Provide current standard printed product literature for vegetated system components, growing media type, and planting types indicating characteristics and limitations.

C. Product Samples: Submit product samples of membrane and flashing materials showing color, texture, thickness and surfacing representative of the proposed system for review and approval by the Owners Representative and Architect.

D. Submit sample copies of both the Manufacturer and Applicator warranties for the periods stipulated. Each specimen must be a preprinted representative sample of the issuing company's standard warranty for the system specified.

E. Submit copies of current Material Safety Data Sheets (MSDS) for all components of the work.

F. Membrane Shop Drawings: Submit shop drawings of cold fluid-applied reinforced polyurethane showing all a project plan, size, flashing details, and attachment for review and approval by the Owners Representative and Membrane Manufacturer.

G. Vegetated System Shop Drawings: Plan layout and details at critical terminations of garden roof system with adjacent building construction. Include flashing connections to planter system, pavers, and building systems. Include plant schedule and layout.

H. Vegetated System Maintenance Instructions: Manufacturer's instructions for Owner maintenance of planting media as needed for long term propagation and health of vegetation. Include special provisions as applicable for specific plant media and climatic zone, as well as requirements for irrigation and fertilization.

I. LEED Building Submittal Requirements: The Contractor or subcontractor shall submit the following LEED Building certification items:

1. A completed LEED Building Materials Certification Form, per Section 013300, "Submittals," under the LEED Building Submittal Requirements article of these specifications. Information to be supplied includes:

   a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
   b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s).
   c. Material costs for the materials included in the Contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.

2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

3. Product Cut Sheets for all materials that meet the LEED Performance Requirements this Section.

4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to, adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted. (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer's literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content.)

1.7 QUALITY ASSURANCE

A. Membrane Supplier: Company specializing in manufacturing the products specified in this section with ten (10) years documented experience. Membrane Manufacturer shall submit the following certifications for review:

1. Substrates and conditions are acceptable for purpose of providing specified warranty.

2. Materials supplied shall meet the specified requirements.

B. Vegetated System Supplier: Company specializing in manufacturing/supplying the products specified in this section with five (5) years documented experience. Vegetated System Supplier shall submit the following certifications for review:

1. Substrates and conditions are acceptable for purpose of providing specified warranty.

2. Materials supplied shall meet the specified requirements.

C. Applicator: Company specializing in performing the work of this section with (3) years documented experience and approved by system manufacturer/supplier for warranted membrane system installation. Applicator shall submit the following certification for review:

1. Applicator shall submit documentation from the membrane manufacturer to verify contractor's status as an approved applicator for warranted installations.

2. Submit applicator's qualifications at the time of the bid.

D. Evaluate moisture content of substrate materials. Constructor shall determine substrate moisture content throughout the work and record with Daily Inspection Reports or other form of reporting acceptable to the Owner or designated Representative, and Membrane Manufacturer.

E. Provide FM Global wind uplift testing per FM Global Datasheet 1-52.

~~E.~~**F.** Random tests to determine tensile bond strength of membrane to substrate shall be conducted by the Contractor at the job site using an Elcometer Adhesion Tester Model 106 or similar device, or by the performance of a manual pull test. Contractor shall perform tests at the beginning of the Work, and at intervals as required to assure

specified adhesion with a minimum of three (3) tests per 5000 square feet. Smaller areas shall receive a minimum of three (3) tests. Test results shall be submitted to the Owner or his designated Representative and the Membrane Manufacturer. Contractor shall immediately notify the Owner or his designated Representative and Membrane Manufacturer in the event bond test results are below specified values.

1. Adequate surface preparation will be indicated by tensile bond strength of membrane to substrate greater than or equal to 220 psi (1.5 N/mm^2), as determined by use of an adhesion tester.

2. Adequate surface preparation will be indicated by 135° peel bond strength of membrane to substrate such that cohesive failure of substrate occurs before adhesive failure of membrane/substrate interface.

3. In the event the bond strengths are less than the minimum specified, additional substrate preparation is required. Repeat testing to verify suitability of substrate preparation.

~~F.~~**G.** Monitor quantities of installed materials. Monitor application of resin mixture, reinforcing fleece and flashing. Perform Work in accordance with manufacturer's instructions.

~~G.~~**H.** Mock-up areas shall be used to determine required methods and tools to obtain degree of substrate preparation required by the membrane manufacturer. Conduct tests as required to verify that substrate preparation meets specified requirements. Tests shall include, but are not limited to, tensile bond strength and moisture content of substrate. In addition, mock-up areas shall be used to confirm application practices in the installation of the membrane system assembly.

1. Prepare and clean a three (3) foot (0.9 m) by three (3) foot (0.9 m) area of each substrate material type.

2. Submit findings in writing to Owner or his designated Representative and Membrane Manufacturer.

3. Mock-up areas shall be maintained for quality control for the entire project.

~~H.~~**I.** LEED Building Performance Requirements

1. Adhesives or sealants used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113, "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings," where applicable.

2. The Volatile Organic Compound (VOC) content of any field applied interior sealant used as a filler (as opposed to a coating) shall not exceed 250 grams per liter (g/l).

3. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall

be documented in accordance with the LEED Building Submittal Requirements of this Section.

4. Materials that contain recycled content shall be documented in accordance with the LEED Building Submittal Requirements of this Section.

J. Roof edges, perimeter systems and parapet copings shall be engineered to meet FM Global wind uplift requirements, review and approval.

K. Field, perimeter and corner fastening patterns shall be engineered to meet FM Global wind uplift requirements, review and approval.

L. Roofing system shall be an FM Global RoofNav approved assembly, subject to review by FM Global for approval. Submit a completed FM Global Form 2688 Checklist for roofing system and the FM Global RoofNav assembly number for all FM approved roofing systems to be used.

M. Mechanically-fastened insulation shall provide a uniform and planar installation for insulation cover board.

N. FM approved flashing assembly with class 105 rating or greater and roof nailer securement shall be designed by a professional engineer to resist field uplift pressures.

1.8 REGULATORY REQUIREMENTS

A. Conform to applicable building and jurisdictional codes for roofing/waterproofing assembly and fire resistance requirements.

B. Comply with requirements of OSHA, NIOSH or local governing authority for work place safety.

C. Comply with authority or agency "Confined Space Policy" during and throughout all work to be performed.

1.9 PRE-INSTALLATION MEETING

A. Convene a pre-installation meeting at the job site (1) week before starting work of this section. Require attendance of parties directly affecting work of this section, including but not limited to, Architect and Owner's Representative, Roofing/ Waterproofing/ Landscaping Contractor, and Membrane Manufacturer's Representative/ Vegetative System Representative. Review roofing and waterproofing system preparation and installation procedures, coordination and scheduling required with related work, and condition and structural loading limitations of deck/substrate.

1.10 FIELD INSPECTION SERVICES

A. Manufacturer's technical representative shall provide the following inspections of the membrane application:

1. Jobstart inspection at the beginning of each phase of the project, to review special detailing conditions and substrate preparation.

2. Periodic in-progress inspections throughout duration of the project to evaluate membrane and flashing application.

3. Final punch-list inspection at the completion of each phase of the project prior to installation of any surfacing or overburden materials.

4. Warranty inspection to confirm completion of all punch list items, followed by 24 hr. flood test to confirm watertightness of installed waterproofing membrane.

5. In-progress inspection during vegetative system installation to confirm tray, perimeter metal securement, and irrigation system installation prior to growing media installation.

6. Final inspection to confirm completion of planting installation.

1.11 DELIVERY, STORAGE, AND PROTECTION

A. The Contractor together with the Owner or his designated Representative shall define a storage area for all components. The area shall be cool, dry, out of direct sunlight, and in accordance with manufacturer‘s recommendations and relevant regulatory agencies. Materials shall not be stored in quantities that will exceed design loads, damage substrate materials, hinder installation or drainage.

B. Store solvent-bearing solutions, resins, additives, inhibitors or adhesives in accordance with the MSDS and/or local fire authority. After partial use of materials replace lids promptly and tightly to prevent contamination.

C. Rolls of fleece reinforcing materials shall be stored horizontally on platforms sufficiently elevated to prevent contact with water and other contaminants. DO NOT use rolls that are wet, dirty or have damaged ends. Fleece reinforcing materials must be clean, dry, and free of all contaminants.

D. Roofing/waterproofing materials must be kept dry at all times. If stored outside, raise materials above ground or roof level on pallets and cover with a tarpaulin or other waterproof material. Plastic wrapping installed at the factory should **not** be used as outside storage covers.

E. Follow manufacturer's directions for protection of vegetated system materials prior to and during installation. Do not use materials that have been damaged to the point that they will not perform as specified.

F. Store preplanted trays, hardscape materials, growing media, and palletized materials over plywood panels or protective sheeting laid over the finished waterproofing membrane to prevent damage to the membrane.

G. Maintain health of plants as recommended by nursery guidelines prior to rooftop installation. Provide water source for irrigation of and maintenance of plants until permanent drip or alternative irrigation system is in place.

H. Copies of all current MSDS for all components shall be kept on site. Provide any and all crew members with appropriate safety data information and training as it relates to

the specific chemical compound he or she may be expected to deal with. Each crew member shall be fully aware of first-aid measures to be undertaken in case of incidents. Comply with requirements of OSHA, NIOSH or local governing authority for work place safety.

1.12 ENVIRONMENTAL REQUIREMENTS

A. Do not apply roofing/waterproofing membrane during or with the threat of inclement weather.

B. Application of cold fluid-applied reinforced polyurethane roofing/waterproofing membrane may proceed while air temperature is between 40°F (5°C) and 85°F (30°C) providing the substrate is a minimum of 5°F above the dew point.

C. When ambient temperatures are at or expected to fall below 50°F (10°C), or reach 85°F (30°C) or higher, follow Membrane System Manufacturer's recommendations for weather related additives and application procedures.

D. Ensure that substrate materials are dry and free of contaminants. DO NOT commence with the application unless substrate conditions are suitable. Contractor shall demonstrate that substrate conditions are suitable for the application of the materials.

E. Odor control and elimination measures are not typically necessary, but if required by the Owner or his designated Representative, Contractor shall implement odor control and elimination measures prior to and during the application of the roofing/waterproofing materials. Control/elimination measures shall be field tested at off-hours and typically consists of one (1) or a multiple of the following measures:

1. Sealing of air intakes with activated carbon filters. Install filters in accordance with requirements and recommendations of the filter manufacturer. Seal filters at joints and against building exterior walls to prevent leakage of unfiltered air where required due to size of intake opening. Provide track system to secure filters.

2. Erection and use of moveable enclosure(s) sized to accommodate work area(s) and stationary enclosure for resin mixing station. Enclosure shall be field constructed or pre-manufactured of fire retardant materials in compliance with local code requirements in accordance with requirements of the Owner or his designated Representative. Equipment enclosure(s) with mechanical air intake/exhaust openings and Odor Control Air Cleaners, as required to clean enclosed air volume and to prevent odor migration outside the enclosure. Exhaust opening shall be sealed with activated carbon filter.

3. Placement of odor elimination stations inside and outside of the enclosure(s) as required by field condition, in coordination with the Owner or his designated Representative.

4. Protection of Contractor personnel and occupants of the structure and surrounding buildings as necessary to comply with requirements of OSHA, NIOSH and/or governing local authority.

F. Install plant materials at temperatures between 40 degrees F and 95 degrees F. Do not install plants in freezing conditions or when overnight frost is expected.

G. When disposing of all refuse or unused materials, observe all EPA, OSHA or local disposal requirements.

1.13 COORDINATION AND PROTECTION

A. Coordinate the work with the installation of associated metal flashings, accessories, appurtenances, etc. as the work of this section proceeds.

B. Building components shall be protected adequately (with tarp or other suitable material) from soil, stains, or spills at all hoisting points and areas of application. Contractor shall be responsible for preventing damage from any operation under its Contract. Any such damage shall be repaired at Contractor's expense to Owner's satisfaction or be restored to original condition.

C. Provide barricades, retaining ropes, safety elements (active/passive) and any appropriate signage required by OSHA, NIOSH, and NSC and/or the Owner or designated Representative.

D. Protect finished roofing/waterproofing membrane from damage by other trades. Do not allow waste products containing petroleum, grease, acid, solvents, vegetable or mineral oil, animal oil, animal fat, etc. or direct steam venting to come into direct contact with the membrane.

1.14 WARRANTY

A. Manufacturer's Premier Warranty: Provide (20) year manufacturer's premier warranty under provisions of this section. This warranty provides for cost of labor and materials for loss of watertightness, limited to amounts necessary to effect repairs necessitated by either defective material or defects in related installation workmanship, with no dollar limitation ("NDL").

1. Warranty to include basic removal and replacement of vegetated overburden and pavers as required for performance of warranty repairs to the waterproofing membrane.

B. Waterproofing Contractor's Warranty: Provide (5) year "Applicator Maintenance Warranty" covering workmanship for all work of this section including installation of membrane, flashings, metal work, and roofing/waterproofing accessories.

C. Extensive Sedum and Ground Cover Plus: 2- year thrive and coverage (plus: minimum 50% cover end of year 1; 80% coverage end of year 2).

D. Submit (2) executed copies of both the manufacturer and applicator warranties for the periods stipulated, starting from the date of substantial completion. Each warranty must be signed by an authorized representative of the issuing company.

1.15 MATERIAL SUBSTITUTIONS

A. Materials proposed for use in the performance of the work that are not specified herein must be submitted to the Owner/Owner's Representative for evaluation no later than ten days prior to bid.

PART 2 PRODUCTS

2.1 GENERAL

A. The products herein specified are totally pre-engineered products of the listed manufacturer and establish criteria for the approval of substitutions. Products must be part of a virtually odorless, pre-engineered, low-VOC, fully-reinforced, cold-fluid-applied liquid waterproofing membrane system, equivalent in function, quality, composition and method of application to be considered for approval as an "Approved Substitute". Substitute materials must meet or exceed the physical performance characteristics of the specified materials.

2.2 MANUFACTURERS - MEMBRANE

A. The products herein specified are totally pre-engineered products of the listed manufacturer and establish criteria for the approval of substitutions. Products must be part of a virtually odorless, pre-engineered, low VOC, fully reinforced, cold fluid applied liquid waterproofing membrane system, equivalent in function, quality, composition and method for application to be considered for approval as an "Approved Substitute". Substitute materials must meet or exceed the physical characteristics of the specified materials.

1. Basis of Design: Kemper System's 2K-PUR resin for use in an adhered waterproofing system, Soprema Alsan RS 260 LO PMMA for use in adhered waterproofing system or equal by Derbigum or Triflex.

B. Physical Properties:

Property	**Typical Value**	**Test Method**
Color	Gray-Green	-
Physical state	Cures to solid	-
Nominal thickness (165 fleece)	70 mils	-
Tensile strength @ break	120 lb/in	ASTM D 751
Elongation	50%	ASTM D 751
Tearing strength	5.0 lbs	ASTM D 751
Puncture resistance	140 lbf	FTMS 101-2031
Dimensional stability	0.1%	ASTM D 1204
Water absorption	2.2%	ASTM D 471
Surface hardness	Shore A 85	ASTM D 2240
Water vapor transmission	0.04 perms	ASTM E 96
Usage time*	30 minutes	-
Rainproof after*	6 hours	-
Solid to walk on after*	24 hours	-
Solid to drive on with air rubber tires after*	48 hours	-

Overburden may be applied after	2 days	-
Completely hardened after	3 days	-
Crack spanning	2mm/0.08 inch	-
Resistance to temperatures up to (short term)	250°C/482°F	-
*all times are approximate and depend upon air flow, humidity and temperature.		

2.3 FLASHINGS

A. Membrane Flashings: A composite of the same resin material as field membrane with 165 fleece reinforcement.

2.4 ACCESSORIES

A. Epoxy Primer: Two-component, solvent-free epoxy coating for use in improving adhesion of membrane to cementitious/masonry substrate surfaces. Monitor application rate and adjust depending on substrate absorbency. Kemper EP Primer is basis of design.

B. Accelerator: Additive specifically designed to accelerate the resin reaction time at ambient temperatures below 50ºF (10ºC). Accelerator to be used with cream resin Component A prior to mixing of multi-component resin. Continuously monitor substrate surface temperatures.

C. Tools, Accessories, and Cleaners: Supplied and/or approved by membrane manufacturer for product installation.

D. Topcoat Surfacing Aggregate: Silica sand, ceramic-coated quartz, or specialty aggregate shall be washed, kiln-dried, and dust-free with the following size specification (provide where drawings call for traffic sandcasting):

1. Aesthetic/Fire Rating: 0.3 - 1.0 mm
2. Alkalinity/Adhesion Key: 0.5 - 1.2 mm
3. Pedestrian Traffic: 0.4 - 1.0 mm
4. Light Vehicular Traffic: 0.5 - 1.2 mm

E. Leveling and Patching Aggregate: Silica sand shall be washed, kiln-dried, and dust-free, suitable for troweling or pourable self-leveling, round grain or angular with the following size specification:

1. For voids less than 1" in depth: 0.3 - 0.6 mm
2. For voids 1" to 2" in depth: 0.5 - 1.2 mm

Mixing Proportions shall be a ratio of resin to sand at 1:2 by volume or as approved by membrane manufacturer.

F. Backer Rod: Expanded, closed-cell polyethylene foam designed for use with cold-applied joint sealant.

G. Caulking: Single component, non-sag elastomeric polyurethane sealant, as recommended or supplied by membrane manufacturer for use in making airtight and watertight seals where required.

H. Wood Nailers and Cant Strips: New wood nailers and cant strips shall be pressure treated for rot resistance (e.g., "Wolmanized" or "Osmose K-33"), #2 or better lumber. Asphaltic or creosote treated lumber is not acceptable.

I. Miscellaneous Fasteners: FM-approved and appropriate for purpose intended, length required for thickness of material, with metal plates, and approved by membrane system manufacturer.

J. Drains: Spun/cast aluminum or cast iron roof drain with strainer/grate, strainer, as supplied or approved by membrane manufacturer.

K. Temporary and Night Sealant: As recommended or required by membrane manufacturer.

2.5 DRAINAGE/PROTECTION BOARD

A. Dimpled polystyrene core, 0.25" thick, with nonwoven geotextile filtering fabric suitable for applications where a direct topping of stone aggregate, concrete pavers, extruded polystyrene insulation, or sand setting bed will be applied, as provided by the following manufacturer:

1. American Wick Drain, Inc.'s Sitedrain 454-T.

2.6 BASE SHEET

A. UL-rated G2 asphalt-coated fiberglass base sheet conforming to ASTM D 4601, Type II.

2.7 INSULATION COVER BOARD

A. Cover Board (Durock and Permabase): High compressive strength underlayment board consisting of aggregated Portland cement slurry with polymer-coated glass fiber mesh, with the following characteristics:

1.	Board Weight	3.0 lb/sq. ft.
2.	Board Size	48 x 96 inches.
3.	Board Thickness	1/2 inch.
4.	Thermal Conductivity	K factor of 1.92 as determined by ASTM C 177.
5.	Board Edges	Square

2.8 INSULATION

A. Polyisocyanurate insulation board having non-asphaltic facers meeting or exceeding the requirements for Fed. Spec. HH-I-1972/Gen., with minimum compressive resistance of ~~18 psi~~ **25 psi**, 1.0 inch minimum thickness, with the following characteristics:

1.	Board Density	2.0 lb/cu. ft.
2.	Board Size	48 x 96 inches.
3.	Board Thickness	2 inches.
4.	Thermal Conductivity	K factor of 0.17 as determined by ASTM C 177, aged 12 months at 75 degrees.
5.	Board Edges	Square

2.9 TAPERED INSULATION

A. Tapered polyisocyanurate insulation board having non-asphaltic facers meeting or exceeding the requirements for Fed. Spec. HH-I-1972/Gen., with minimum compressive resistance of 18 psi, 1.0 inch minimum thickness, with the following characteristics:

1.	Board Density	2.0 lb/cu. ft.
2.	Board Size	48 x 96 inches.
3.	Board Taper	1/4 inch per foot
4.	Total Thickness	1/2 inch minimum
5.	Thermal Conductivity	K factor of 0.17 as determined by ASTM C 177, aged 12 months at 75 degrees.
6.	Board Edges	Square

B. Provide crickets at drain sump assemblies and at other locations that require additional drainage considerations.

2.10 SUBSTRATE BOARD

A. Provide Dens Deck as manufactured by Georgia-Pacific Corp., or equivalent, conforming to ASTM C 1177, glass-mat, water-resistant gypsum substrate, thickness as indicated.

2.11 BASE/ CAP SHEET AND INSULATION SECUREMENT

A. Polyurethane Adhesive (Insulation and Cover Board): FM-approved single-component, moisture-cured polyurethane adhesive. Adhesive application rate shall be in accordance with specified wind uplift rating for system application. Roofing adhesive shall be a type approved by membrane and insulation manufacturer. NOTE: Prior

written approval by the adhesive, insulation and membrane manufacturers for use of polyurethane roofing adhesive must be obtained.

B. Asphalt Adhesive (Base Sheet): FM-approved steep roofing asphalt conforming to ASTM D 312, Type III. Provide label on each container indicating flash point, finished blowing temperature, softening point, and equiviscous temperature. Asphalt primer, cutback solvent type, conforming to ASTM D 41, required for concrete, masonry, and metal surfaces.

2.12 SLIP SHEET

A. Slip Sheet: Non-woven needle-punched polyester fleece suitable for use over extruded polystyrene insulation and beneath vegetative trays, as provided by the following manufacturer:

1. Kemper System, Inc.'s 120 Fleece

2. Columbia Green Technologies, Inc.'s AVRS multilayer Filter Fabric

2.13 PRECAST CONCRETE PAVERS

A. Concrete Pavers: Freeze-thaw resistant precast concrete pavers, minimum 2" thickness, with the following characteristics:

1.	Compressive Strength	8,000 psi avg. min. (ASTM C 140)
2.	Flexural Strength	1,000 psi avg. min. (ASTM C 293)
3.	Water Absorption	5% max. (ASTM C 140)
4.	Freeze/Thaw	1% max. loss of dry weight – 50 cycles (ASTM C 67)
5.	Center Load	1,750 lbs. ~~ave~~ **avg**. min. (WTCL 99)
6.	Weight	24 lbs./sq.ft. avg. min. (based on 2" thickness)
7.	Dimensions	24 x 24 inches
8.	Manufacturer	Hanover or equivalent.
9.	Style	Prest Paver.
10.	Color	Glacier White.

B. Paver Pedestal System: Heavy-duty polyethylene pedestals specifically designed for use with specified precast concrete pavers. Provided with shim system or integral height adjustment mechanism. Provided with drainage channels within the pedestal base.

2.14 FLASHING SURFACINGS AND COATINGS

A. Aggregate Finish Coating: Single component polyurethane-based resin suitable for use to seal aggregate, as provided by the following Manufacturer**:**

1. Kemper System, Inc.'s Kemperdur ECO Finish.

2. Kemper System, Inc.'s Kemperdur BSFR Finish.

B. Color Coating: Polyurethane-based coating suitable for use as a colored coating for exposed and submerged applications, as provided by the following Manufacturer:

1. Kemper System, Inc.'s Kemperdur 1K Deko Colored Finish.

2. Color coated is required at all horizontal roof surfaces in order to achieve an SRI 78 greater than 78. See drawings for custom colors applied to vertical surfaces.

2.15 INTERLOCKING VEGETATIVE TRAYS

A. Vegetative Trays: Injection molded, interlocking, 100 mil polypropylene trays, 2 ft. x 2 ft. x 4-5/8 in. deep, with water-detention ridges and troughs that also de-energize wind flow and facilitate drainage beneath the trays, as provided by the following manufacturer:

1. Columbia Green Technologies, Inc.'s AVRS Trays, or equal by LiveRoof or Green Grid.

2.16 GROWING MEDIA

A. Growing Media: Produced from organic recycled material and inorganic by-products for use as a lightweight growing media for hardy succulent or phytoremediation plants, typically sedum. For extensive applications, typically up to a 12" depth. Preblended regionally in accordance with German FLL Greenroof guidelines, as provided by the following supplier:

1. Columbia Green Technologies, Inc.'s AVRS or Max-Lite AVRS Growing Media or approved equal by LiveRoof, Green Grid or Nature TEC.

B. Typical Tray Weights with Growing Media: The following roof loading weights are provided for filled vegetative trays:

1. AVRS Growing Media, 5-1/4 in. depth to overfill trays. Suitable for post-planting, hydroplanting, sedum tiles and blankets.

a. Fully Saturated Weight: 26 psf
b. Field Moisture Capacity Weight: 20.5 psf

2.17 PLANTS

A. General: Conform to project landscape design requirements and requirements of authorities having jurisdiction, including Fire Marshal, for specific recommendations and regulations. Design mix of firewise/firesafe hardy long-lasting fiberous succulents, capable of thriving in limited-irrigated rooftop environment for project location/USDA hardiness zone classification, as provided by the following supplier:

1. Columbia Green Technologies, Inc.'s nursery affiliates.

B. Planting Method: Select planting method in accordance with design requirements from the following:

1. Post-Planting of Trays – Plug Size min. 1-1/2", 12 plugs per tray min. or as otherwise specified. Distribute differing plant species evenly and uniformly within each tray for overall appearance of in-place installation. Healthy plants of a species and variety shown on listed on drawings.

2.18 DRAIN INSPECTION BOXES

A. Drain Inspection Boxes: Drain inspection boxes ~~by others~~ to be installed ~~as per project landscape design requirements~~.

B. Provide roof drain stones in mesh bags and galvanized steel cages over drains to prevent small missile exposure.

2.19 EDGE ELEMENTS/METAL TRIM

A. Edge Flashing and Trim: Manufacturer's standard 26 gauge stainless steel sidewall flashing and trim at trays and walkways to frame, connect, and tie tray and walkpad systems into each other and adjacent building components. Intended to be connected to the trays and mechanically attached to the adjacent building components. As provided by the following supplier:

1. Columbia Green Technologies, Inc.'s Metal Flashing or approved equal.

2.20 SUPPLEMENTAL BUILT-UP ASSEMBLY

A. General: Intended for extensive assembly application at radius turns and other locations where tray installation is difficult or not possible. Multi-layered system components include 0.75" thick polypropylene entangled-matrix drainage layer, non-woven polypropylene filter layer, and 2" thick polyester blanket designed for water retention, drainage, and anchorage points for promoting secure rooting of plants, as provided by the following supplier:

1. Columbia Green Technologies, Inc.'s Multi-Layered System or approved equal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify deck/substrate openings, curbs, and protrusions through deck/substrate, wood cant strips and reglets are in place and solidly set.

C. Verify deck/substrate is structurally supported, secure and sound.

3.2 PREPARATION OF SUBSTRATE

A. General**:** Surfaces to be prepared as a substrate for the new waterproofing system as follows:

1. The Contractor shall determine the condition of the existing structural deck/substrate. All defects in the deck or substrate shall be corrected before new waterproofing work commences. Areas of deteriorated deck/substrate, porous or other affected materials must be removed and replaced with new to match existing.

2. Prepare flashing substrates as required for application of new waterproofing membrane flashings.

3. Inspect substrates, and correct defects before application of new waterproofing. Fill all surface voids greater than 1/8 inch wide with an acceptable fill material.

4. Remove all ponded water, snow, frost and/or ice from the work substrate prior to installing new waterproofing materials.

5. The final substrate for waterproofing shall be clean, dry, free of loose, spalled or weak material including coatings, mineral aggregate, and flood coat/gravel surfacing, oil, grease, contaminants, abrupt changes in level, waterproofing agents, curing compounds, and free of projections which could damage membrane materials.

B. Concrete

1. New concrete shall have cured a minimum of 28 days in accordance with ACI-308, or as approved by Waterproofing Manufacturer's Technical Department.

2. New or existing concrete shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, bituminous products and previous waterproofing materials.

3. New or existing concrete shall be dry with a maximum moisture content of five (5) percent. Determinations of moisture content shall be performed by the Contractor. Contractor shall be responsible to perform periodic evaluations of moisture content during the work. Moisture evaluation results shall be submitted in writing to the Owner or his designated Representative and Waterproofing manufacturer for acceptance.

4. Where required, concrete shall be abrasively cleaned in accordance with ASTM D 4259 to provide a sound substrate free from laitance. Achieve an open concrete surface in accordance with ICRI surface profiles CSP 3-5. When using mechanical methods to remove existing waterproofing products or surface deterioration, the surface profile is not to exceed ¼ inch (peak to valley).

5. The substrate shall be sound and all spalls, voids and blow holes on vertical or horizontal surfaces must be repaired prior to placement of the primer coat. Spalls and other deterioration shall be repaired in accordance with the requirements of the Owner or his designated Representative and Membrane manufacturer.

6. Areas of minor surface deterioration of 0.25" (6 mm) or greater in depth shall be repaired to prevent possible ponding of the system, leading to excessive usage of primer and resin.

7. Extent and location of thin surface patching shall require approval of the Owner or his designated Representative and Waterproofing Manufacturer prior to the application of any system component.

8. For concrete materials with a compressive strength of less than 3,500 psi contact Waterproofing Manufacturer Technical Department for substrate preparation requirements.

C. Masonry:

1. Walls shall be built with hard kiln dried brick or waterproof concrete block construction.

2. Areas of soft or scaling brick or concrete, faulty mortar joints, or walls with broken, damaged or leaking coping shall be repaired in accordance with the requirements of the Owner or his designated Representative and Flashing Membrane Manufacturer.

D. Steel/Metal:

1. Clean and prepare metal surfaces to near white metal in accordance with SSPC - SP3 (power tool clean) or as required by membrane manufacturer. Extend preparation a minimum of three (3) inches beyond the termination of the membrane flashing materials. Notch steel surfaces to provide a rust-stop.

2. In addition to cleaning, all metal surfaces shall be abraded to provide a rough open surface. A wire brush finish is not acceptable.

E. Other Flashing Surfaces: Remove all contaminants as required by membrane manufacturer. Surface preparation shall be performed by means approved by Owner or his designated Representative.

F. Finish Leveling, Patching and Crack Preparation:

1. General: EP primer/sand mix is the preferred material for all concrete and masonry substrate finish leveling, crack and wall/deck preparation and patching. EP primer/sand patching mix provides a set time of approximately twelve (12) hours and does not require surface grinding. Kemperol primer/sand mix is typically applied in conjunction with general surface priming.

2. Concrete and Masonry Substrate Leveling ans Patching: Substrate conditions are to be evaluated by the Contractor, the Owner, or his designated Representative, and Membrane manufacturer. Perform leveling and patching operations as follows:

a. Level uneven surfaces with a leveling mixture of primer and approved kiln-dried silica sand in a 1:2 primer to sand ratio by volume. Spread and plane this compound with a squeegee and trowel to achieve a flat surface.
b. Fill cavities with a patching mixture of primer and approved kiln-dried sand in a 1:3/1:3.5 primer to sand ratio by volume.
c. Silica sand must be kept absolutely dry during storage and handling.
d. Any surface to be leveled or filled must first be primed with an appropriate primer.

3. Joint and Crack Preparation: Joints, cracks and fractures in the structural deck/substrate shall be prepared as defined below prior to installation of the waterproofing membrane. NOTE: Joints, cracks, and fractures may telegraph through the waterproofing membrane.

a. Non-Moving Cracks: Determine that crack is non-moving. Clean out crack by brushing and oil-free compressed air. Fill crack with polyurethane sealant. Allow for a minimum of twelve (12) hours cure or as required by sealant Manufacturer.
b. Moving Cracks: Determine that crack is moving. Clean out crack by brushing and oil-free compressed air. Fill crack with polyurethane sealant. Allow for a minimum of twelve (12) hours cure or as required by sealant Manufacturer. Apply resin and 4 inch (10 cm) wide strip of membrane (resin and fleece) in strict accordance with Membrane manufacturer's written instructions.

3.3 PRIMER APPLICATION

A. General:

1. Mix and apply two-component primer in strict accordance with written instructions of Membrane Manufacturer. Use only proprietary materials, as supplied by the membrane manufacturer.

2. The substrate surface must be dry, with any remaining dust or loose particles removed using clean, dry, oil-free compressed air, industrial vacuum, cloth wipe or a combination of methods.

3. Do not install primer on any substrate containing newly-applied and/or active asphalt, coal-tar pitch, creosote or penta-based materials unless approved in writing by Membrane Manufacturer. Some substrates may require additional preparation before applying primer.

B. Mixing of Standard EP Primers:

1. Premix primer Component A thoroughly with a spiral agitator or stir stick. Pour primer Component B into Component A and mix the components for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks. DO NOT AERATE. The Primer solution should be a uniform color, with no light or dark streaks present.

2. Do not thin primer. Determine required primer coverage for each substrate material/condition and apply in strict accordance with written instructions of Membrane Manufacturer.

3. Mix only that amount of primer components A & B that can be used in 30 minutes.

C. Application of Primer:

1. Apply primer at the rate~~ of approximately 0.7 – 1.4 gallons (2.65-5.30L) per 100 square feet (9 m^2)~~ **recommended by the manufacturer based on substrate material to receive application**.

2. Roll or brush the primer evenly onto the surface to fully saturate the substrate in one application. Do not allow primer to pond or collect in low areas.

3. Apply primer only up to the edge of the membrane flashing terminations. Primer application past the membrane terminations requires surfacing with an approved material.

4. For EP primer applications over cementitious substrates where protection from substrate wetness is required, apply primer coat at a heavier application rate until pore saturation is achieved.

5. For all EP primer applications, apply kiln-dried sand into the final coat of EP primer while still wet at the rate of ~~20~~ **40** lbs. per 100 square feet.

6. Allow standard primers to cure for a minimum of twelve (12) hours before membrane application. Allow methyl methacrylate primer to cure for a minimum of one (1) hour before membrane application. Membrane must be applied to primer only when completely dry and without tack.

7. Exposure of the primer in excess of eight (8) days or premature exposure to moisture may require removal and application of new primer. DO NOT apply new primer over exposed primer older than eight (8) days, primer prematurely exposed to moisture, or primer used as temporary waterproofing, unless approved in writing by the Membrane Manufacturer.

D. Disposal of Primer:

1. Cured primer may be disposed of in standard landfills. This is accomplished by thoroughly mixing all components.

2. Uncured primer is considered a hazardous material and must be handled as such, in accordance with local, state and federal regulation. Do not through uncured resin away.

3.4 MEMBRANE APPLICATION

A. General:

1. Mix and apply cold fluid-applied reinforced polyurethane waterproofing membrane in strict accordance with written instructions of Membrane

Manufacturer. Use only proprietary membrane resins and materials, as supplied by the membrane manufacturer.

2. The primed substrate surface shall be dry, with any remaining dust or loose particles removed using clean, dry, oil-free compressed air, industrial vacuum, cloth-wipe or a combination.

3. Protect all areas where membrane has been installed. Do not work off installed membrane during application of remaining work before forty-eight (48) hours of curing. Movement of materials and equipment across installed membrane is not acceptable. If movement is necessary, provide complete protection of affected areas.

4. Closely follow the Membrane Manufacturer's recommendation for hot and cold weather application. Monitor surface and ambient temperatures, including the effects of wind chill.

B. Mixing of Resin:

1. Mix resin Component A (cream formulation) with a spiral agitator until the liquid is a uniform cream color. If the ambient temperature is below 50°F (10°C), then a weather related additive should be combined and mixed into the Component A.

   a. Accelerator should be added to resin Component A when the ambient temperature is 50°F (10°C) and below. The accelerator should be mixed with the spiral agitator for 5 minutes or until both liquids are thoroughly blended.

2. Mix resin Component B (dark brown formulation) with a separate spiral agitator until the color is a uniform dark syrup color.

3. Pour resin Component A and Component B into a third clean bucket at a 4:1 ratio (by weight) and thoroughly mix the components with a clean spiral agitator. The Resin solution should be a uniform color, with no light or dark streaks present.

4. Mix only that amount of resin components A & B that can be used in 30 minutes.

C. Application of Resin/Fleece

1. Apply mixed resin to the prepared surface at the approximate rate of 4.5 gallons (16.9L) per 100 square feet (9 m^2). The resin should be rolled or brushed liberally and evenly onto the surface using a broad, even stroke. Cover one working area at a time, between 15 – 20 $ft.^2$ (1.4 – 1.9 m^2).

2. Roll out dry polyester fleece onto the liquid resin mix, making sure the SMOOTH SIDE IS FACING UP (natural unrolling procedure), avoiding any folds and wrinkles. The fleece will begin to rapidly saturate with the liquid resin mix. Use a medium nap roller or brush to work the resin into the fleece, saturating from the bottom up, and eliminating air bubbles, wrinkles, etc. The appearance of the saturated fleece should be light opaque amber with no white spots. White spots are

indications of unsaturated fleece or lack of adhesion. It is important to correct these faults before the resin cures.

3. Apply additional liquid resin mix on top of fleece at the approximate rate of 2 gallons (7.5L) per 100 square feet (9 m^2) to finish the saturation of the fleece. Roll this final coating into the fleece, which will result in a glossy appearance. The fleece can only hold so much resin and all excess should be rolled forward to the unsaturated fleece, eliminating ponding or excessive build-up of the resin. Any excess resin left on the top of the fleece will weather and peel off. The correct amount of resin will leave no whiteness in fleece and there will be a slightly fibrous surface texture. The final resin coating should be smooth and uniform.

4. Prevent contact between mixed/unmixed resin and new/existing membrane. If any unmixed resin contacts membrane surface remove immediately and clean thoroughly with a cloth rag.

5. At all fleece seams, allow a 2" (5 cm) overlap for all side joints and a 4" (10 cm) overlap for all end joints.

6. At membrane tie-offs, clean in-place membrane with MEK (methyl ethyl ketone) solvent once resin has cured. Allow solvents to fully evaporate before application of new resin.

D. Disposal of Resin:

1. Cured resin may be disposed of in standard landfills. This is accomplished by thoroughly mixing all components.

2. Uncured resin is considered a hazardous material and must be handled as such, in accordance with local, state and federal regulation. Do not throw uncured resin away.

3.5 FLASHING APPLICATION

A. General:

1. Install flashing system in accordance with the requirements/recommendations of the Membrane manufacturer and as depicted on standard drawings and details. Provide system with base flashing, edge flashing, penetration flashing, counter flashing, and all other flashings required for a complete watertight system.

2. Wherever possible, install the flashings before installing the field membrane to minimize foot traffic over newly installed field membrane.

3. All membrane flashings shall be installed concurrently with the waterproofing membrane as the job progresses. Temporary flashings are not allowed without prior written approval from the Membrane manufacturer. Should any water penetrate the new waterproofing membrane because of incomplete flashings, the affected area shall be removed and replaced at the Contractor's expense.

4. Provide a minimum vertical height of 8" for all flashing terminations. Flashing height shall be at least as high as the potential water level that could be reached as a result of a deluging rain and/or poor slope. Do not flash over existing through-wall flashings, weep holes and overflow scuppers.

5. All flashings shall be terminated as required by the Membrane Manufacturer.

6. Alkalinity surface protection consisting of two applications of EP primer and one application of approved broadcast mineral aggregate surfacing shall be applied wherever stone, concrete, or masonry elements will be placed directly over the flashing.

B. Metal Flashing – General:

1. Metal flashings shall be fabricated in accordance with the current recommendations of SMACNA and in accordance with standard drawings and project details.

2. Metal flashing flanges to which membrane is to be bonded shall be a minimum of four (4) inches in width, and secured to the substrate six (6) inches on center staggered with fasteners appropriate to the substrate type. The flanges shall be provided with a roughened surface that has been cleaned of all oil and other residue.

3. Metal edges that will be overlaid with membrane shall be provided with a 1/4" min. hemmed edge.

4. Apply primer, resin and fleece to metal flange, extending membrane to outside face of metal edging, and to vertical face of metal base/curb flashing.

C. Membrane Flashing – General:

1. Membrane flashings shall be fabricated with primer appropriate for the substrate surface, resin of the same base chemical type as the field membrane, and fleece of the same weight as the field membrane unless specified otherwise.

2. Primer, resin, and fleece mixing and application methods as specified for field membranes are also suitable for membrane flashing.

3. Fleece shall overlap 2" (5 cm) minimum for all joints. Fleece shall be cut neatly to fit all flashing conditions without a buildup of multiple fleece layers. Work wet membrane with a brush or roller to eliminate blisters, openings, or lifting at corners, junctions, and transitions.

D. Pipes, Conduits, and Unusually Shaped Penetrations:

1. Flash all penetrations using cold fluid-applied reinforced polyurethane waterproofing membrane. Flashing material shall be the same resin used in the field membrane with 165 fleece reinforcement.

2. Flashing is typically constructed as a two-part assembly consisting of a vertical wrap and a horizontal target patch. There must be a minimum of a two (2) inch (5 cm) overlap between vertical and horizontal flashing components.

E. Drains and Scuppers:

1. Acceptable drain and scupper materials are cast iron, cast aluminum, and copper.

2. Connect new drains and scuppers to existing storm sewer system.

3. Alternatively, replace all broken or damaged parts of existing drains and scuppers, or provide and install an acceptable insert.

4. Flash drains and scuppers using cold fluid-applied reinforced polyurethane waterproofing membrane. Flashing material shall be the same resin used in the field membrane with 165 fleece reinforcement.

5. Flashing material shall extend four (4) inches minimum onto drain, scupper, or insert flange.

6. Install clamping ring if provided as part of the drain or scupper design. Install a strainer basket to prevent debris from clogging the drainage line.

F. Hot Stacks:

1. Protect the membrane components from direct contact with steam or heat sources when the in-service temperature exceeds 150 degrees F. In all such cases flash to an intermediate "cool" sleeve.

2. Fabricate "cool" sleeve in the form of a metal cone using galvanized metal in accordance with Membrane manufacturer's details.

3. Flash all penetrations using cold fluid-applied reinforced polyurethane waterproofing membrane. Flashing material shall be the same resin used in the field membrane with 165 fleece reinforcement.

4. Flashing is typically constructed as a two part assembly consisting of a vertical wrap and a horizontal target patch. There must be a minimum of a two (2) inch (5 cm) overlap between vertical and horizontal flashing components.

G. Flexible Penetrations:

1. Provide a weathertight gooseneck of round cross-section for each penetration or group of penetrations. Set in water cut-off mastic and secure to the structural substrate.

2. Acceptable gooseneck material is copper, of a sheet weight appropriate for the application.

3. Flash all penetrations using cold fluid-applied reinforced polyurethane waterproofing membrane. Flashing material shall be the same resin used in the field membrane with 165 fleece reinforcement.

4. Flashing is typically constructed as a two-part assembly consisting of a vertical wrap and a horizontal target patch. There must be a minimum of a two (2) inch (5 cm) overlap between vertical and horizontal flashing components.

H. Walls, Curbs and Base Flashings

1. Wall, curb and base flashings shall be installed to solid substrate surfaces only. Adhering to gypsum-based panels, cementitious stucco, synthetic stucco, wood or metal siding, and other similar materials is not acceptable.

2. Flash all walls, curbs and base flashings using cold fluid-applied reinforced polyurethane waterproofing membrane. Flashing material shall be the same resin used in the field membrane with 165 fleece reinforcement.

3. Reinforce all transition locations and other potential wear areas with a four (4) inch wide 165 polyester fleece bottom layer evenly positioned over the transition prior to installing the exposed flashing layer.

4. Reinforce all inside and outside corners with a four (4) inch diameter conical piece of 165 fleece prior to installing the exposed flashing layer.

5. All pins, dowels and other fixation elements shall be flashed separately with a vertical flashing component prior to installing the exposed flashing layer.

6. Extend flashing a minimum of four (4) inches onto the field substrate surface.

I. Drip Edges and Gravel Stops**: Engineered to meet FM Global wind uplift requirements.**

1. Metal drip edges and gravel stops shall be installed to solid substrate surfaces only. Securement to gypsum-based panels, cementitious stucco, synthetic stucco, wood or metal siding or coping, and other similar materials is not acceptable.

2. Flash all drip edges and gravel stops by extending the field membrane all the way to the edge of the exposed face prior to installing the metal edging. Strip in the metal flange with a separate 8-inch wide strip of membrane adhered to both the securement flange and to the field membrane.

3. For conditions where water infiltration behind the exposed drip edge or gravel stop face is possible, install a separate 165 polyester fleece bottom layer positioned behind the face area and extending a minimum of four (4) inches past the securement flange onto the field substrate prior to installing the drip edge or gravel stop.

J. Field Fabricated Control or Expansion Joint Flashing

1. Control or expansion joints in excess of two (2) inches in width require the use of a separate engineered joint system.

2. Control or expansion joints two (2) inches or less in width may be flashed with two layers of cold fluid-applied reinforced polyurethane waterproofing membrane and

a compressible foam or rubber insert. Use a 165 polyester reinforcing fleece bottom layer and 165 polyester fleece top layer.

3. Grind or otherwise bevel the inside edges of the joint opening to provide a smooth transition edge for the fleece.

4. Flashing typically consists of a 165 polyester reinforcing fleece bottom layer looped into the joint as a cradle, a compressible foam or rubber insert at 25% compression fitted into the joint, and a 165 polyester fleece top layer applied over the joint. Extend both fleece layers four (4) inches minimum onto the field substrate on both sides of the joint.

5. Apply the field membrane over the entire joint area.

K. Electrical Conduit, Gas Lines and Lightning Protection

1. Supports for electrical conduit and gas lines greater than one (1) inch in diameter require the use of a separate engineered support system.

2. Supports for electrical conduit and gas lines one (1) inch or less in diameter, and bases for lightning protection rods and cable, can be adhered directly to the membrane surface with a single-component, high quality polyurethane sealant.

3.6 SURFACING AND FINISHES

A. Kiln-Dried Aggregate Finish Surfacing

1. Where specified, provide and install approved kiln-dried silica sand, or other approved mineral surfacing to achieve an aesthetic and/or non-skid surface.

2. Broadcast specified and approved sand or aggregate in excess into a bonding coat application of Kemperol 2K-PUR resin (without fleece reinforcement) applied over clean, freshly-cured membrane at the rate of approximately 0.8 gal. per 100 square feet. Aggregate shall be applied at the rate of 60 lbs. per 100 square feet. Obtain uniform and full coverage.

3. Following minimum 24-hour cure time remove loose/un-embedded mineral aggregate by blowing with oil-free compressed air or with a vacuum.

4. Manufacturer's approved aggregate coating, applied at the rate of approximately 0.8 gal. per 100 square feet. After completion of mineral aggregate broadcasting, avoid any traffic for a minimum of two (2) days to allow for surfacing to cure.

B. Coating-Type Finish Surfacing

1. Where specified, provide and install Membrane Manufacturer's approved urethane-based coating applied over clean, fully cured membrane.

2. For two-component coatings, premix resin component A thoroughly with a spiral agitator or stir stick. Pour Color Component B into Component A and mix the components for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks until material is consistent in

color. Transfer to a clean container and mix again to ensure a thorough combination of the two components.

3. Apply coating at a rate of approximately 0.8 gallons per 100 square feet. Avoid any traffic for a minimum of two (2) days to allow for surfacing to cure.

C. Alkalinity Protection

1. Where placement of concrete, mortar or adhesive setting beds are required over sections of the waterproofing membrane or flashing, the application of the following alkalinity protective measure is mandatory:

a. Application of one (1) heavy or two (2) lighter coats of Primer EP at 1.5 gal (5.7L)/100 SF (9 m^2) total application, with broadcast of kiln-dried silica sand at the approximate rate of 30 lbs. per 100 square feet into final wet coat of primer.

2. Protection shall extend a minimum of one (1) foot (0.3m) past the concrete form on all sides.

3. Provide continuous cleaning with water and brush to eliminate settlement of concrete residues on in-place waterproofing membrane adjacent to area of concrete placement.

D. Adhesion Key: Where placement of non-cementitious material such as asphalt pavement is required over sections of the waterproofing membrane or flashing, the application of the following adhesion key measure is mandatory:

1. Application of one (1) coat of Primer EP at 1.0 gal (3.8L)/100 SF (9 m^2) total application, with broadcast of kiln-dried silica sand at the approximate rate of 30 lbs. per 100 square feet into wet primer.

3.7 TEMPORARY CLOSURES AND WATERSTOPS

A. Contractor shall be responsible to ensure that moisture does not damage any completed section of the new waterproofing system. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition. All temporary closures shall be made as recommended or required by the membrane manufacturer.

3.8 PROTECTION

A. Upon completion of waterproofing and flashings (including all associated work), institute appropriate procedures for surveillance and protection of roofing during remainder of construction period. Protect all areas where membrane has been installed.

3.9 VERIFICATION OF MEMBRANE INTEGRITY

A. General: After installing horizontal membrane and before placing overburden, verify installed membrane is waterproof. Provide testing to verify membrane is free of any holes, open seams and capillary defects that will allow water to pass.

1. Utilize electrical conduction method EFVM (Electric Field Vector Mapping) as provided by International Leak Detection, Phone (1) 905-428-8283, as follows:

2. Installation of EFVM impulse conductor wire around perimeter of area to be tested. The testing agency will determine size and shape of area. Areas will typically range between 2000 SF and 7,500 SF. The conductor wire will consist of braided polyethylene (1.5 mm diameter) interwoven with a minimum of nine (9) strands of stainless steel wire. The conductor wire will have a tensile strength of not less than 180 lbs.

3. Place conductor wire 4 inches from perimeter and secure against accidental movement or damage. Place so not to create a tripping hazard. Place wire directly on membrane.

4. Isolate all metal items contacting the membrane by placing isolation strands of conductor wire to isolate the field or by removing the metal items temporarily if possible.

5. Isolate field of membrane from contact with grounded soil or structure contacting the membrane by placing isolation strands of conductor wire to isolate the field.

6. Wet the test area with potable water sufficiently to create a continuous conducting "plate" above the membrane.

7. Attach EFVM impulse generator to conductor wire with removable connectors and to ground or building structure creating a potential circuit. (The circuit will complete if water finds a path to ground by way of a breech in membrane.)

8. Deliver a one second long 40 volt potential electrical impulse to the conductor wire at an average rate of one impulse every three seconds.

9. Utilizing a EFVM potentiometer and two probes placed at the surface of the membrane detect the presence or absence of electrical flow across the surface to the membrane.

10. If there is no flow detected after a systematic search then the certified inspector shall report the installed membrane in that area tested free of holes, seam and capillary defects and is therefore waterproof at that time.

11. If there is flow detected during the search then the certified inspector shall work to identify the source of electricity and therefore the breach in the membrane. The technician shall report to the waterproofing contractor immediately if possible the exact location of any defects on the installed membrane in that area tested.

12. Defects found shall be repaired and retested.

13. The technician providing the EFVM testing shall provide a report of each day's test results containing a written description and photograph of all defects and any corrections made and a schematic CAD drawing indicating location of stationary conductor wire and of any defects found in testing to within 1 inch of accuracy. This report shall be made in hard copy and submitted to the Architect and Owner.

3.10 DRAINAGE/PROTECTION MAT INSTALLATION

A. Place the drainage mat fabric side up on top of the finished waterproofing membrane. Secure the drainage mat in place by placing temporary ballast on top of the drainage mat.

B. Connect adjacent panels at the longitudinal edge by pulling the filter fabric back to expose the flange. The panel edge should be butted to the edge of the adjacent panel dimple to dimple or the edge of the next panel may be placed over two dimples and interlocked. Panel ends are to be attached in the same manner. Connections should be completed in shingle fashion so the moisture will flow with the overlap and not against it. Overlap fabric in the direction of water flow. Cover all terminal edges with the filter fabric flap by tucking the fabric behind the core.

C. The drainage mat should be channeled into an internal drain or perimeter drain system. Create openings in the drainage core to correspond with all discharge holes in the drain at the structural deck level. Fabric must be left intact at these holes to prevent intrusion of soil, grout, sand, or concrete into the drainage core.

D. At roof penetrations, cut the drainage core around the protrusion, cut an X in the fabric, and tape the fabric around the protrusion to prevent intrusion of overburden materials into the core.

3.11 INSULATION/COVER BOARD INSTALLATION

A. General: Insulation and cover board shall be installed in accordance with the insulation/cover board manufacturer's current published specifications and recommendations for use with adhered roofing.

B. Install Insulation/Cover Board: Install only as much insulation and cover board as can be primed, sealed, and protected before the end of the day's work or before the onset of inclement weather.

C. Fit Insulation/Cover Board: Neatly fit insulation/cover board to all penetrations, projections, and nailers. Insulation shall be loosely butted, with gaps not greater than 1/4". All gaps greater than 1/4" shall be filled with acceptable insulation. Cover board shall be loosely butted, with gaps not greater than 1/4". All gaps greater than 1/8" shall be filled with primer; all gaps greater than ¼" shall be filled with polyurethane sealant.

D. Strip In Cover Board Joints: Strip all cover board joints with four inch (4") wide strip of flashing membrane. Under no circumstances shall the membrane be left unsupported over a space greater than 1/4".

E. Stagger Insulation/Cover Board Joints: When installing multiple layers of insulation, all joints between succeeding layers shall be staggered a minimum of 6" in each direction.

F. Steel Deck Substrates: Place boards perpendicular to steel deck flutes with edges over flute surface for bearing support. Edges shall be checked so that no edges are left substantially unsupported along the flutes.

G. Drain Sumps: Insulation shall be feathered or tapered to provide a sump area a minimum of 36" x 36" where possible at all drains. Taper insulation around roof drains so as to provide proper slope for drainage. In areas where feathered or tapered insulation leaves insulation core exposed, cover with an appropriate cover board or base sheet/cap sheet assembly to provide a sound and smooth substrate surface.

H. Tapered Insulation: Place the constant thickness first layer and the tapered thickness insulation to the required slope pattern in accordance with insulation manufacturer's instructions.

I. Polyurethane Adhesive Attachment: Follow insulation/cover board and adhesive manufacturers' recommendations for the appropriate adhesive application rate and application procedure. Under normal application rate, dispense the first bead 3" inside the outside edges of the insulation/cover board to be attached, with sequential beads equidistant. Place the boards onto the roofing adhesive beads. Walk on the boards to spread the roofing adhesive for maximum contact. Periodically walk on the boards until firmly attached. Reference FM approvals for adhesive application patterns that satisfy FM wind uplift requirements. Typical application is a 3/4" bead of roofing adhesive at a rate of one lineal foot per square foot of insulation/cover board to be attached. Note: additional adhesive is required in the corner and perimeter regions of the roof. Secure insulation/cover board in accordance with approval requirements.

J. Provide mechanically-attached insulation to provide a uniform and planar installation for cover board and membrane. Fastener pattern shall meet FM Global wind uplift requirements at field, perimeter, and corners.

3.12 FILTER FABRIC INSTALLATION

A. Roll out filter fabric over the extruded polystyrene insulation as specified, avoiding wrinkles. Overlap all side and end laps by 12".

B. Extend the filter fabric mat vertically to just above the height of the solid overburden or growing medium.

C. Cut filter fabric neatly around all penetrations and projections.

3.13 TRAY INSTALLATION

A. Place trays directly on waterproofing membrane or over filter fabric/extruded polystyrene insulation. Position bottom troughs of trays perpendicular to roof slope, except minor crickets. Orient edges to interlock and hold trays in place. Secure trays together with manufacturer's quick-lock fasteners through aligned holes in tray sidewalls.

B. Promptly after placing trays on roof, install edge flashing to secure tray array to structure, and fill trays with growing media or otherwise ballast trays as necessary to prevent movement of trays due to weather and construction activities.

3.14 SUPPLEMENTAL BUILT-UP ASSEMBLY INSTALLATION

A. Install drainage layer parallel to roof slope directly on waterproofing membrane or over filter fabric/extruded polystyrene insulation at all areas within vegetated installation area not receiving trays or walkpads.

B. Place filter layer parallel to roof slope over drainage layer, providing 2" overlaps at all side and end laps.

C. Place retention layer parallel to roof slope over filter layer.

D. Promptly after placing built-up assembly on roof, install edge flashing and growing media or ballast as necessary to prevent movement of multi-layer components due to weather and construction activities.

3.15 METAL EDGE FLASHING INSTALLATION

A. Provide stainless steel retaining angle and perimeter gravel where noted on the drawings. Retaining angle shall be a minimum of 18 gauge Type 316 stainless steel.

B. Install trim flashing to conceal tray sides/built-up assembly components and to lock into metal counter flashing at building perimeter flashing systems. Install interlocking metal anchor flashing at openings between trays and perimeter roof edges to anchor trays, building perimeter flashings, counter flashings, and walkpad system together.

C. Fasten metal edge flashing to structure 12" o.c. Use ¼" lead drive pins into concrete and masonry. Use #12 stainless steel screws into wood and metal.

3.16 DRAIN INSPECTION BOX INSTALLATION

A. Install drainage inspection boxes at all drain locations to allow periodic inspection and cleaning of all drainage outlets.

3.17 GROWING MEDIA INSTALLATION

A. Distribute growing media evenly into the trays and over the built-up assembly to achieve the specified media thickness.

3.18 PLANT INSTALLATION

A. See landscape drawings for layout and extensive green roof plant list.

B. Install plants by the method selected, conforming to landscape design and other requirements.

C. If post-planting with individual plants, distribute differing plant species evenly and uniformly within each tray for overall uniform appearance, or install in specific pattern or arrangement as specified by designer.

D. Following installation of plants, irrigate using potable water free of substances harmful to plant growth.

3.19 PLANT MAINTENANCE

A. Maintain a uniform stand of succulent plants by watering and maintaining vegetated areas for the duration of the guarantee period. Include watering, spot weeding, fertilization, and other measures as necessary to maintain health and propagation of plant materials and as necessary for stabilization, in accordance with horticultural/nursery recommended plant maintenance procedures.

B. Following installation of plant media, irrigate using potable water free of substances harmful to plant growth. Provide holes in lengths reaching from water supply to source planting areas,

C. Instruct Owner and furnish written maintenance instructions to be followed after initial plant maintenance period. Instructions shall describe typical work necessary for planting materials to develop complete root structure and to become stabilized. Periodic watering is required for the first year after installation to ensure proper root development.

3.20 CONCRETE PAVER APPLICATION

A. Install precast concrete pavers in accordance with paver manufacturer's currently published specifications, and as per layout schedule. Pavers can be installed over a drainage mat without pedestals, or supported by a pedestal system approved by the paver manufacturer. The use of insulation blocks in lieu of pedestals is not acceptable.

B. Pavers shall be installed with a 1/8" maximum, 1/16" typical height variation between adjacent pavers. Pavers shall be installed without rocking. Pavers shall be installed in a straight line with a maximum variance of ½" within a distance of 10' measured at any location and in any direction. Joints between pavers shall be 3/16" typical.

C. Cracked, broken or otherwise damaged pavers must be removed and discarded, and replaced with undamaged units. Cut and fit pavers neatly around all penetrations and projections, and at the perimeter, achieving a 1" maximum gap.

3.21 CLOSEOUT

A. Correction of Work: Work that does not conform to specified requirements including tolerances, slopes, and finishes shall be corrected and/or replaced. Any deficiencies of membrane application, termination and/or protection as noted during the membrane manufacturer's inspections shall be corrected and/or replaced at Contractor's expense.

B. Clean-Up: Site clean-up, including both interior and exterior building areas that have been affected by construction, shall be restored to preconstruction condition.

END OF SECTION

SECTION 077100

ROOF SPECIALTIES AND ACCESSORIES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 LEED BUILDING GENERAL REQUIREMENTS

A. Implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ 2009 New Construction Silver rating. Specific project goals which may impact this and the other sections of this specification include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; use of certified wood products; construction waste recycling; and the implementation of a construction indoor air quality management plan. Ensure that the requirements related to these goals, as defined in this Section and other Sections of the contract documents, are implemented to the fullest extent. Substitutions or other changes to the work shall not be allowed if such changes substantially compromise the stated LEED Building criteria.

B. Comply with LEED (Leadership in Energy and Environmental Design) Green Building Rating System BD+C, Version 3, Silver.

1.3 SECTION INCLUDES

A. Work of this Section includes all labor, materials, equipment and services necessary to complete the roof specialties and accessories as shown on the drawings and/or specified herein, including but not necessarily limited to the following:

1. Aluminum copings.

2. Prefabricated roof curbs.

1.4 RELATED SECTIONS

A. Construction and Demolition Waste Management – Section 017419.

B. VOC Limits for Adhesives, Sealants, Paints and Coatings – Section 018113.

C. Construction Indoor Air Quality (IAQ) Management – Section 018119.

D. Roofing - Section 075560 and 075400.

E. Sheet metal flashing - Section 076200.

1.5 QUALITY ASSURANCE

A. LEED Building Performance Requirements

1. Adhesives or sealants used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113, "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings," where applicable.

2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the LEED Building Submittal Requirements of this Section.

3. Materials that contain recycled content shall be documented in accordance with the LEED Building Submittal Requirements of this Section.

1.6 SUBMITTALS

A. Before any roof specialties and accessories are delivered to the job site, submit shop drawings showing profiles and anchoring devices.

B. LEED Building Submittal Requirements: The Contractor or subcontractor shall submit the following LEED Building certification items:

1. A completed LEED Building Materials Certification Form, per Section 013300, "Submittals," under the LEED Building Submittal Requirements article of these specifications. Information to be supplied includes:

a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s).
c. Material costs for the materials included in the Contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.

2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

3. Product Cut Sheets for all materials that meet the LEED Performance Requirements this Section.

4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to, adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted. (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer's

literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content.)

1.7 PRODUCT HANDLING

A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

PART 2 PRODUCTS

2.1 ALUMINUM COPINGS

A. Aluminum copings that fasten membranes down shall be engineered to meet building code and FM Global uplift requirements.

~~A.~~**B.** Fabricate of 0.063" thick aluminum alloy 5005-H154, smooth, no pattern.

~~B.~~**C.** Provide concealed splice plates 12'-0" o.c. fabricated of 0.050" thick aluminum to match exposed aluminum; finished to match exposed aluminum.

~~C.~~**D.** Provide pre-fabricated mitered and welded corner units.

~~D.~~**E.** For copings, provide galvanized steel anchor plates, anchors spaced 6'-0" o.c. and snap-lock coping design; all anchors concealed. Provide structural blocking at edge of coping to resist deformation from façade maintenance and window washing rope loading.

~~E.~~**F.** High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: Cleaned with inhibited chemicals; Chemical Finish: Acid-chromate-fluoride-phosphate conversion coating; Organic Coating: As specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.

1. Fluoropolymer Three-Coat System: Manufacturer's standard Three-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605-02.

2. Custom color and gloss as selected by the Architect.

~~F.~~**G.** Provide units manufactured by MM Systems, or equal made by Cheney, Hickman or approved equal.

2.2 PREFABRICATED ROOF CURBS

A. Provide manufacturer's standard shop fabricated units made of 14 ga. zinc coated steel factory primed with rust inhibitive primer, and insulated with 2" thick fiberglass board. Provide units manufactured by Pate, Louvers & Dampers, Inc., Industrial Louvers, Inc.

B. Reinforce units over 8'-0" long and units requiring reinforcement due to heavy loads by forming units of double-walled box-type construction with stiffeners of heavy gauge with flanges as required to provide sufficient rigidity and strength to withstand max. lateral forces in addition to super imposed vertical loads.

C. Sloping Roof Decks: For deck slopes of 1" per ft. and more, fabricate curb units (except expansion joint curbs) to form a level top edge. Where slope is less than 1" per ft., and curb is used to support equipment with moving parts, or supports vertical elements such as gravity ventilators which are intended to be plumb, provide tapered wood nailers (treated wood) at top of curb units to form a level top edge.

D. Provide treated wood nailer, not less than 1-5/8" thick and of the width shown, but not less than the width of the curb wall assembly. Anchor nailer securely to the top of the metal frame unit. Refer to Section 062000 of these specifications for pressure-treatment required for wood nailers.

E. Provide 22 ga. galvanized steel curb liners; where required extend curb liners through deck construction to coordinate with work below.

F. Provide 18 ga. galvanized steel cap flashing to cover a min. of 3" over roof flashing.

G. Where curb units are shown to support shop fabricated items of equipment, do not proceed with fabrication of curb units until size or dimensions have been checked for coordination with equipment.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions where roof specialties and accessories are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

A. General: Comply with manufacturer's instructions and recommendations. Coordinate with installation of roof deck and other substrates to receive accessory units, and with roof insulation, roofing and flashing; as required to ensure that each element of the work performs properly, and that combined elements are waterproof and weathertight. Anchor units securely to supporting structural substrates, adequate to withstand lateral and thermal stresses as well as inward and outward loading pressures.

B. Isolation: Where metal surfaces of units are to be installed in contact with non-compatible metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation.

C. Cap Flashing: Where cap flashing is required as component of accessory, install to provide adequate waterproof overlap with roofing or roof flashing (as counter flashing). Seal with thick bead of mastic sealant, except where overlap is indicated to be left open for ventilation.

3.3 CLEANING AND PROTECTION

A. Clean exposed metal and plastic surfaces in accordance with manufacturer's instructions. Touch up damaged metal coatings.

END OF SECTION

SECTION 078100

SPRAYED FIRE-RESISTIVE MATERIALS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 LEED BUILDING GENERAL REQUIREMENTS

A. Implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ 2009 New Construction Silver rating. Specific project goals which may impact this and the other sections of this specification include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; use of certified wood products; construction waste recycling; and the implementation of a construction indoor air quality management plan. Ensure that the requirements related to these goals, as defined in this Section and other Sections of the contract documents, are implemented to the fullest extent. Substitutions or other changes to the work shall not be allowed if such changes substantially compromise the stated LEED Building criteria.

B. Comply with LEED (Leadership in Energy and Environmental Design) Green Building Rating System BD+C, Version 3, Silver.

1.3 SECTION INCLUDES

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the sprayed fire-resistive materials as shown on the drawings and/or specified herein, including, but not necessarily limited to, the following:

1. Spray on fireproofing for structural steel.

2. Seal coat over fireproofing in special areas.

3. Preparation of surfaces.

4. Field quality control.

B. NOTE: All sprayed fireproofing and firestopping materials shall be FM approved and installed in accordance with manufacturer's guidelines and the *Approval Guide*, a publication of FM Approvals.

1.4 RELATED SECTIONS

A. Construction and Demolition Waste Management – Section 017419.

B. VOC Limits for Adhesives, Sealants, Paints and Coatings – Section 018113.

C. Construction Indoor Air Quality (IAQ) Management – Section 018119.

D. Structural steel - Section 051200.

E. Metal decking - Section 053100.

F. Intumescent fireproofing - Section 078123.

G. Firestops and smokeseals - Section 078413.

1.5 SUBMITTALS

A. Product Data: For each fire-resistive product specified.

B. Shop Drawings: Submit structural framing plans indicating the following:

1. Locations and types of surface preparations required before applying sprayed fire-resistive material.

2. Extent of sprayed fire-resistive material for each construction and fire-resistance rating, including the following:

a. Applicable fire-resistive design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
b. Minimum thicknesses needed to achieve required fire-resistance ratings of structural components and assemblies, as indicated on contract documents.

C. Product Certificates: Signed by manufacturer of sprayed fire-resistive material certifying that the products furnished comply with requirements.

D. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

F. If primer is used on steel or metal deck, submit certifications by supplier of primer that primer is compatible with materials, and will not impair the required performance of the installed fireproofing. Such certification shall be accompanied by evidence that the primer was successfully used in conjunction with the fireproofing material in a UL test applicable to the construction.

1. Coordinate with Section 051200 – Structural Steel, and Structural Drawings prior to application of primer.

G. Product Test Reports: Indicate that physical properties of proposed sprayed fire-resistive materials comply with specified requirements based on comprehensive testing

of current product formulations by a qualified testing and inspecting agency according to requirements specified in "Quality Assurance" Article.

H. Research/Evaluation Reports: Evidence of sprayed fire-resistive material's compliance with building code in effect for Project.

I. LEED Building Submittal Requirements: The Contractor or subcontractor shall submit the following LEED Building certification items:

1. A completed LEED Building Materials Certification Form, per Section 013300, "Submittals," under the LEED Building Submittal Requirements article of these specifications. Information to be supplied includes:

   a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
   b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s).
   c. Material costs for the materials included in the Contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.

2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

3. Product Cut Sheets for all materials that meet the LEED Performance Requirements this Section.

4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to, adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted. (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer's literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content.)

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer certified, licensed, or otherwise qualified by sprayed fire-resistive material manufacturer as having the necessary experience, staff, and training to install manufacturer's products according to specified requirements. A manufacturer's willingness to sell its sprayed fire-resistive materials to Contractor or to an installer engaged by Contractor does not in itself confer qualification on the buyer.

B. Source Limitations: Obtain each type of sprayed fire-resistive material from one source and by a single manufacturer.

C. Provide products containing no detectable asbestos as determined according to the method specified in 40 CFR, Part 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy."

D. Mockups: After processing of initial submittals and before delivery and installation of fireproofing materials, prepare a sample installation of fireproofing work, approximately 100 sq. ft. in area; providing an example of each type required, applied on each different substrate, to produce each different rating as required and reasonably representative of entire sprayed on fireproofing work, for joint approval by representative of fire resistant material manufacturer and Owner. Work in other areas shall not proceed until mock-up has been completed. Mock-up work which remains in compliance with requirements and is in undamaged and acceptable condition may be retained as final work in place.

E. LEED Building Performance Requirements

1. Adhesives or sealants used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113, "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings," where applicable. Some applicable VOC limits are as follows:

a. Firestop Sealants: 250 g/l less water.
b. All Architectural Sealants: 250 g/l less water.

2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the LEED Building Submittal Requirements of this Section.

3. Materials that contain recycled content shall be documented in accordance with the LEED Building Submittal Requirements of this Section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; shelf life, if applicable; and fire-resistance ratings applicable to Project.

B. Use materials with limited shelf life within period indicated. Remove from Project site and discard materials whose shelf life has expired.

C. Store materials inside, under cover, aboveground, so they are kept dry until ready for use. Remove from Project site and discard materials that have deteriorated.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply sprayed fire-resistive material when ambient or substrate temperatures are 40 deg F. or lower, unless temporary protection and heat is provided to maintain temperatures at or above this level for 24 hours before, during, and for 24 hours after product application.

B. Ventilation: Ventilate building spaces during and after application of sprayed fire-resistive material to achieve a minimum of four air changes per hour. Use natural

means or, where this is inadequate, forced-air circulation until fire-resistive material dries thoroughly.

1.9 SEQUENCING

A. Sequence and coordinate application of sprayed fire-resistive materials with other related work specified in other Sections to comply with the following requirements:

1. Provide temporary enclosures for interior applications to prevent deterioration of fire-resistive material due to exposure to unfavorable environmental conditions.

2. Avoid unnecessary exposure of fire-resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application.

3. Do not apply fire-resistive material to metal roof deck substrates until roofing has been completed; prohibit roof traffic during application and drying of fire-resistive material. Fireproofing shall be considered dry when the moisture content is 6% or less.

4. Do not begin applying fire-resistive material until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.

5. Defer installing ducts, piping, and other items that would interfere with applying fire-resistive material until application of fire protection is completed.

6. Do not install enclosing or concealing construction until after fire-resistive material has been applied, inspected, tested, and corrections have been made to defective applications.

7. Protect permanently exposed walls, floor or special surfaces.

1.10 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Submit a written warranty, executed by Contractor and cosigned by Installer, agreeing to repair or replace sprayed fire-resistive materials that fail within the specified warranty period.

1. Failures include, but are not limited to, cracking, flaking, eroding in excess of specified requirements; peeling; and delaminating of sprayed fire-resistive materials from substrates due to defective materials and workmanship within the specified warranty period.

2. Not covered under the warranty are failures due to damage by occupants and Owner's maintenance personnel, exposure to environmental conditions other than

those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.

C. Warranty Period: Three (3) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 SPRAYED FIRE-RESISTIVE MATERIALS

A. General: For exposed applications of sprayed fire-resistive materials, provide manufacturer's standard products complying with requirements indicated for material composition and for minimum physical properties of each product listed, measured by standard test methods referenced with each property.

B. Cementitious Sprayed Fire-Resistive Material: Factory-mixed, dry, cement aggregate formulation, chloride-free formulation of gypsum or Portland cement binders, additives, and inorganic aggregates, mixed with water at Project site to form a slurry or mortar for conveyance and application, complying with the following requirements:

1. Dry Density: Values for average and individual densities as required for fire-resistance ratings indicated, per ASTM E 605 or AWCI Technical Manual 12-A, Appendix A, "Alternate Method for Density Determination," but with an average density of not less than 22 lb./cu. ft.

2. Thickness: Provide minimum average thickness required for fire-resistive design shown on approved submittals.

   a. Fireproofing shall be of thicknesses and density to meet the requirements of the State of Connecticut Building Code for Type 1B construction.

3. Bond Strength: 1500 psf per ASTM E 736.

4. Compressive Strength: 10,000 psf. per ASTM E 761.

5. Corrosion Resistance: No evidence of corrosion per ASTM E 937.

6. Deflection: No cracking, spalling, delamination, or the like per ASTM E 759.

7. Effect of Impact on Bonding: No cracking, spalling, delamination, or the like per ASTM E 760.

8. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. per ASTM E 859.

9. Combustion Characteristics: Passes ASTM E 136.

10. Fire-Test-Response Characteristics: Provide sprayed fire-resistive materials with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

a. Flame Spread: 10 or less.
b. Smoke Developed: 0.

11. Fungal Resistance: No observed growth on specimens per ASTM G 21.

12. For exterior applications of sprayed fire-resistive material, provide manufacturer's formulation approved for surfaces exposed to the exterior.

C. Products: Subject to compliance with requirements, provide one of the following:

1. Cement-Aggregate Cementitious Sprayed Fire-Resistive Material:

a. Pyrocrete 239; Carboline Co., Fireproofing Products Div.
b. Monokote Type Z106HY; W.R. Grace & Co.--Conn., Construction Products Div.
c. 7GP; Southwest Vermiculite.
d. Cafco 400.

2.2 AUXILIARY FIRE-RESISTIVE MATERIALS

A. General: Provide auxiliary fire-resistive materials that are compatible with sprayed fire-resistive materials and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistive designs indicated.

B. Adhesive for Bonding Fire-Resistive Material: Product approved by manufacturer of sprayed fire-resistive material, used where required by manufacturer to insure proper bond.

C. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required to comply with fire-resistive designs indicated and fire-resistive product manufacturer's written recommendations. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive sprayed fire-resistive material.

D. Sealer for Sprayed Fire-Resistive Material in Elevator Shafts: Transparent-drying, water-dispersible protective coating by manufacturer of fire-resistive material.

1. Product: Subject to compliance with requirements, provide "Firebond Concentrate" by W. R. Grace, or similar product recommended by the manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, to determine whether they are in satisfactory condition to receive sprayed fire-resistive material. A substrate is in satisfactory condition if it complies with the following:

1. Substrates are free of oil, grease, rolling compounds, incompatible primers, loose mill scale, dirt, or other foreign substances capable of impairing bond of fire-resistive material with substrate under conditions of normal use or fire exposure.

2. Objects penetrating fire-resistive material, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.

3. Substrates are not obstructed by ducts, piping, equipment, and other suspended construction that will interfere with applying fire-resistive material.

B. Do not proceed with installation of fire-resistive material until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances that could impair bond of fire-resistive material, including oil, grease, rolling compounds, incompatible primers, and loose mill scale.

B. For exposed applications, repair substrates to remove any surface imperfections that could affect uniformity of texture and thickness in finished surface of sprayed fire-resistive material. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

C. Cover other work subject to damage from fallout or overspray of fire-resistive materials during application. Provide temporary enclosure as required to confine spraying operations, protect the environment, and ensure maintenance of adequate ambient conditions for temperature and ventilation.

3.3 INSTALLATION

A. Comply with fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to convey and spray on fire-resistive material, as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

B. Install metal lath, as required, to comply with fire-resistance ratings and fire-resistive material manufacturer's written recommendations for conditions of exposure and intended use. Securely attach lath to substrate in position required for support and reinforcement of fire-resistive material. Use anchorage devices of type recommended in writing by fire-resistive material manufacturer. Attach lathing accessories where indicated or required for secure attachment to substrate.

C. Coat substrates with adhesive before applying fire-resistive material where required to achieve fire-resistance rating or as recommended in writing by fire-resistive material manufacturer for material and application indicated.

D. Extend fire-resistive material in full thickness over entire area of each substrate to be protected. Unless otherwise recommended in writing by fire-resistive material manufacturer, install body of fire-resistive covering in a single course.

E. Spray apply fire-resistive materials to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by manufacturer.

F. Where sealers are used, apply products that are tinted to differentiate them from the sprayed fire-resistive material over which they are applied.

G. Maintain ambient conditions during installation and for cure period following installation, as recommended by manufacturer. Provide ventilation and avoid excessive rate of drying.

H. Installation Sequence of Fireproofing: All patching and repairing of sprayed fireproofing, due to cutting by other trades or testing and inspection, shall be performed under this Section.

I. Provisions shall be made for ventilation to properly dry the fireproofing after application. In enclosed areas lacking natural ventilation, air circulation and ventilation must be provided.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing and inspecting of completed applications of sprayed fire-resistive material will take place in successive stages, in areas of extent and using methods as follows. Do not proceed with application of fire-resistive material for the next area until test results for previously completed applications of fire-resistive material show compliance with requirements.

1. Extent: For each 1000-sq. ft. area, or partial area, on each floor, testing and inspecting agency will evaluate the following characteristics. Tested values must equal or exceed values indicated and values required for approved fire-resistance design.

a. Thickness for Floors, Roofs, and Walls: From the average of 10 measurements from a 144-sq. in. sample area, with sample width of not less than 6 inches per ASTM E 605.
b. Thickness for Structural Frame Members: From a sample of 25 percent of structural members per floor, taking 9 measurements at a single cross section for structural frame beams or girders, 7 measurements of a single cross section for joists and trusses, and 12 measurements of a single cross section for columns per ASTM E 605.
c. Density for Floors, Roofs, Walls, and Structural Frame Members: At frequency and from sample size indicated for determining thickness of each type of construction, per ASTM E 605 or AWCI Technical Manual 12-A, Appendix A, "Alternate Method for Density Determination."

d. Bond Strength for Floors, Roofs, Walls, and Structural Framing Members: Cohesion and adhesion at frequency and from sample size indicated for determining thickness of each type of construction, per ASTM E 736.

2. When testing discovers applications of fire-resistive material not in compliance with requirements, testing and inspecting agency will perform additional random testing to determine extent of noncompliance.

C. Remove and replace applications of fire-resistive material where test results indicate that they do not comply with specified requirements for cohesion and adhesion or for density, or both.

D. Apply additional fire-resistive material per manufacturer's written instructions where test results indicate that thickness does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5 CLEANING, PROTECTING, AND REPAIR

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Cure exposed sprayed fire-resistive material according to product manufacturer's written recommendations to prevent premature drying.

C. Protect fire-resistive material, according to advice of product manufacturer and Installer, from damage resulting from construction operations or other causes so fire protection will be without damage or deterioration at the time of Substantial Completion.

D. Coordinate application of fire-resistive material with other construction to minimize the need to cut or remove fire protection. As installation of other construction proceeds, inspect fire-resistive material and patch any damaged or removed areas.

E. Repair or replace work that has not been successfully protected.

END OF SECTION

SECTION 078123

INTUMESCENT FIREPROOFING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 LEED BUILDING GENERAL REQUIREMENTS

A. Implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ 2009 New Construction Silver rating. Specific project goals which may impact this and the other sections of this specification include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; use of certified wood products; construction waste recycling; and the implementation of a construction indoor air quality management plan. Ensure that the requirements related to these goals, as defined in this Section and other Sections of the contract documents, are implemented to the fullest extent. Substitutions or other changes to the work shall not be allowed if such changes substantially compromise the stated LEED Building criteria.

B. Comply with LEED (Leadership in Energy and Environmental Design) Green Building Rating System BD+C, Version 3, Silver.

1.3 SECTION INCLUDES

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the intumescent fireproofing on interior fireproofed steel exposed to view, as indicated on drawings and as specified herein.

B. NOTE: All sprayed fireproofing and firestopping materials shall be FM approved and installed in accordance with manufacturer's guidelines and the *Approval Guide*, a publication of FM Approvals.

1.4 RELATED SECTIONS

A. Construction and Demolition Waste Management – Section 017419.

B. VOC Limits for Adhesives, Sealants, Paints and Coatings – Section 018113.

C. Construction Indoor Air Quality (IAQ) Management – Section 018119.

D. Structural steel - Section 051200.

E. Joint sealants - Section 079200.

1.5 REFERENCES

A. Publications listed herein are part of this specification to the extent referenced.

B. American Society for Testing and Materials: ASTM E 119 Method for Fire Tests of Building Construction and Materials.

C. Warnock Hersey - 2001 Certification Listings.

D. Underwriters' Laboratories, Inc. - List of Equipment and Materials.

E. Steel Structures Painting Council (SSPC) Surface Preparation Standards.

1.6 SUBMITTALS

A. Product Data

1. Submit manufacturer's literature describing product characteristics, performance, and limitation criteria, including thickness for typical shape, curing time and application sequence.

2. Submit schedule of material thickness for members to receive intumescent coating.

B. Samples

1. Submit two (2) samples of the intumescent fireproofing.

2. The manufacturer shall provide stepped samples applied to the same material as the finished installation. The first layer is the specified primer. The top layer is the intumescent fireproofing. The finished application will have a smooth paint-like finish.

C. Quality Assurance Submittals

1. Test Designs/Results: Submit test designs for intumescent fireproofing prepared by a nationally recognized, certified, independent testing laboratory indicating full compliance with specified fire resistance performance requirements.

2. Certificates

a. Provide certification that contractor/applicator utilized for application of intumescent fireproofing is approved by manufacturer.
b. Provide certification that specialized equipment as may be recommended by manufacturer for proper application of intumescent fireproofing shall be utilized for work of this section.

3. Manufacturer's Instructions: Submit manufacturer's installation procedures which shall be basis for accepting or rejecting actual installation procedures.

D. LEED Building Submittal Requirements: The Contractor or subcontractor shall submit the following LEED Building certification items:

1. A completed LEED Building Materials Certification Form, per Section 013300, "Submittals," under the LEED Building Submittal Requirements article of these specifications. Information to be supplied includes:

    a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
    b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s).
    c. Material costs for the materials included in the Contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.

2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

3. Product Cut Sheets for all materials that meet the LEED Performance Requirements this Section.

4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to, adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted. (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer's literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content.)

1.7 QUALITY ASSURANCE

A. Qualifications

1. Applicator shall be approved by manufacturer for application of intumescent fireproofing. Applicators shall be trained and qualified in techniques and procedures for proper application and shall demonstrate a minimum of five (5) years' successful experience in such application.

2. Single Source Responsibility

    a. Intumescent fireproofing, decorative, protective, top coat shall be products from a single manufacturer or approved for use by the manufacturer.
    b. Provide primers and other undercoat materials which are produced or are specifically recommended by manufacturer of intumescent fireproofing to ensure compatibility of system.

B. Certifications: Intumescent fireproofing materials shall bear classification marking by Warnock Hersey, UL or other nationally recognized testing agency using ASTM standards and having a factory inspection service subject to approval of authorities having jurisdiction. Products shall be manufactured under testing agency's follow-up program.

C. LEED Building Performance Requirements

1. Adhesives or sealants used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113, "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings," where applicable.

2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the LEED Building Submittal Requirements of this Section.

3. Materials that contain recycled content shall be documented in accordance with the LEED Building Submittal Requirements of this Section.

1.8 DELIVERY, STORAGE, HANDLING

A. Packing, Shipping, Handling, and Unloading

1. Deliver products factory mixed, ready for application, in manufacturer's original unopened containers. Each container shall have manufacturer's label, intact and legible.

2. Include on the label for each container:

a. Manufacturer's name and address.
b. Type of coating.
c. Referenced Warnock Hersey, UL or nationally certified testing laboratory design number.
d. Warnock Hersey, UL or national certified testing laboratory seal.

B. Storage and Protection

1. Store materials in a clean, dry, protected area. Stack containers raised off ground, using blocking or skids to provide drainage.

2. Store materials at temperatures not less than 40 deg. F.

3. Protect material from freezing.

4. Discard materials which come in contact with contaminates or water, prior to actual use. Remove damaged materials from site.

1.9 PROJECT CONDITIONS

A. Environmental Requirements

1. Intumescent fireproofing shall not commence or proceed when steel surfaces are below 40 deg. F. or when ambient temperature is less than 40 deg. F. or expected within 24 hours.

2. Relative humidity shall not exceed 80% throughout total period of application and drying of intumescent fireproofing, and shall not exceed 85% throughout application and drying period for protective decorative finish coat, unless approved by the manufacturer prior to application.

3. Provide ventilation in areas to receive intumescent fireproofing during and for 24 hours following application to dry materials.

1.10 SEQUENCING AND SCHEDULING

A. Schedule application of intumescent fireproofing with the General Contractor. The General Contractor shall coordinate preparation and primer application with steel fabricators along with repairs and repriming of welds.

B. Do not apply intumescent fireproofing until concrete toppings have been installed.

C. Sequence work in conjunction with placement of hanger tabs, mechanical component hangers, electrical devices and any other similar devices connected to members scheduled to be coated.

D. Steel surfaces with less than 36'-0" clear working access may necessitate application of material to inaccessible surfaces prior to erection of finished steel members, either at point of fabrication or on-site.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Intumescent Fireproofing: Albi Clad TF.

B. Products manufactured by Nu-Chem, Carboline, and Cafco Inc. shall be considered as equivalent if surface finish, texture, thickness, and specified material characteristics comply with the conditions shown for this Project, and manufacturer can provide above certifications.

2.2 MATERIALS

A. Intumescent Fireproofing: Solvent, thin-film fireproofing.

1. Ratings: As indicated on drawings.

2. Surface Burning Characteristics: ASTM E 84:

a. Flame Spread: Less than 15
b. Smoke Developed: Less than 65.

B. Primer: Provide primer tinted differently from intumescent coating and appropriate base for finish top coat; Albi 490W, or approved equal.

C. Finish Coat: Type recommended by manufacturer of intumescent in custom color.

2.3 EQUIPMENT

A. Spray and roller equipment shall be as recommended by intumescent coating manufacturer.

B. Dry film thickness gage.

C. Air movement equipment.

D. Dehumidification equipment.

PART 3 EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions

1. Examine surfaces and conditions under which intumescent fireproofing is to be applied. Report any defects which may affect the work of this Section.

2. Confirm compatibility of surfaces to receive fireproofing materials prior to application of fireproofing. Steel surfaces shall be primed with a compatible primer. The primer must be approved by the intumescent fireproofing manufacturer prior to shop priming to ensure sufficient adhesion. Coordinate work with Section 051200 to insure proper coordination.

3. Applicator shall submit in writing certifications of substitute acceptance prior to proceeding with application of fireproofing.

4. Correct conditions detrimental to timely and proper execution of work.

5. Verify that all clips, hangers, sleeves and similar devices have been attached.

6. Do not proceed until unsatisfactory conditions have been corrected. Beginning application indicates acceptance of substrate surfaces.

3.2 PREPARATION

A. Clean substrate free of dust, dirt, grease or other foreign matter which would impair bond of fire resistance materials.

3.3 PROTECTION

A. Protect adjacent surfaces and equipment from overspray of sprayed fireproofing materials.

3.4 APPLICATION

A. Intumescent Fireproofing

1. Prior to application, allow materials to reach same temperature as surface temperature of steel by storing unopened containers in areas where application is to take place.

2. No spackle compound, gypsum basecoats, additives to intumescent paint fireproofing (other than reducers approved by the manufacturer) will be acceptable.

3. Thoroughly mix intumescent fireproofing in accordance with manufacturer's instructions and apply in sufficient thickness to achieve the fire resistance rating. Apply in as many passes as necessary to cover, with uniformed texture.

4. Apply intumescent fireproofing in strict adherence with manufacturer's instructions by spray method. Brush or roller application shall be allowed only when spray application is not practical.

5. Spray apply material using heavy duty, self-cleaning (reversible), type tip. Increase distance between tip and surface if necessary to adjust orange peel effect due to pressure. Adjust fan width accordingly.

6. Fireproofing material dries quickly, a viscosity increase may be experienced after container has been opened. Keep container covered as much as possible during application. Use recirculation feature on spray equipment at all times, especially at breaks or interruptions during spraying.

7. When applying fireproofing with roller or brush, work from small containers, mixing frequently. Original pail shall be kept tightly closed and surface of material covered with plastic sheet provided for that purpose.

8. Fireproofing materials are designed for high build with minimum number of coats, however do not exceed 40 mils per dry coat, as shrinkage may occur.

9. Follow manufacturer’s recommendations for recoat times and times to finish coat.

10. Final thickness shall be measured by dry film thickness gage. Do not apply protective top coat until it has been determined that required dry film thickness of intumescent fireproofing has been provided.

11. All runs, sags, orange peel in excess of 1/32" (peak to valley), depressions shall be sanded to achieve a uniform appearance in selected high finish areas.

12. Protect coating from running water during curing process.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing and inspecting of completed applications of intumescent material will take place in successive stages, in areas of extent and using methods as follows. Do not proceed with application of fire-resistive material for the next area until test results for previously completed applications of fire-resistive material show compliance with requirements.

1. The intumescent coating thickness shall be measured in accordance with Technical Manual 12-B, "Standard Practice of the Testing and Inspection of Field Applied Thin-Film Intumescent Fire Resistive Materials; an Annotated Guide" published by the Association of the Wall and Ceiling Industries.

2. When testing discovers applications of fire-resistive material not in compliance with requirements, testing and inspecting agency will perform additional random testing to determine extent of noncompliance.

C. Remove and replace applications of intumescent material where test results indicate that they do not comply with specified requirements.

D. Apply additional fire-resistive material per manufacturer's written instructions where test results indicate that thickness does not comply with specified requirements.

E. 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

SECTION 078413

FIRESTOPS AND SMOKESEALS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 LEED BUILDING GENERAL REQUIREMENTS

A. Implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ 2009 New Construction Silver rating. Specific project goals which may impact this and the other sections of this specification include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; use of certified wood products; construction waste recycling; and the implementation of a construction indoor air quality management plan. Ensure that the requirements related to these goals, as defined in this Section and other Sections of the contract documents, are implemented to the fullest extent. Substitutions or other changes to the work shall not be allowed if such changes substantially compromise the stated LEED Building criteria.

B. Comply with LEED (Leadership in Energy and Environmental Design) Green Building Rating System BD+C, Version 3, Silver.

1.3 SECTION INCLUDES

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the firestops and smokeseals as shown on the drawings and/or specified herein, including, but not limited to, the following:

1. Penetrations through fire-resistance-rated floor and roof construction including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.

2. Penetrations through fire-resistance-rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.

3. Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.

4. Sealant joints in fire-resistance-rated construction.

5. Penetrations at each floor level in shafts and/or stairwells.

6. Construction joints, including those between top of fire rated walls and underside of floors above; and those between exterior curtain walls and the outer perimeter edge of floor assemblies.

B. NOTE: All sprayed fireproofing and firestopping materials shall be FM approved and installed in accordance with manufacturer's guidelines and the *Approval Guide*, a publication of FM Approvals.

1.4 RELATED SECTIONS

A. Construction and Demolition Waste Management – Section 017419.

B. VOC Limits for Adhesives, Sealants, Paints and Coatings – Section 018113.

C. Construction Indoor Air Quality (IAQ) Management – Section 018119.

D. Cast-in-place concrete - Section 033000.

E. Unit masonry - Section 042000.

F. Joint sealers - Section 079200.

G. Aluminum curtainwall - Section 084413.

H. Drywall - Section 092900.

I. Piping penetrations - Division 22.

J. Duct penetrations – Division 23.

K. Cable and conduit penetrations - Division 26.

1.5 REFERENCES

A. ASTM E 814 "Standard Method of Fire Tests of Through-Penetration Firestops."

B. UL 1479, UBC 7-5 (Both are same as A. above).

C. ASTM E 119 "Standard Method of Fire Tests of Building Construction and Materials."

D. UL 263, UBC 7-1 (Both are same as C. above).

E. UL 2079 "Tests For Fire Resistance of Building Joint Systems."

F. ASTM E 1399 "Test For Dynamic Movement Conditions."

G. ASTM E 1966 (Same as E. above).

H. Published Through-Penetration Systems by recognized independent testing agencies.

1. UL Fire Resistance Directory, Volume II of current year.

2. Warnock Hersey Certification Listings, current year.

3. Omega Point Laboratories, current year.

1.6 SUBMITTALS

A. Submit manufacturer's product literature for each type of firestop material to be installed. Literature shall indicate product characteristics, typical uses, performance, limitation criteria, test data and indication that products comply with specified requirements.

B. Submit shop drawings detailing materials, installation methods, and relationships to adjoining construction for each firestop system, and each kind of construction condition penetrated and kind of penetrating item. Include firestop design designation of qualified testing and inspection agency evidencing compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop configuration for construction and penetrating items.

C. Material Safety Data Sheets: Submit MSDS for each firestop product.

D. Submit qualifications of firestop installer, including letter from firestop manufacturer of products proposed to be installed, wherein manufacturer approves or recognizes as trained/ or certifies installer for installation of that manufacturer's products.

E. Manufacturer's Letters: For installations or configurations not covered by a UL or Warnock Hersey design number, a recommendation shall be obtained from the manufacturer, in writing, for the specific application.

F. LEED Building Submittal Requirements: The Contractor or subcontractor shall submit the following LEED Building certification items:

1. A completed LEED Building Materials Certification Form, per Section 013300, "Submittals," under the LEED Building Submittal Requirements article of these specifications. Information to be supplied includes:

a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s).
c. Material costs for the materials included in the Contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.

2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

3. Product Cut Sheets for all materials that meet the LEED Performance Requirements this Section.

4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to, adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted. (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer's literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content.)

1.7 QUALITY ASSURANCE

A. General: Provide firestopping systems that are produced and installed to resist the spread of fire, and the passage of smoke and other gases.

B. Firestopping materials shall conform to Flame (F) and Temperature (T) ratings as required by local building code and as tested by nationally accepted test agencies per ASTM E 814 or UL 1479. The F rating must be a minimum of one (1) hour but not less than the fire resistance rating of the assembly being penetrated. T rating, when required by code authority, shall be based on measurement of the temperature rise on the penetrating item(s). The fire test shall be conducted with a minimum positive pressure differential of 0.01 inches of water column.

C. Firestopping products shall be asbestos free and free of any PCBs.

D. Do not use any product containing solvents or that requires hazardous waste disposal.

E. Do not use firestop products which after curing, dissolve in water.

F. Do not use firestop products that contain ceramic fibers.

G. Firestopping Installer Qualifications: Firestop application shall be performed by a single firestopping contractor who specializes in the installation of firestop systems, whose personnel to be utilized have received specific training and certification or approval from the proposed respective firestop manufacturer, and firestop installer shall have a minimum of three years experience (under present company name) installing firestop systems of the type herein specified.

H. Mock-Up: Prepare job site mock-ups of each typical Firestop System proposed for use in the project. Approved mock-ups will be left in place as part of the finished project and will constitute the quality standard for the remaining work.

I. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.

2. For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means.

3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

J. LEED Building Performance Requirements

1. Adhesives or sealants used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113, "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings," where applicable. Some applicable VOC limits are as follows:

   a. Firestop Sealants: 250 g/l less water.
   b. All Architectural Sealants: 250 g/l less water.

2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the LEED Building Submittal Requirements of this Section.

3. Materials that contain recycled content shall be documented in accordance with the LEED Building Submittal Requirements of this Section.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer's original unopened containers with manufacturer's name, product identification, lot numbers, UL or Warnock Hersey labels, and mixing and installation instructions, as applicable.

B. Store materials in the original, unopened containers or packages, and under conditions recommended by manufacturer.

C. All firestop materials shall be installed prior to expiration of shelf life.

1.9 PROJECT CONDITIONS

A. Verify existing conditions and substrates before starting work

B. Do not use materials that contain solvents, show sign of damage or are beyond their shelf life.

C. During installation, provide masking and drop cloths as needed to prevent firestopping products from contaminating any adjacent surfaces.

D. Conform to ventilation requirements if required by manufacturer's installation instructions or Material Safety Data Sheet.

E. Weather Conditions: Do not proceed with installation of firestop products when temperatures are in excess or below the manufacturer's recommendations.

F. Schedule installation of firestop products after completion of penetrating item installation but prior to covering or concealing of openings.

G. Coordinate this work as required with work of other trades.

1.10 SEQUENCING AND SCHEDULING

A. Pre-Installation Conference: Convene a pre-installation conference to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

B. Sequence: Perform work of this and other sections in proper sequence to prevent damage to the firestop systems and to ensure that their installation will occur prior to enclosing or concealing work.

C. Install all firestop systems after voids and joints are prepared sufficiently to accept the applicable firestop system.

D. Do not cover firestop systems until they have been properly inspected and accepted by the authority having jurisdiction.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide products of one of the following manufacturers:

1. Tremco
2. Bio-Fireshield
3. 3M
4. Specified Technologies Inc.
5. U.S. Gypsum Co.
6. Nelson
7. Hilti, Inc.
8. Grace Flame Safe

2.2 FIRESTOPPING, GENERAL

A. Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.

B. Accessories: Provide components for each firestopping system that are needed to install fill materials. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Accessories include but are not limited to the following items:

1. Permanent forming/damming/backing materials including the following:

    a. Semirefractory fiber (mineral wool) insulation.
    b. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
    c. Fire-rated form board.
    d. Joint fillers for joint sealants.

2. Temporary forming materials.

3. Substrate primers.

4. Collars.

5. Steel sleeves.

C. Applications: Provide firestopping systems composed of materials specified in this Section that comply with system performance and other requirements.

D. Smokeseals at top of partitions shall be flexible to allow for partition deflection.

2.3 FILL MATERIALS FOR THROUGH-PENETRATION FIRESTOP SYSTEMS

A. Endothermic, Latex Compound Sealant: Single-component, endothermic, latex formulation.

B. Intumescent, Latex Sealant: Single-component, Intumescent, latex formulation.

C. Intumescent Putty: Non-hardening, dielectric, water-resistant putty containing no solvents, inorganic fibers, or silicone compounds.

D. Intumescent Wrap Strips: Single-component, elastomeric sheet with aluminum or polyethelene foil on one side.

E. Job-Mixed Vinyl Compound: Prepackaged vinyl-based powder product for mixing with water at Project site to produce a paintable compound, passing ASTM E 136, with flame-spread and smoke-developed ratings of zero per ASTM E 84.

F. Mortar: Prepackaged dry mix composed of a blend of inorganic binders, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.

G. Pillows/Bags: Re-usable, heat-expanding pillows/bags composed of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.

H. Silicone Foam: Two-component, silicone-based liquid elastomer that, when mixed, expands and cures in place to produce a flexible, non-shrinking foam.

I. Silicone Sealant: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealant of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and non-sag formulation for openings in vertical and other surfaces requiring a non-slumping/gunnable sealant, unless firestop system limits use to non-sag grade for both opening conditions.

2.4 FIRE-RESISTIVE ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated that complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class, and Uses, and requirements specified in this Section applicable to fire-resistive joint sealants.

1. Sealant Colors: Color of exposed joint sealants as selected by the Architect.

B. Single-Component, Neutral-Curing Silicone Sealant: Type S; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, G, A, and (as applicable to joint substrates indicated) O.

1. Additional Movement Capability: Provide sealant with the capability to withstand 33 percent movement in both extension and compression for a total of 66 percent movement.

C. Multi-Component, Non-Sag, Urethane Sealant: Type M; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, A, and (as applicable to joint substrates indicated) O.

1. Additional Movement Capability: Provide sealant with the capability to withstand 40 percent movement in extension and 25 percent in compression for a total of 65 percent movement in joint width existing at time of installation, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, and remain in compliance with other requirements of ASTM C 920 for uses indicated.

D. Single-Component, Non-Sag, Urethane Sealant: Type S; Grade NS; Class 25; and Uses NT, M, A, and (as applicable to joint substrates indicated) O.

2.5 MINERAL FIBER/CERAMIC WOOL NON-COMBUSTIBLE INSULATION (FIRE SAFING)

A. Provide min. 4 pcf Thermafiber as manufactured by Thermafiber Co., min. 4 pcf FBX Safing Insulation as manufactured by Fibrex, or approved equal to suit conditions and to comply with fire resistance and firestop manufacturer's requirements.

B. Material shall be classified non-combustible per ASTM E 119.

2.6 MIXING

A. For those products requiring mixing prior to application, comply with firestopping manufacturer's directions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce firestopping products of uniform quality with optimum performance characteristics for application indicated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions with Installer present, for compliance with requirements for opening configuration, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:

1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.

2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.

3. Remove laitance and form release agents from concrete.

B. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing seal of firestopping with substrates.

3.3 CONDITIONS REQUIRING FIRESTOPPING

A. Building Exterior Perimeters

1. Where exterior facing construction is continuous past a structural floor, and a space (i.e. construction joint) would otherwise remain open between the inner face of the wall construction and the outer perimeter edge of the structural floor, provide firestopping to equal the fire resistance of the floor assembly.

a. If mineral wool is part of firestop system, the mineral wool must be completely covered by appropriate thickness of UL or Warnock Hersey listed firestop sealant or spray.
b. Refer to Article 3.6 herein for description of fire safing insulation.

2. Firestopping shall be provided whether or not there are any clips, angles, plates, or other members bridging or interconnecting the facing and floor systems, and whether or not such items are continuous.

3. Where an exterior wall passes a perimeter structural member, such as a girder, beam, or spandrel, and the finish on the interior wall face does not continue up to close with the underside of the structural floor above, thus interrupting the fire-resistive integrity of the wall system, and a space would otherwise remain open between the interior face of the wall and the structural member, provide firestopping to continuously fill such open space.

B. Interior Walls and Partitions

1. Construction joints between top of fire rated walls and underside of floors above, shall be firestopped.

2. Firestop system installed shall have been tested by either UL or Omega Point, including exposure to hose stream test and including for use with steel fluted deck floor assemblies.

3. Firestop system used shall allow for deflection of floor above.

C. Penetrations

1. Penetrations include conduit, cable, wire, pipe, duct, or other elements which pass through one or both outer surfaces of a fire rated floor, wall, or partition.

2. Except for floors on grade, where a penetration occurs through a structural floor or roof and a space would otherwise remain open between the surfaces of the penetration and the edge of the adjoining structural floor or roof, provide firestopping to fill such spaces in accordance with ASTM E 814.

3. These requirements for penetrations shall apply whether or not sleeves have been provided, and whether or not penetrations are to be equipped with escutcheons or other trim. If penetrations are sleeved, firestop annular space, if any, between sleeve and wall of opening.

D. Provide firestopping to fill miscellaneous voids and openings in fire rated construction in a manner essentially the same as specified herein before.

3.4 INSTALLING THROUGH PENETRATION FIRESTOPS

A. General: Comply with the through penetrations firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.

B. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for through penetration firestop systems by proven techniques to produce the following results:

1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.

2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

3. For fill materials that will remain exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.5 INSTALLING FIRE RESISTIVE JOINT SEALANTS

A. General: Comply with ASTM C 1193, and with the sealant manufacturer's installation instructions and drawings pertaining to products and applications indicated.

B. Install joint fillers to provide support of sealants during application and at position required to produce the cross sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability and develop fire resistance rating required.

C. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross sectional shapes and depths relative to joint width that optimum sealant movement capability. Install sealants at the same time joint fillers are installed.

D. Tool no sag sealants immediately after sealant application and prior to the time skinning or curing begins. Form smooth, uniform beads of configuration indicated or required to produce fire resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.6 INSTALLING FIRESAFING INSULATION

A. Install fire safing insulation utilizing welded or screw applied galvanized steel impaling pins and retaining clips; space clips or pins 24" o.c. maximum.

B. Completely fill voids in areas where safing insulation is required. At spandrel conditions/floor edges, depth of insulation top to bottom shall be at least four (4) inches.

C. Cover top of all safing insulation with firestop sealant or spray.

3.7 FIELD QUALITY CONTROL

A. Inspecting agency employed and paid by the Owner will examine completed firestopping to determine, in general, if it is being installed in compliance with requirements.

B. Inspecting agency will report observations promptly and in writing to Contractor, Owner and Architect.

C. Do not proceed to enclose firestopping with other construction until reports of examinations are issued.

D. Where deficiencies are found, Contractor must repair or replace firestopping so that it complies with requirements.

3.8 CLEANING

A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.

B. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to product firestopping complying with specified requirements.

END OF SECTION

SECTION 131146 TANK FILTRATION EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: The following tank filtration equipment:

1. Sand filter
2. Pumps
3. Heat Exchanger
4. Chlorine Injector

B. Related Section:

1. Division 22: Plumbing
2. Division 26: Electrical
3. Tank Filtration Equipment: Section 131146

1.02 REFERENCES

A. The following standards are cited in this Section. They govern the work of this Section only to the extent specified in each citation.

B. ASME B31.9 - Building Services Piping

1.03 SUBMITTALS

A. Comply with Section 01-3000 requirements.

B. Shop Drawings: Show sizes, locations, loads, anchorage requirements, and clearances for each element of the filtration assembly. Show other information necessary to fabricate and install tank filtration equipment and coordinate work of affected trades.

C. Product Data: Details, specifications, and other data necessary to complement shop drawings and describe materials, finishes and construction.

D. Installer Qualification Data:

1. List similar installations with 5-year minimum service histories for laboratory research vessels of 10,000 gallons or greater and their filtration equipment. Give volumes, product makes and models, installation dates, locations, owner/building manager names and addresses. Swimming pool experience is not counted and experience must be in laboratory settings.

2. List local service accounts; the location of nearest service office from which proposed equipment would be maintained; and the location of nearest parts inventory for the proposed equipment.

E. Operation and Maintenance Data: Comply with Section 01-730 requirements. Describe step-by-step operation and routine maintenance that can be performed by Owner's personnel. Include parts list and location of maintenance service facility.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Filtration equipment shall be standard products of a manufacturer regularly engaged in producing assemblies of the required kind and quality, with a ten-year minimum successful service history.

B. Installer Qualifications: Filtration equipment shall be installed by a installation and service agency capable of rendering complete service and providing rapid response to service calls in the New England area.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 01-6000 requirements.

1.06 PROJECT CONDITIONS

A. Work by others:

1. Tank needs to be fully installed with clear access to all plumbing ports from the basement level.

2. Work areas shall be clean and free of construction debris.

3. A pressurized, clean water source (of not less than 100 gpm) and drain needs to be available for hydrotesting at time of equipment installation.

4. A floor sink that can accommodate a flow rate of 100 gpm.

5. Equipment Pads. Provide housekeeping pads of concrete, minimum 4 inches (100 mm) thick and extending 3 inches (75 mm) beyond supported equipment: sand filters, pumps, and chlorine injector. Filtration contractor to provide locations for pads.

6. Tank Filtration Supplier to provide level sensors for tank alarming, but wiring and connection to BMS (Building Management System) by others.

7. Power supply for filtration equipment and connections to power provided by others.

8. Provide source of heated and chilled water for heat exchanger.

B. Field Measurements: Fabricate work to field dimensions where possible. Where field measurements cannot be made without delaying work, the Contractor shall provide guaranteed dimensions and coordinate work of affected trades/Sections to assure proper execution of adjoining work.

1.07 WARRANTY

A. Warrant assemblies to be free from defect in materials, workmanship, and performance for one year following acceptance. Deliver two copies of written warranties to the Owner. Both copies shall be signed by the installer and the Contractor.

PART 2 - PRODUCTS

2.01 MANUFACTURED UNITS

A. Sand Filter:

1. Approved Manufacturers

a. Pentair
b. Hayward
c. Approved Equal

2. Capable of filtering water at rates of 15 gpm/ft2 (10 lps/m2) and back washing at rates from 15 gpm/ft2 (10 lps/m2) to 20 gpm/ft2 (13.5 lps/m2) of filter media area.

3. Vessel

a. Constructed of molded colorfast polymeric material or seamless filament wound fiberglass reinforced plastic.
b. Automatic air-relief valve
c. Drain port located in bottom of filter.
d. Inspection cover in top of filter.
e. Internal distribution piping to direct water evenly across entire sand surface.

B. Pumps:

1. Approved Manufacturers
a. Pentair
b. Sta-Rite
c. Approved Equal

2. Casing: Molded from glass reinforced, corrosion-resistant thermoplastic with Bronze wear ring.
3. Impeller: polycarbonate
4. Mechanical Seal: ceramic
5. Shaft and Shaft Sleeve: stainless steel with neoprene sleeve.
6. Basket Strainer:
a. Body to be Integral with pump housing.
b. Transparent acrylic or Plexiglas lid with an ethylene propylene “O” ring.
c. Quick release to allow strainer basket to be removed quickly and easily.

d. 304 stainless steel or better basket with 3/16 in. (5 mm) rectangular holes and 75% open area. Holes in basket shall not be larger than 50 percent of minimum opening size of the pump it is protecting.

7. Pump and Motor Assembly
   a) Mounted on molded glass reinforced, corrosion resistant thermoplastic supporting both pump and motor ends.
   b) Motor to have class F insulation with temperature rise as specified by NEMA standards for class of insulation used and shall have a 1.15 service factor.

C. Heat Exchanger

1. Approved manufacturers
   a. AquaLogic

2. Heat exchanger to be constructed of titanium. Outer shell to be insulated PVC. Control package to be mounted on standard AquaLogic frame for floor or wall mounting.

D. Chlorine Injector

1. Approved manufacturer
   a. Pentair

PART 3 - EXECUTION

3.01 EXAMINATION

A. Comply with Section 016000 requirements.

3.02 INSTALLATION

A. All plumbing to be SCH 80 PVC.

B. Use only true union or flanged valves.

3.03 HYDROTEST

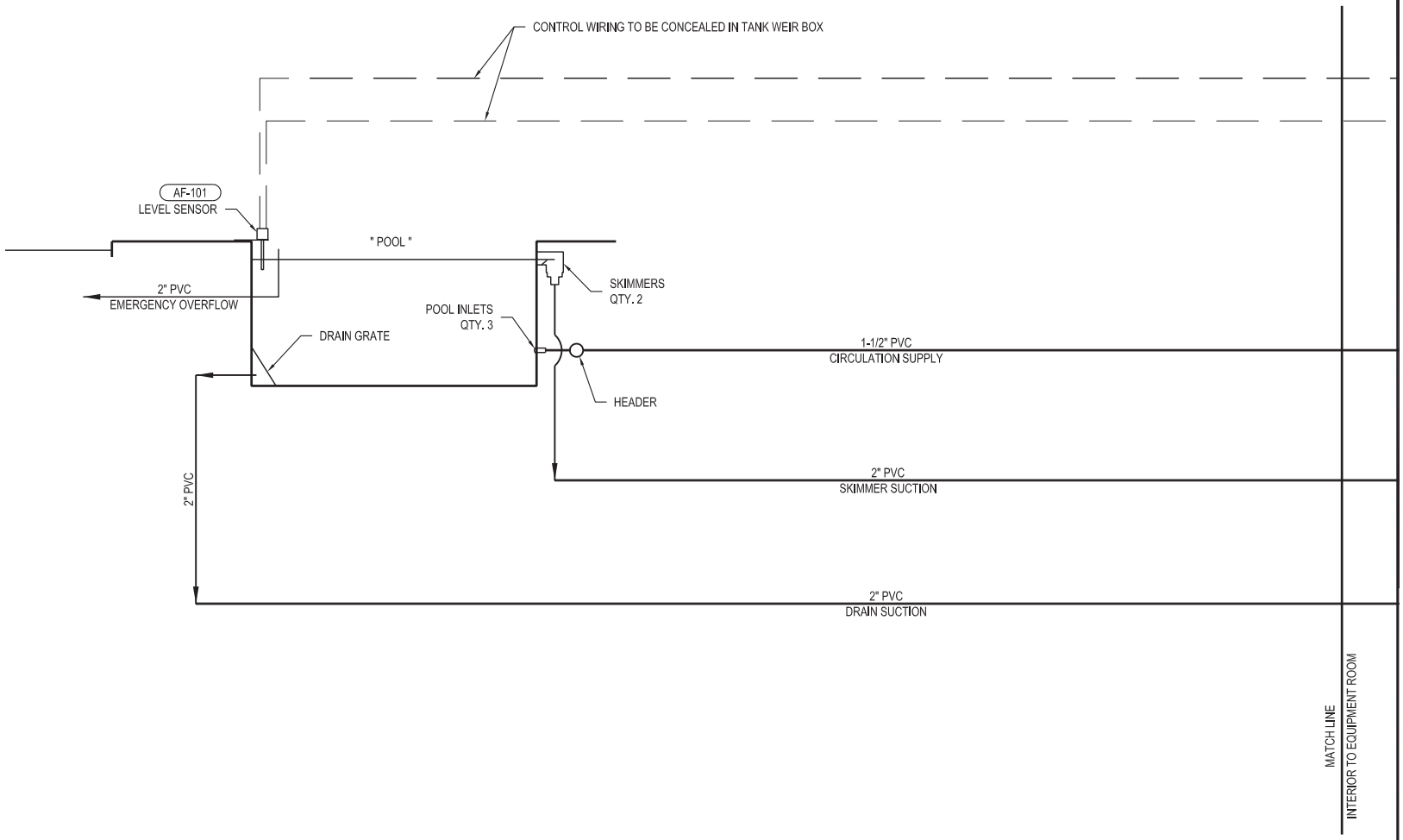
A. Run filtration system for 48 hours (with tank fully filled) to insure that system is fully functioning. Repair any leaks.

B. Test all systems: sand filter (backwash, filter, and drain settings), heat exchanger (test for temperature drop and gain of +/- 5 F from setpoint), and chlorine injection.

C. Drain system.

Diagrams on following pages:

~~END OF SECTION~~



MECHANICAL EQUIPMENT SCHEDULE

ITEM TAG	DESCRIPTION	SPECIFICATION	kW	HP	RPM	VAC	PHASE	Hz
P-101	CIRCULATION PUMP	PENTAIR WHISPERFLO, WFE-3, 35 GPM @ 65' TDH	0.6	0.75	3450	230	1	60
F-101	CARTRIDGE FILTER	TRITON, TR-50, 2.47 SQ. FT. PER FILTER INCLUDE MULTI-PORT VALVE						
HX-101	HEAT EXCHANGER	AQUALOGIC, TUBE AND SHELL (SIZE AS REQUIRED)						
CL-101	CHLORINE FEEDER	RAINBOW CHLORINATOR, HC-3315 (15 LB CAPACITY)						
OZ-101	OZONE GENERATOR	DEL OZONE, ECLIPSE EC-4, INCLUDE INJECTOR MANIFOLD & MDV	0.04			120	1	60
CF-101	pH FEED PUMP	BLUE WHITE, STAR SYSTEM, C-1500N, 7 GAL.	0.05			120	1	60
CC-101	CHEMICAL CONTROLLER	BECS TECHNOLOGY, BECSYS3, INCLUDE INDUSTRIAL PROBES	1.1			120	1	60
AF-101	AUTOFILL CONTROLLER	FLOWLINE, SMART TRAK AU23 W/ COMPACT LEVEL CONTROLLER				120/240	1	60
FM	FLOW METER	BLUE WHITE, PITOT TUBE OR EQUAL						
CG	COMPOUND GAUGE	WIKA (TYPE PER INSTALLATION), LIQUID FILLED 1 1/2" DIA. 0-30 Hg/0-30 PSI RANGE						
PG	PRESSURE GAUGE	WIKA (TYPE PER INSTALLATION), LIQUID FILLED 1 1/2" DIA.						
TI	THERMOMETER	TRERICE, DIRECT MOUNTED 4 1/2" ADJUSTABLE ANGLE W/ THERMOWELL						
PC-101	POOL CONTROLLER	PENTAIR INTELLITOUCH CONTROL SYSTEM				115/230	1	60

POOL GEOMETRY

AREA	217	SQ. FEET
VOLUME	9,740	GALLONS

TREATMENT INFORMATION

TURNOVER FLOW RATE	35	GPM
TURNOVER TIME	4.6	HOURS
	278	MINUTES

EQUIPMENT TAG LEGEND

EQUIPMENT CALL OUT

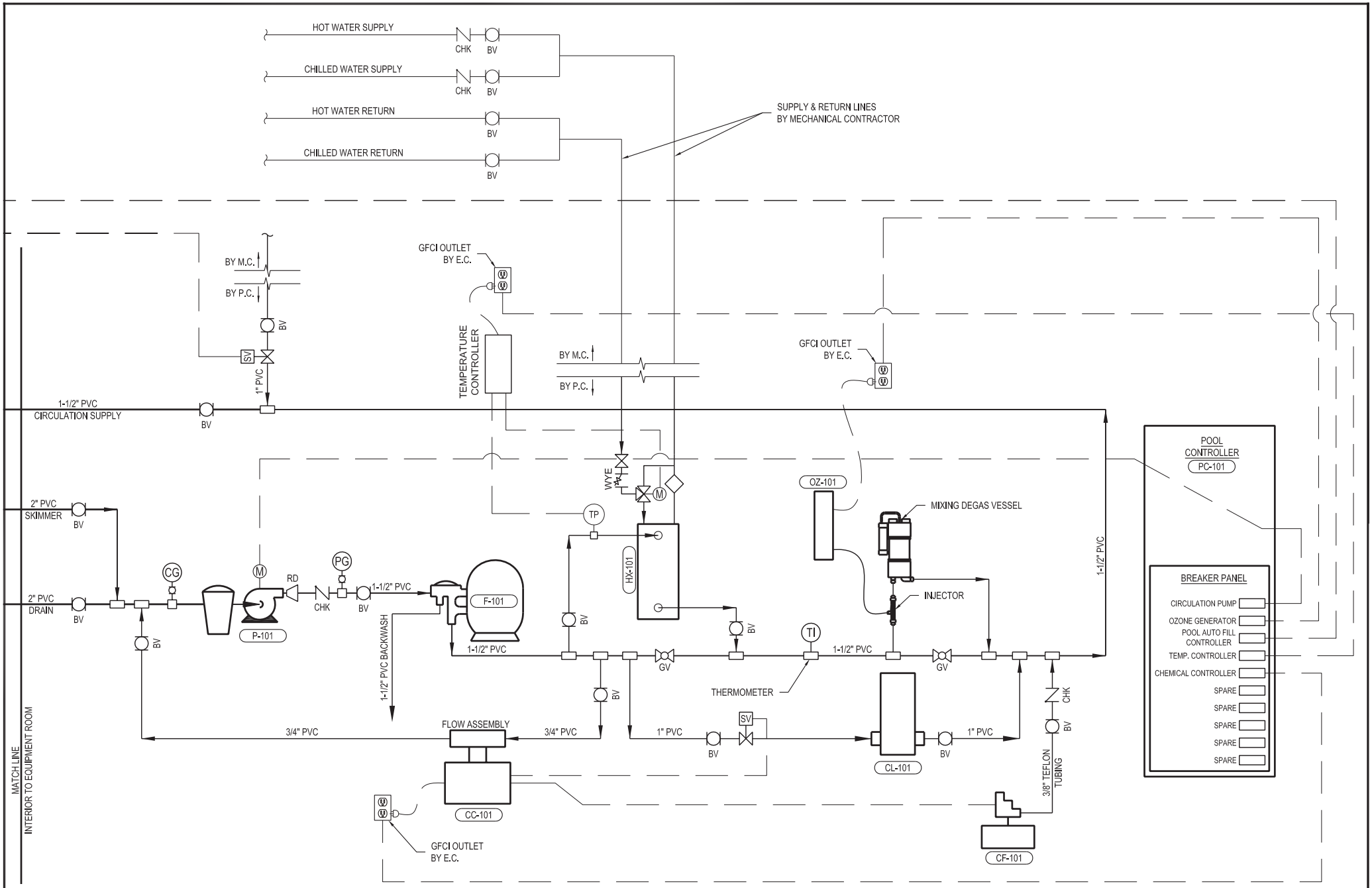
EQ-100

IDENTIFICATION NUMBER

TANK FILTRATION EQUIPMENT
131146

UCONN RESEARCH POOL
SCHEMATIC DIAGRAM

BID ADDENDUM NO. 03 -
APRIL 20, 2015



TANK FILTRATION EQUIPMENT
131146

UCONN RESEARCH POOL
SCHEMATIC DIAGRAM
BID ADDENDUM NO. 03 -
APRIL 20, 2015

SECTION 133413 FIBERGLASS TANK CONSTRUCTION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   a. Engineering design and fabrication of Fiber Reinforced Plastic (FRP) components.
   b. Engineering design of acrylic windows.
   c. Installation of the acrylic windows, including sealants and glazing materials.
   d. Onsite assembly and installation of the tank

B. Related Sections: Tank Filtration Equipment: Section 131146.
Ornamental Metals: Section 057000

1.02 REFERENCES

A. The following standards are cited in this Section. They govern the work of this Section only to the extent specified in each citation.
B. American Society of Mechanical Engineers, ASME-RTP-1-95 standard.
C. ASTM 4097-95a standard.
D. American Society of Civil Engineers, Structural Plastics Design Manual, 1984.
E. American Bureau of Shipping, Guide for Classing and Building High Speed Craft, 1990.
F. ASME/ANSI PVHO-1-2007

1.03 SUBMITTALS

A. Shop Drawings:
   a. Plan, elevation, isometric, and section views
   b. Acrylic panel details including thickness and the location of any chemical bonds.
   c. Tank details including all penetrations and fittings, flanges, skimmers, and gelcoat color and other details necessary to fabricate the tank **and coordinate with other tank elements provided by other divisions**.
   d. Drawings to be signed and sealed by a licensed structural engineer.

B. Product Data: Details and specifications necessary to complement shop drawings and describe materials and construction.

C. Maintenance Data: Describe cleaning and routine maintenance that can be performed by Owner's personnel.

D. Samples: 6” x 6” sample of tank wall construction indicating proposed color and texture.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Fabricator must have a minimum of 10 years documented experience in the fabrication of FRP tanks with acrylic viewing windows.

E. Assembly Team Qualifications: Fabricator must have a minimum of 5 years documented experience in the onsite assembly of multi-piece tanks of a similar size.

F. Sole Source Responsibility – Only one source for full responsibility in fulfilling all requirements from fabrication through onsite assembly shall be allowed for this section of the Work.

G. Manufacturers:

a. Waterdog Products, Inc., El Cajon, CA. Phone (619) 441-9688
b. Tenji, Inc., Pacific Grove, CA. Phone (831) 401-9551
c. Cal Aquaria, Ontario, CA. Phone (909) 930-2791

1.05 DELIVERY, STORAGE, AND HANDLING

A. Prior to shipment and onsite assembly, storage and handling of the FRP tank pieces at the Manufacturer's shop shall be accomplished in such a manner as to assure that all the components are in a new and undamaged condition.

B. Each tank will be tagged with the manufacturer's drawing and tank number for ease of identification.

1.06 WORK BY OTHERS

A. The connection with all tank filtration system plumbing will be by the designated Filtration Contractor, but all tank penetrations will be integral to the fabricated FRP tank and provided as such.

B. All adjacent wall, floor, and ceiling construction and related adjacent surfaces and equipment.

1.07 WARRANTY

A. Fiberglass tanks and their related acrylic viewing panels shall be warrantied for a period of two (2) years from the time of onsite delivery to be free of defects of either material or workmanship, and shall be appropriately constructed and engineered for the intended use. The glazing system shall be warrantied for a period of one (1) year from the completion of the onsite assembly of the tank.

1.08 QUALITY CONTROL

A. Allowable Tolerances:
a. Linear dimensions prior to water fill not to exceed +/- 0.25 inches
b. Operating deflection of not more than L/200 with a skin stress of less than 1500 psi.

B. Quality craftsmanship – All fabrication shall conform to this section as to materials, drawings, and dimensions. All gelcoat surfaces shall be solid, smooth, and uniformly colored. All hand lay-up work shall be smooth to the touch, with all glass fibers completely embedded in resin.

1.09 COORDINATION

A. The fabrication and onsite assembly of the tank shall be accomplished in such a manner as to coordinate with other elements and trades such as floors, walls, and plumbing.

PART 2 - PRODUCTS

2.01 FIBERGLASS TANK WITH ACRYLIC WINDOWS

A. FRP Fabrications:
   a. Tanks are to be open molded on male molds
   b. Tank surfaces to be of a high quality isothalic NPG polyester gelcoat with a minimum thickness of 20-30 mil. **Tank interior color to match Benjamin Moore 2129-70 "Silver Cloud". Tank exterior to be black. Color "bleed" from interior to exterior is unacceptable.**
   c. Vertical tank wall to be of a sandwich-type, composite construction with an end grain balsa core with a minimum density of 7.5 lbs/cu. ft.
   d. Laminations to be hand applied and of a sufficient number of layers of chopped strand mat and woven roving impregnated with a resin-rich layer of isothalic corrosion resistant polyester resin to reach the engineered wall thickness with the minimum thickness of each side to be no less than 0.125 inches.
   e. Both laminations and core material are to be of an appropriate thickness to the tank size and operating water level.
   f. No raw fiberglass to be present on any surface.
   g. All window rebates/sills/jambs to be molded into the tank and be designed so that the mounted viewing panels are flush with the interior of the tank.
   h. All fittings are to be FRP type and flush with the interior of the tank.
   i. All cut and trimmed edges will be edge coated and sealed with isothalic polyester resin.
   j. Provide embedded blocking and angles in FRP construction as indicated on the drawings for attachment of ladder and rail.

B. Tank Acrylic
   a. Tank acrylic shall conform to the requirement set forth below and in general the acrylic and its installation of the acrylic into the window rebate of the FRP tank are considered part of this scope.
   b. Acrylic panel material shall be commercial grade polymethyl methacrylate.
   c. Acrylic material shall have a flame spread of 20 or less (Class III) in accordance with ASTM E-84.
   d. Thickness of the acrylic windows shall be engineered to provide a minimum safety factor of 11.2 and shall be based on the minimum allowable physical properties per the latest revision of ASME PVHO-1 standards for monolithic castings.
   e. Each acrylic window must be free of inclusions which either significantly decrease its structural performance or mar its optical appearance.
      i. An inclusion is any non-acrylic material including bubbles within the acrylic panel.
      ii. Only inclusions that would be in the viewing area of the finished window whose diameter or length exceeds the significant dimension of 0.125 inches shall be considered. Inclusions in excess of 0.250 inches in two dimensions or that exceed 0.5 inches in overall length, i.e. a hair, are unacceptable.

iii. Inclusions acceptable to the criteria in paragraph 2.01 (B)(e)(ii) are limited to one per 2 sq. yds.

f. The material must be colorless, clear, with minimal haze (greater than 92% total transmission with a 2” cubed sample per ASTM D-1003).

g. The dry side surface of the panel shall be polished, smooth, without obvious surface irregularities in the form of waviness, ridges, distortions, pits, dimples, and scratches when viewed from 24-36” away.

h. If any panel will require chemical bonds, manufacturer shall show joints on shop drawings and obtain approval from Contractor prior to fabrication.

i. Chemical bonds shall be of Museum Grade with a visual quality that meets or exceeds the minimum requirements in ASTM D-4802. Additionally, chemical bonds shall be:

   i. Wet sanded inside and out yielding a high quality, polished bond joint

   ii. Annealed to remove stress and increase bond strength.

PART 3 - EXECUTION

3.01 ONSITE INSTALLATION

A. Tank will be constructed in the manufacturer’s shop in ~~the largest pieces practical for ease of installation and cost effective freight~~ **sections of the size indicated on the drawings.**

~~B. Offload and rigging and placement of the tank pieces shall be under the scope of Building Contractor. The manufacturer will provide an onsite supervisor for this activity.~~

C. All onsite laminations and gelcoat application to meet the requirements of section 2.01 (A).

END OF SECTION

Fusco celebrating 90 years

Sign-In Sheet

PHASE 2 – Pre Bid Meeting

UConn NESB
(New Engineering and Science Building)

Project #901376
Fusco Project No. 2730

April 16, 2015
10:00AM Student Union Theatre
Auditorium (1st floor), 2110
Hillside Road

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Fusco celebrating 90 years

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Fusco celebrating 90 years

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Fusco celebrating 90 years

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Tom Muscato	System One	TMUSCATO@SYSTEMONECT.com	860-982-763
Patrick Glomb	Morganero Northeast	pglomb@morganero.com	301 440 1205
Sibley Muschinsky	Adams Ahern	sibley@adamsahern.com	860.523.8835
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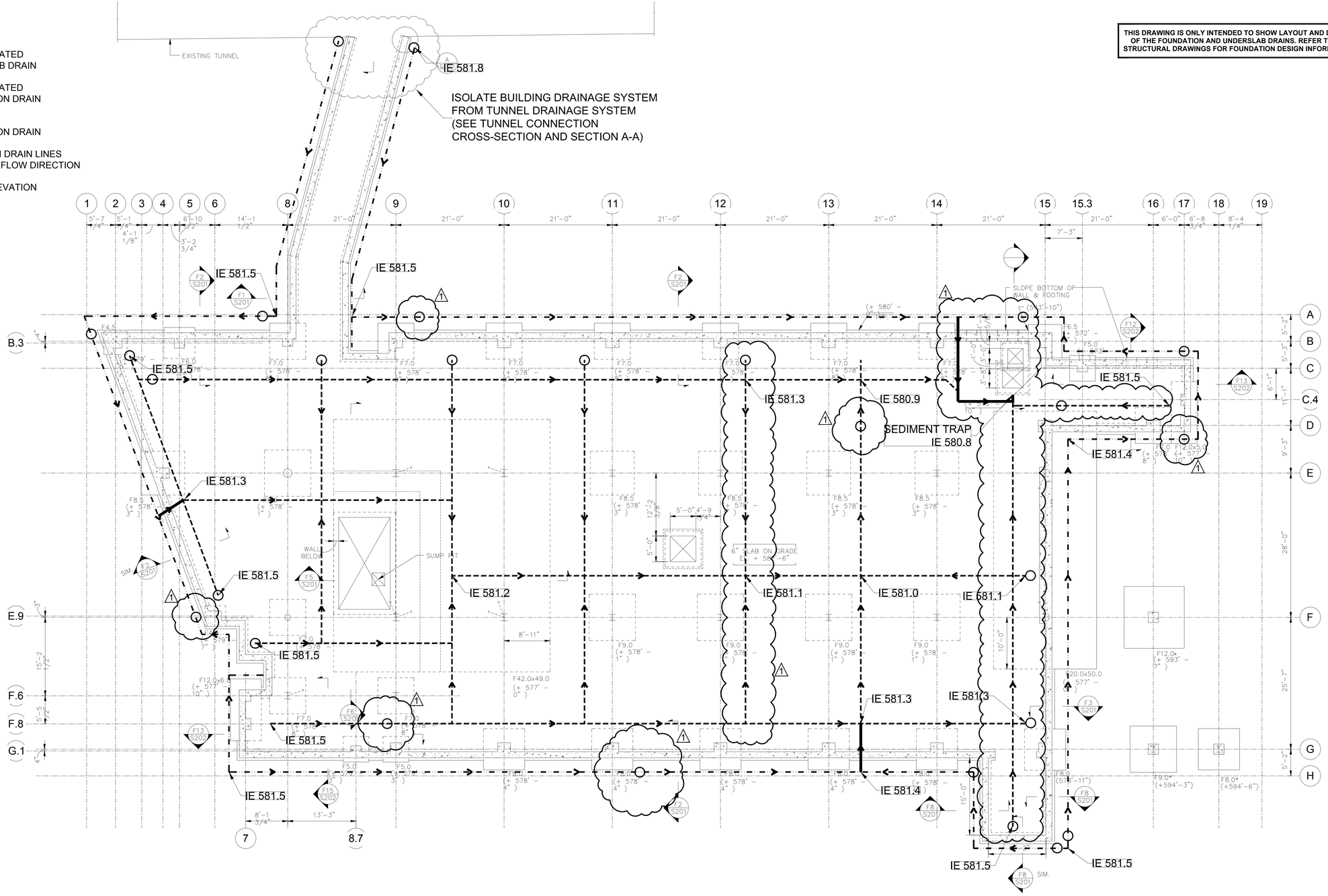
Desiree Howard	"	desiree@ "	
Heidi Coutu	Orange Cleaning Svc.	Heidie orangecleaningservices.net	413-222-0878
Mary Kate Sullivan	UConn	mary-kate.sullivan@uconn.edu	
Miriam Tichman	LMP	miriam.tichman@lmp.com	

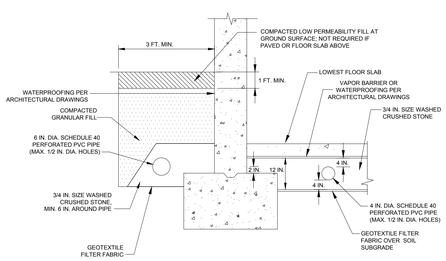
LEGEND:

- 4" PERFORATED UNDERSLAB DRAIN
- 6" PERFORATED FOUNDATION DRAIN
- 6" SOLID FOUNDATION DRAIN
- ARROW ON DRAIN LINES INDICATES FLOW DIRECTION
- IE 583.0 INVERT ELEVATION
- CLEANOUT

THIS DRAWING IS ONLY INTENDED TO SHOW LAYOUT AND DETAILS OF THE FOUNDATION AND UNDERSLAB DRAINS. REFER TO THE STRUCTURAL DRAWINGS FOR FOUNDATION DESIGN INFORMATION.



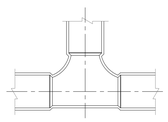
1 FOUNDATION PLAN
1/8" = 1'-0"



TYPICAL FOUNDATION AND UNDERSLAB DRAIN DETAIL

NOT TO SCALE

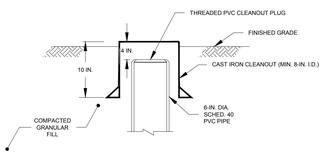
NOTE:
1. THIS DETAIL APPLIES TO AREAS WHERE THE BUILDING IS LOCATED GREATER THAN 20 FEET FROM PERMEABLE PAVERS.



TYPICAL CLEANOUT AT UNDERSLAB DRAIN

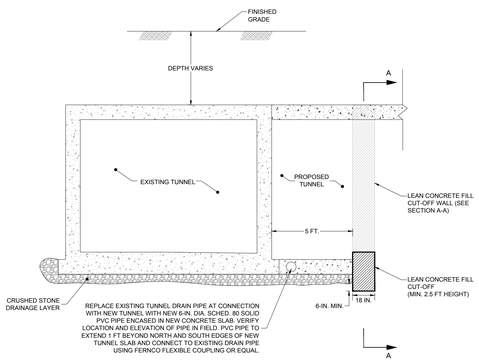
NOT TO SCALE

NOTE: PROVIDE ACCESS FOR CLEANING EQUIPMENT TO ALL PIPES THAT INTERSECT CLEANOUTS.



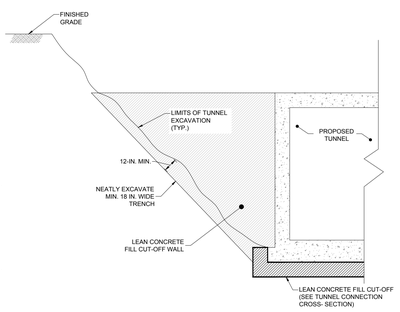
TYPICAL EXTERIOR CLEANOUT SURFACE DETAIL

NOT TO SCALE



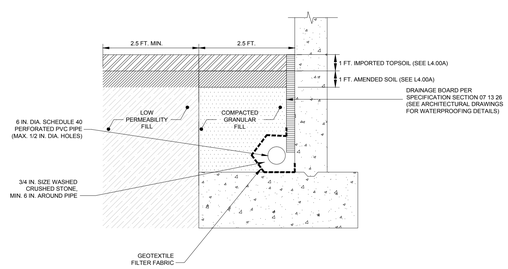
TUNNEL CONNECTION CROSS-SECTION

NOT TO SCALE



SECTION A-A

NOT TO SCALE



FOUNDATION DRAIN DETAIL IN AREAS ADJACENT TO PERMEABLE PAVERS

NOT TO SCALE

NOTES:
1. THIS DETAIL APPLIES TO AREAS WHERE THE BUILDING IS LOCATED WITHIN 20 FEET OF PERMEABLE PAVERS.
2. UNDERSLAB DRAIN DETAIL NOT SHOWN. REFER TO "TYPICAL FOUNDATION AND UNDERSLAB DRAIN DETAIL".
3. CONTRACTOR SHALL CONTACT ENGINEER FOR ASSESSMENT OF SOILS EXPOSED IN EXCAVATION OUTSIDE BUILDING PRIOR TO PLACING BACKFILL AND CONSTRUCTING FOUNDATION DRAINS. MODIFICATIONS TO THIS DETAIL MAY BE REQUIRED AS DIRECTED BY THE ENGINEER IF RELATIVELY FREE-DRAINING SOILS ARE ENCOUNTERED.

UNIVERSITY OF CONNECTICUT

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ISSUE/REVISION

NO.	DATE	COMMENTS
1	2015-0420	BID ADDENDUM 03

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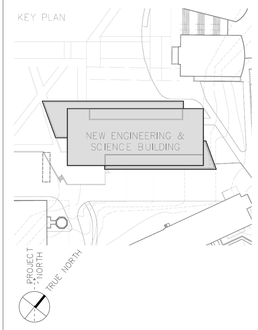
KEY PLAN



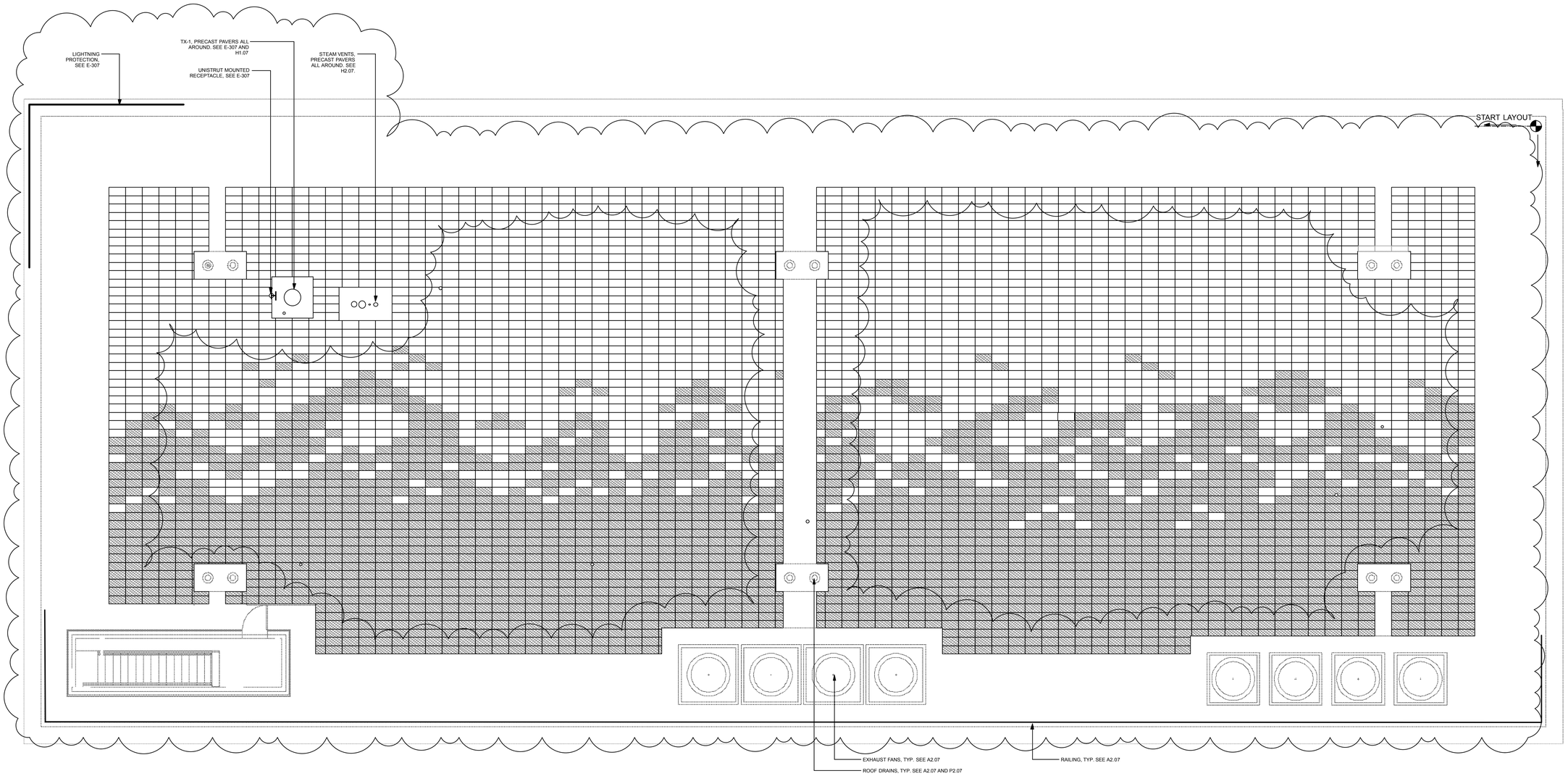
Project:

Drawing Title:

FOUNDATION AND UNDERSLAB DRAIN PLAN

PROJECT NO:	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: 1/8" = 1'

FD 1.0



1 SITE PLANTING PLAN
3/16" = 1'-0"

GREEN ROOF TRAY SCHEDULE		
COMMON NAME	**BOTANICAL NAME**	**QTY**
MIX A		**3221**
Baby Tears Stonecrop	*Sedum album 'Chloroticum'*	
Dragon's Blood Stonecrop	*Sedum spurium 'Dragon's Blood'*	
John Creech Stonecrop	*Sedum spurium 'John Creech'*	
Pink Jewel Stonecrop	*Sedum spurium 'Pink Jewel'*	
Roseum Stonecrop	*Sedum spurium 'Roseum'*	
Royal Pink Stonecrop	*Sedum spurium 'Royal Pink'*	
MIX B		**2428**
Two Row Stonecrop	*Sedum spurium 'Album Superbum'*	
Star Dust Stonecrop	*Sedum spectabile 'Star Dust'*	
Hillbrandtii Stonecrop	*Sedum album 'Hillbrandtii'*	
Kogane Coast Stonecrop	*Sedum kamstschaticum 'Takahira Dake'*	
Blue Spruce Sedum	*Sedum reflexum*	
Hailey's Comet Sedum	*Sedum album 'Hailey's Comet'*	
Green Mantle Stonecrop	*Sedum spurium 'Green Mantle'*	

GREEN ROOF PLANTING NOTES

1. THE CONTRACTOR SHALL VERIFY FIELD CONDITIONS PRIOR TO COMMENCING PLANTING WORK. NOTIFY THE LANDSCAPE ARCHITECT IMMEDIATELY OF CONDITIONS DETRIMENTAL TO NEW AND EXISTING PLANT MATERIAL ARE ENCOUNTERED.
2. ALL PLANTS MUST BE LABELED WHEN THEY ARE DELIVERED TO THE SITE. IF PLANTING IS DELAYED FOR MORE THAN 6 HOURS AFTER DELIVERY, SET PLANTS IN SHADE. PROTECT FROM WEATHER AND MECHANICAL DAMAGE. KEEP ROOTS MOIST BY COVERING WITH MULCH, BURLAP, OR OTHER ACCEPTABLE MEANS OF RETAINING MOISTURE.
3. CALL THE LANDSCAPE ARCHITECT FOR APPROVAL BEFORE SUBSTITUTIONS.
4. PLANTING GROUPS AS SHOWN ON THE PLAN ARE ONLY DIAGRAMMATIC, ACTUAL MASSING OF PLANT MATERIAL MAY VARY DUE TO EXISTING FIELD CONDITIONS. PRIOR TO DIGGING PLANT PITS, PLACE ALL PLANTS, FOR APPROVAL, IN THEIR RELATIVE POSITIONS AS INDICATED ON THE PLAN. MAKE ADJUSTMENTS TO THE LOCATIONS AS REQUESTED BY THE LANDSCAPE ARCHITECT.
5. CUT GREEN ROOF TRAYS AS NECESSARY FOR FIT.
6. CONTACT THE LANDSCAPE ARCHITECT FOR APPROVAL BEFORE MAKING ANY SUBSTITUTIONS, IF ANY DISCREPANCIES OCCUR BETWEEN THE QUANTITIES CALLED FOR ON THE PLANT LIST AND THOSE INDICATED ON THE PLANS, THE GREATER QUANTITY SHALL GOVERN.
7. NO PLANT WILL BE ACCEPTED WHICH DISPLAYS MAJOR IRREGULARITIES OR MECHANICAL DAMAGE. ANY PLANTS DEEMED NOT IN SATISFACTORY HEALTH OR CONDITION AT THE TIME OF PLANTING SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
8. INSTALL ALL PLANTS ACCORDING TO THE PLANTING DETAIL, SPECIFICATIONS, AND NOTES. THOROUGHLY WATER PLANTS AFTER PLANTING.
9. PROVIDE ONE GROWING SEASON PLANT REPLACEMENT GUARANTEE FOR NEW PLANTS.

NOTES:

1. SEE A.207 FOR ARCH PLAN.
2. SEE A6.50 FOR ROOF DETAILS
3. SEE H1.07 FOR ROOF DUCTWORK
4. SEE H2.07 FOR ROOF PIPING
5. SEE P1.07 FOR PLUMBING SUPPLY ROOF PLAN
6. SEE P2.07 FOR PLUMBING DRAINAGE ROOF PLAN
7. SEE E3.07 FOR ELECTRICAL ROOFTOP POWER PLAN
8. SEE SEC-4 FOR ROOF SECURITY PLAN

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ISSUE/REVISION:		
1	2015-04-20	Bid Addendum 03
NO.	DATE	COMMENTS

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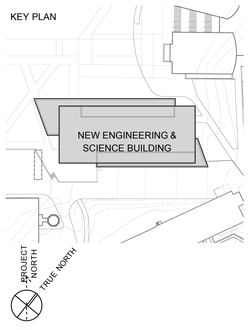
KEY PLAN



Project:

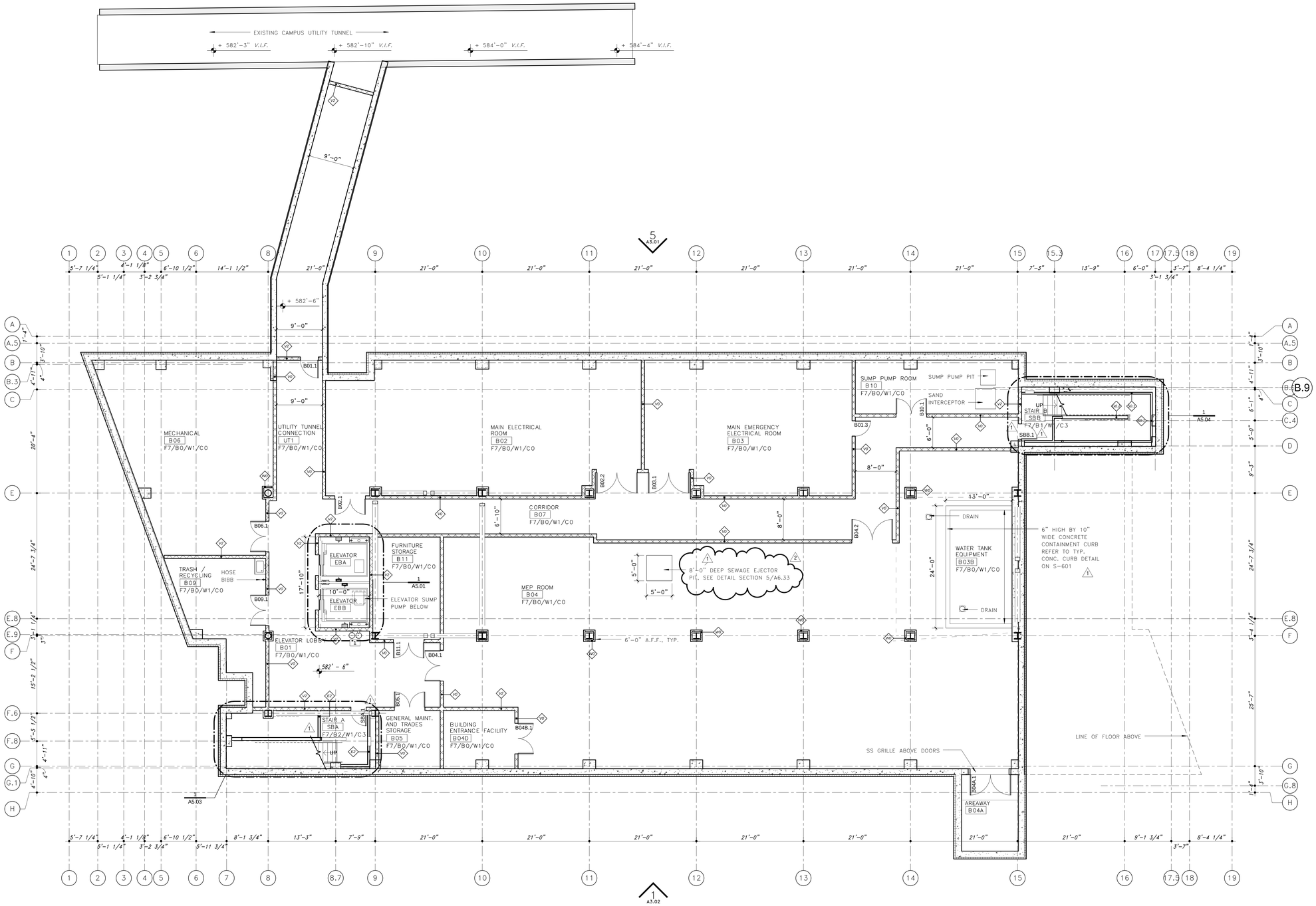
NEW ENGINEERING AND SCIENCE BUILDING

Drawing Title:

GREENROOF PLANTING PLAN

PROJECT NO: 092203	DATE: 20 FEBRUARY 2014
PHASE: BID DOCUMENTS	SCALE: AS NOTED

L5.01A



1 BASEMENT

SCALE: 1/8" = 1'-0"

INTERIOR KEYNOTES

1. DRINKING FOUNTAINS AND BOTTLE FILLER
2. CUSTOM STAINLESS STEEL CORNER GUARD
3. FLAT SCREEN DISPLAY, SEE AUDIOVISUAL DWGS
4. FOR THESE DOORS AND WALL OPENINGS, REFER TO INTERIOR ELEVATIONS FOR PLACEMENT, COORD. WITH TILE COURSING NOTES & DETAILS; FOR PLACEMENT OF ALL THE OTHER INTERIOR DOORS & FRAMES, REFER TO TYPICAL DETAILS ON A7.51.

INTERIOR FINISH SCHEDULE

FLOOR		BASE		WALL		CEILING	
F1	VCT	B0	NO BASE	W1	PAINT	C0	NO FINISH
F2	TERRAZZO	B1	RUBBER	W2	WOOD VENEER PANEL	C1	ACOUSTIC PANEL/PLANK
F3	PORCELAIN TILE	B2	TERRAZZO	W3	EPOXY PAINT	C2	MOISTURE RESISTANT ACOUSTICAL PNL
F4	EPOXY RESIN	B3	GLASS TILE	W4	SCUFF RESISTANT PNT	C3	PAINTED GYPSUM BOARD
F5	ARCH. EPOXY RESIN	B4	RESINOUS	W5	CONCRETE TILE	C4	EPOXY PAINTED STRUCTURE
F6	EPOXY PAINT	B5	PAINT	W6	GLASS TILE	C5	EPOXY PAINTED GYPSUM BOARD
F7	SEALED CONCRETE	B6	EPOXY PAINT	W7	FRAMED GLAZED WALL	C6	PERFORATED PTD METAL PANEL
F8	CARPET	B7	CONCRETE TILE	W8	FRAMELESS GLAZED WALL	C7	ALUMINUM SLOTTED FRAMING SYSTEM
F9	EDGE GRAIN WOOD	B8	WOOD	W9	METAL PANEL	C8	PAINTED STRUCTURE
F10	WALK-OFF MAT	B9	PREFINISHED METAL	W10	PORCELAIN TILE		
F11	RUBBER	B10	PORCELAIN TILE				
F12	DECORATIVE ELASTOMERIC LIQUID FLOORING						

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1	2015-03-20	BID ADDENDUM 01
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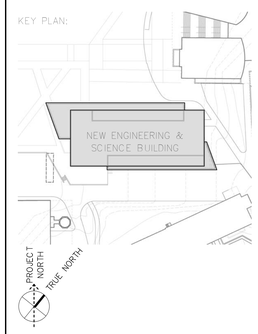


PROJECT:

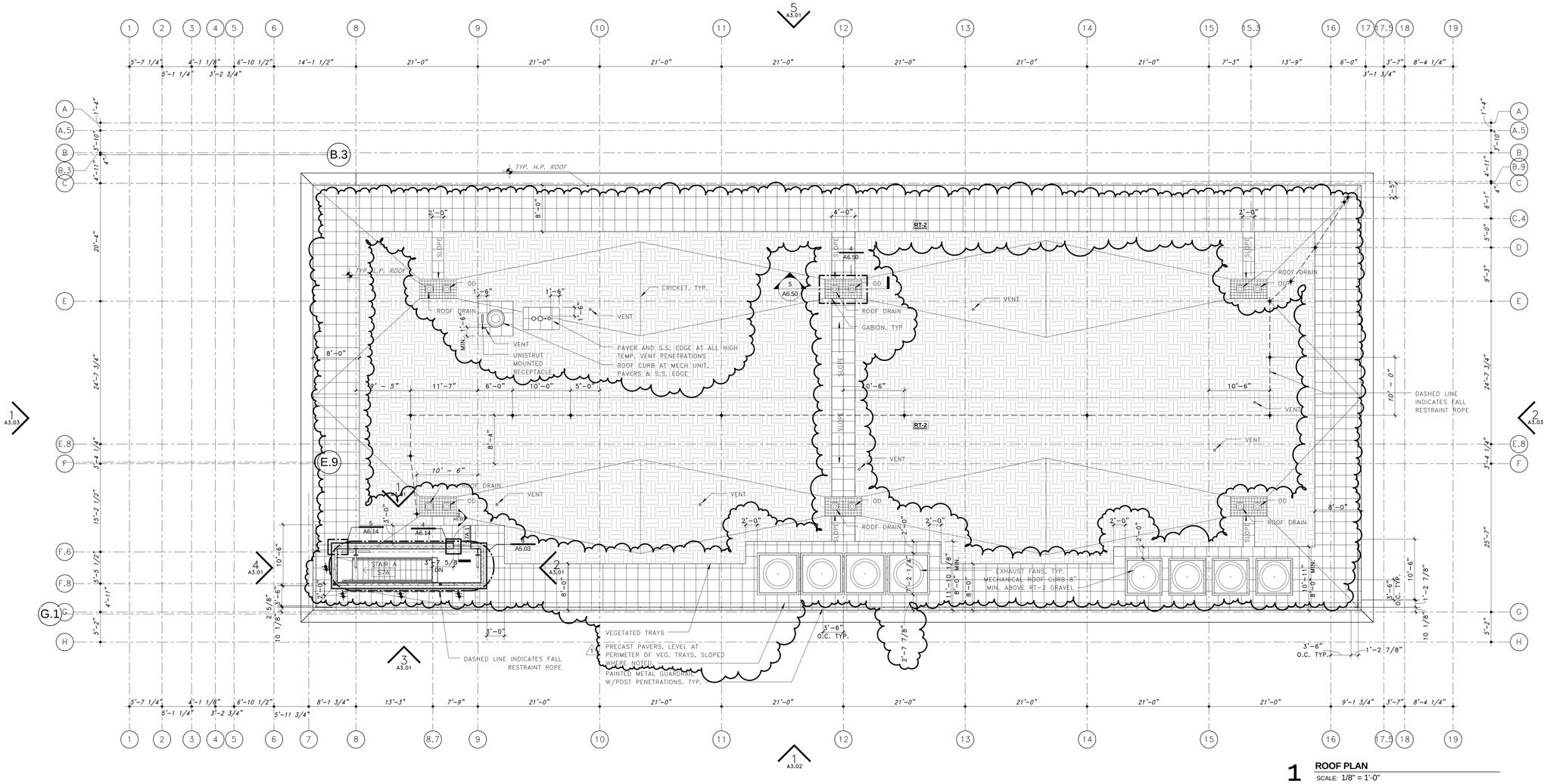
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

BASEMENT PLAN

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: As indicated

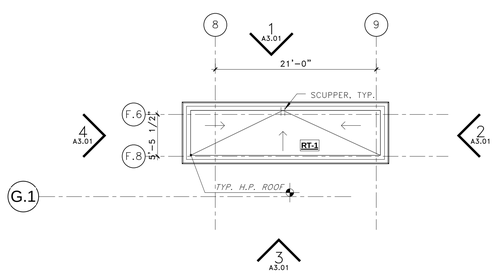
A2.00



1 ROOF PLAN

SCALE: 1/8" = 1'-0"

FACADE MAINTENANCE EQUIPMENT LEGEND
GALVANIZED STEEL U-BAR SAFETY TIEBACK ANCHOR (GROUND MOUNTED)
DOUBLE GALVANIZED STEEL U-BAR SAFETY TIEBACK ANCHOR (WALL MOUNTED)
REFERENCE FM-SERIES DRAWINGS AND SPECIFICATIONS



2 STAIR A ROOF PLAN

SCALE: 1/8" = 1'-0"

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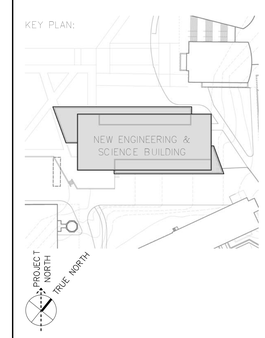


PROJECT:

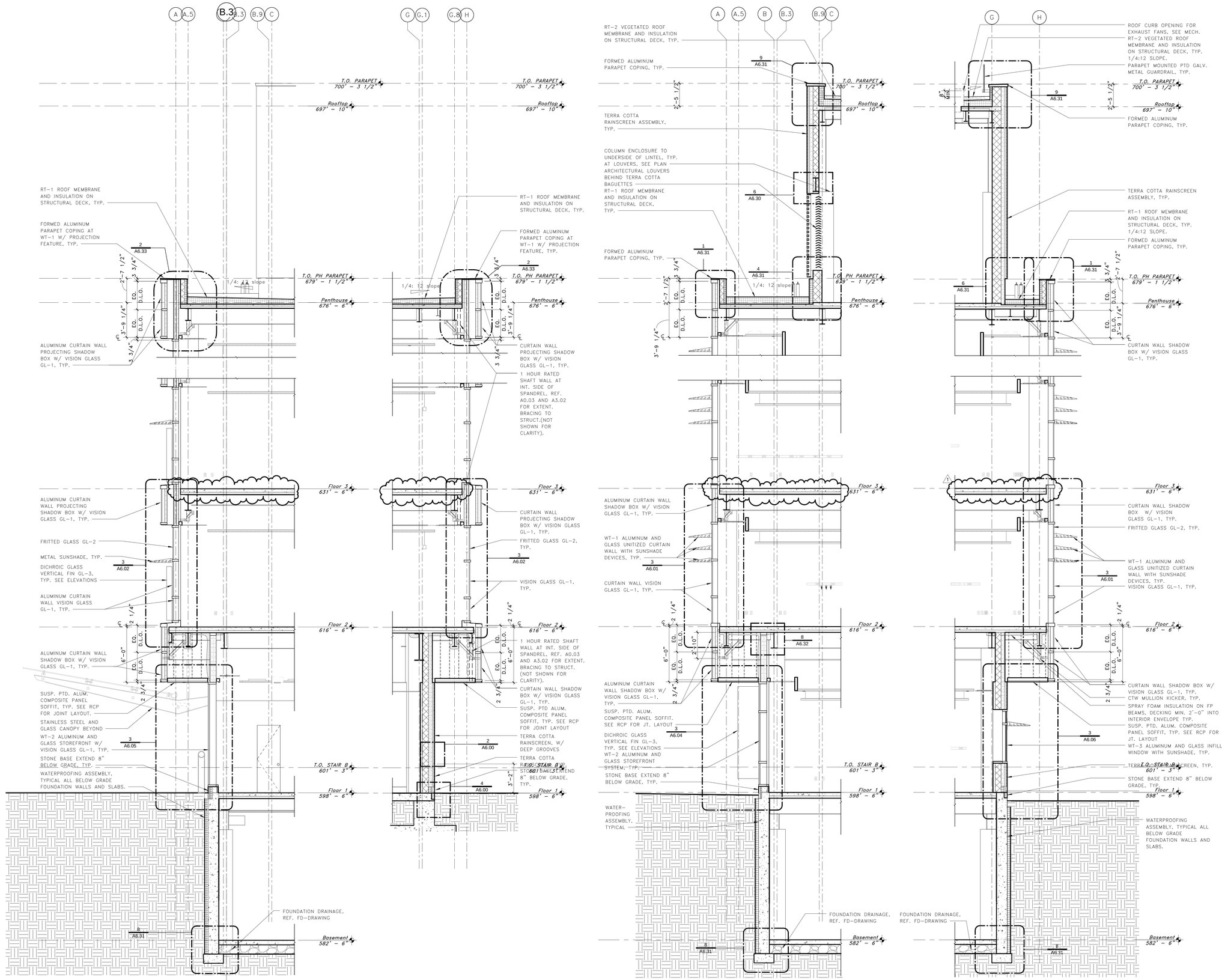
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

ROOF PLAN

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: 1/8" = 1'-0"

A2.07



4 **WALL SECTION NORTH W/ PROJECTION FEATURE**
SCALE: 1/4" = 1'-0"

3 **WALL SECTION SOUTH W/ PROJECTION FEATURE**
SCALE: 1/4" = 1'-0"

2 **WALL SECTION NORTH**
SCALE: 1/4" = 1'-0"

1 **WALL SECTION SOUTH**
SCALE: 1/4" = 1'-0"

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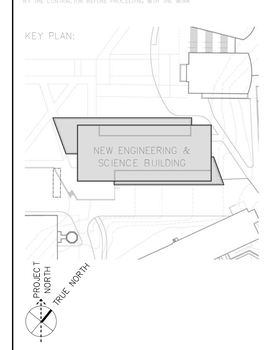


PROJECT:

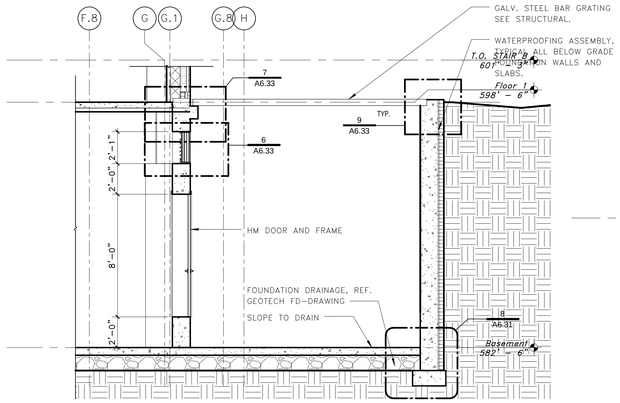
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

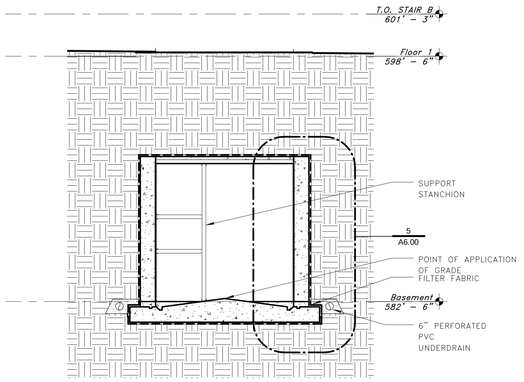
EXTERIOR WALL SECTIONS

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: 1/4" = 1'-0"

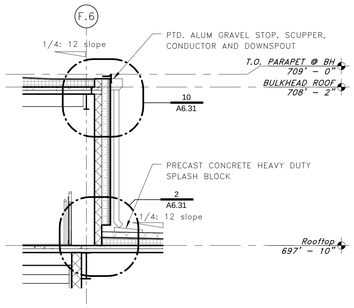
A4.01



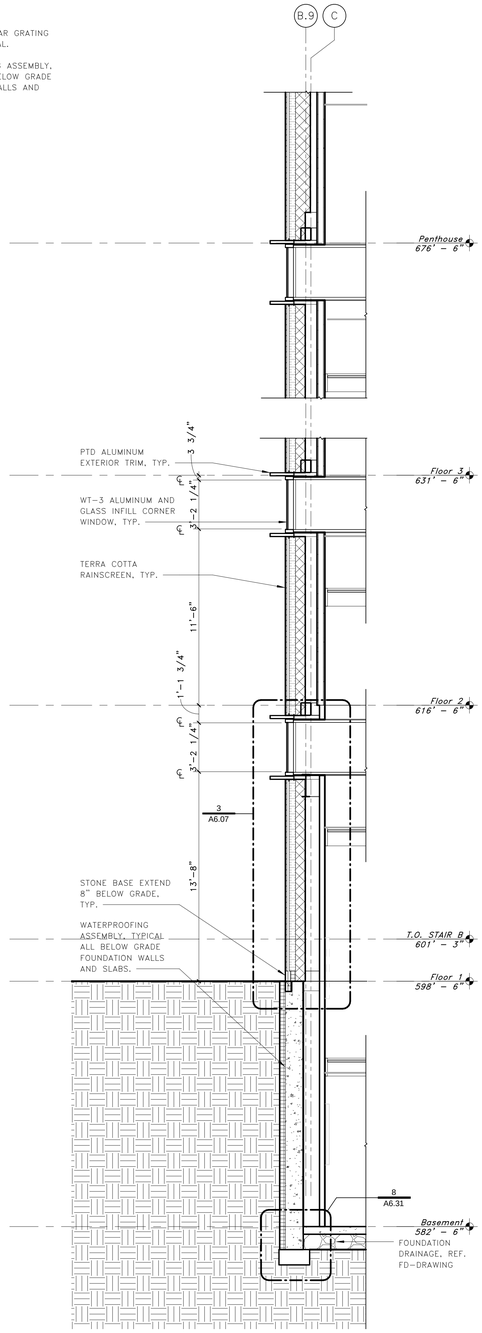
6 AREAWAY SECTION
SCALE: 1/4" = 1'-0"



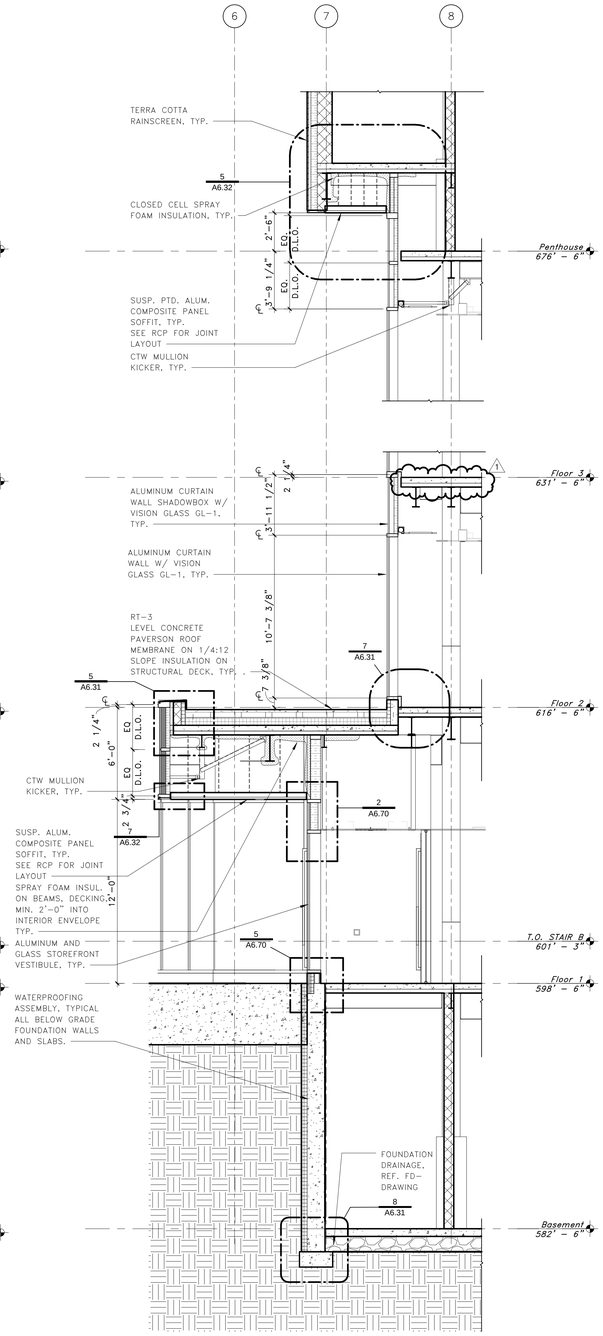
5 BASEMENT UTILITY TUNNEL SECTION
SCALE: 1/4" = 1'-0"



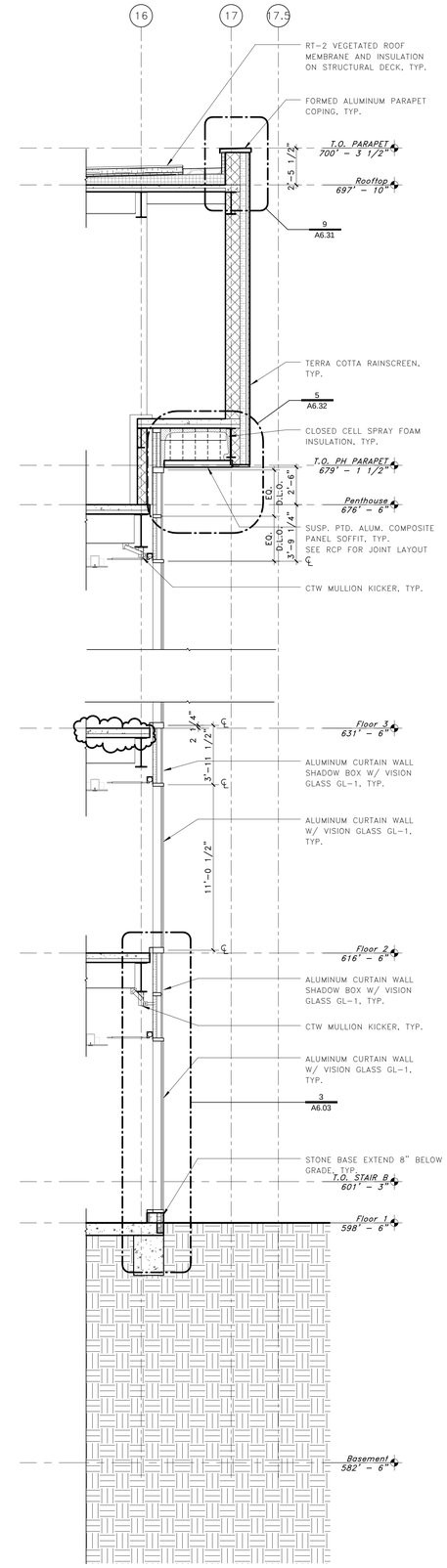
4 WALL SECTION STAIR BULKHEAD
SCALE: 1/4" = 1'-0"



3 WALL SECTION STAIR B
SCALE: 1/4" = 1'-0"



2 WEST WALL SECTION
SCALE: 1/4" = 1'-0"



1 EAST WALL SECTION
SCALE: 1/4" = 1'-0"

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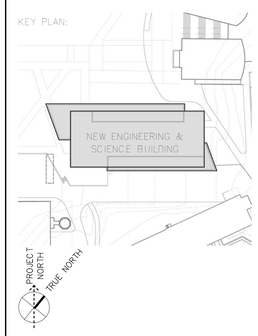
KEY PLAN:



PROJECT:

NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

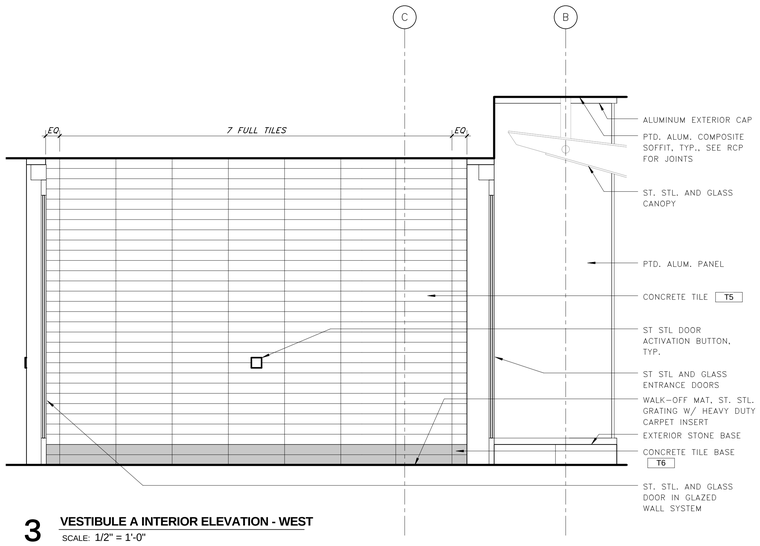
EXTERIOR WALL SECTIONS

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: 1/4" = 1'-0"

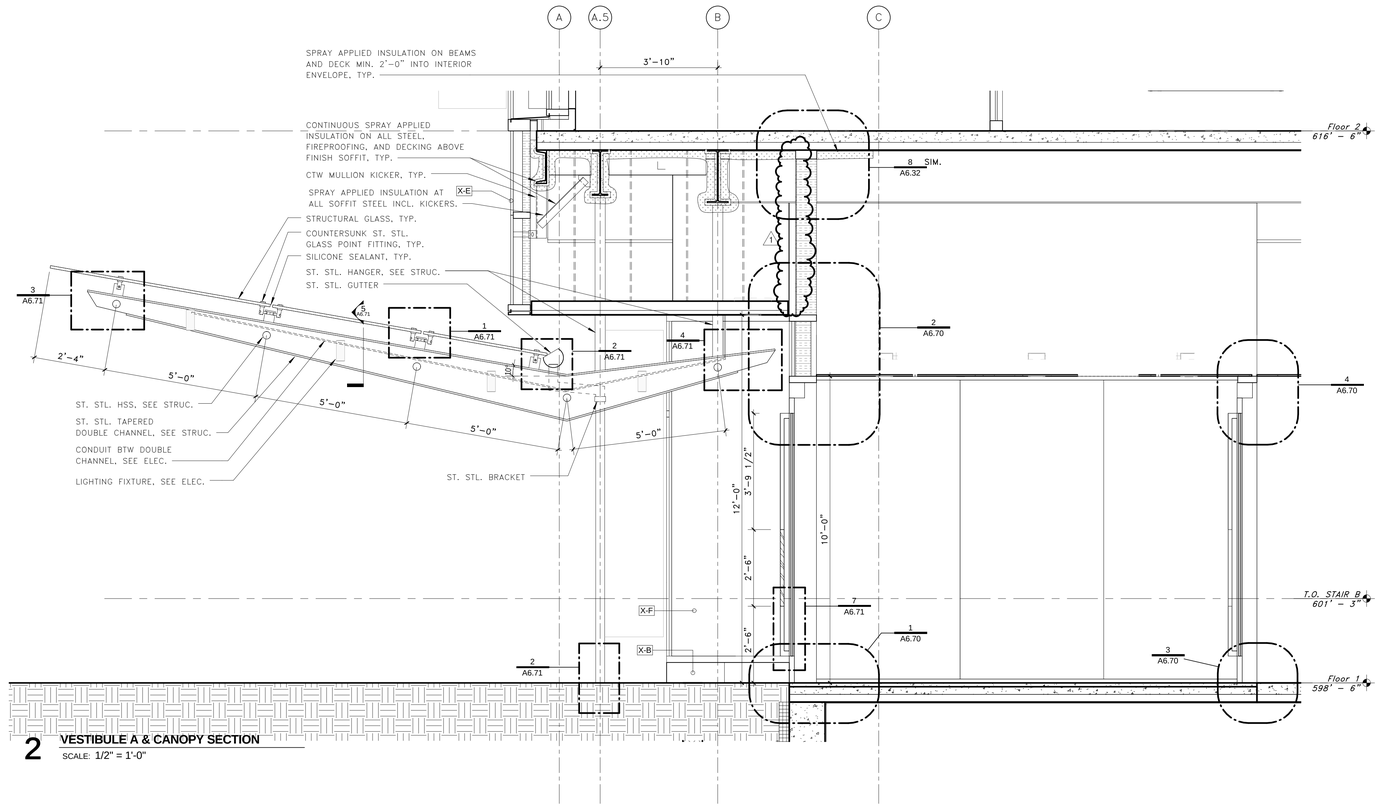
A4.02

EXTERIOR MATERIAL LEGEND

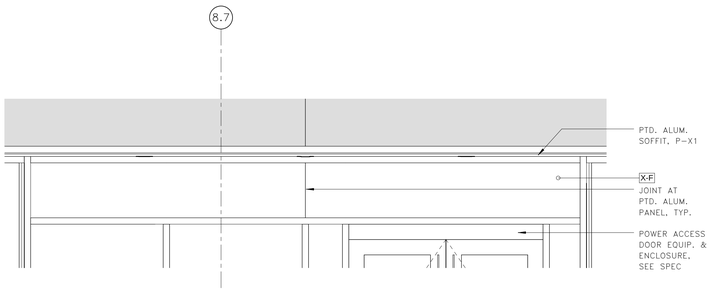
TAG	MATERIAL
X–A	TERRA COTTA RAINSCREEN – PANEL A TYPICAL (SEE 13/A6.00 FOR DIMS.)
X–B	STONE CLADDING
X–C	VISION GLASS [GL–1]
X–D	FRITTED GLASS [GL–2] (SEE SPECIFICATIONS FOR PATTERN)
X–E	SPANDREL GLASS [GL–1] W/ SHADOWBOX [P–X2]
X–F	PAINTED ALUMINUM [P–X1]
X–G	DICHROIC GLASS FINS [GL–3]
X–H	METAL SUNSHADE [P–X1]
X–K	STAINLESS STEEL
X–L	TERRA COTTA RAINSCREEN – PANEL B DEEP GROOVES (SEE 13/A6.00 FOR DIMS.)
X–M	TERRA COTTA RAINSCREEN LOUVER – BAGUETTES WITH ALUM. LOUVERS (SEE 13/A6.00 FOR DIMS.)
X–N	CORRUGATED METAL RAINSCREEN [P–X5]



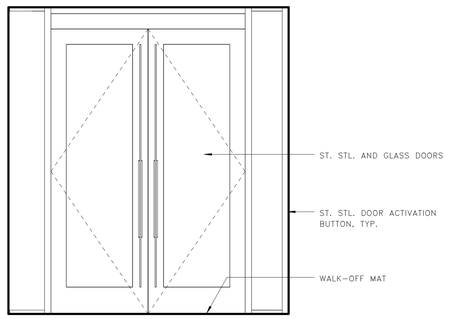
3 VESTIBULE A INTERIOR ELEVATION - WEST
SCALE: 1/2" = 1'-0"



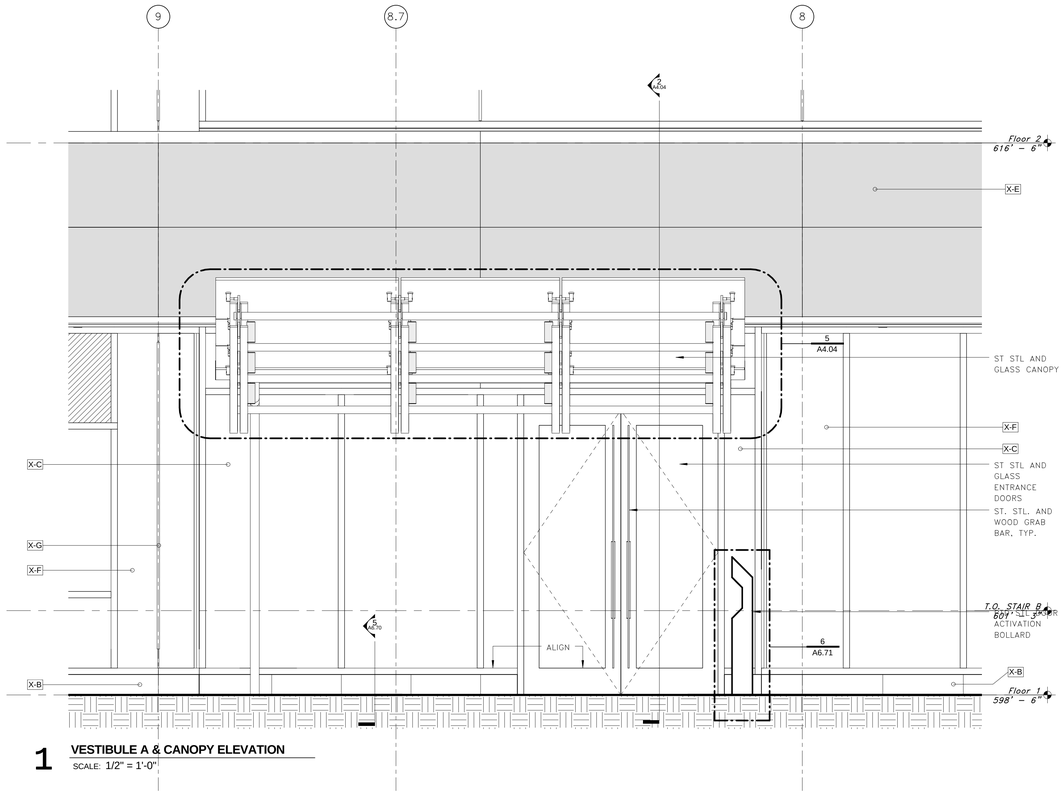
2 VESTIBULE A & CANOPY SECTION
SCALE: 1/2" = 1'-0"



5 VESTIBULE A PARTIAL ELEVATION (BEHIND CANOPY)
SCALE: 1/2" = 1'-0"



4 VESTIBULE A INTERIOR ELEVATION - SOUTH
SCALE: 1/2" = 1'-0"



1 VESTIBULE A & CANOPY ELEVATION
SCALE: 1/2" = 1'-0"

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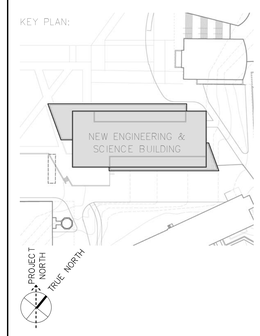
KEY PLAN:



PROJECT:

NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

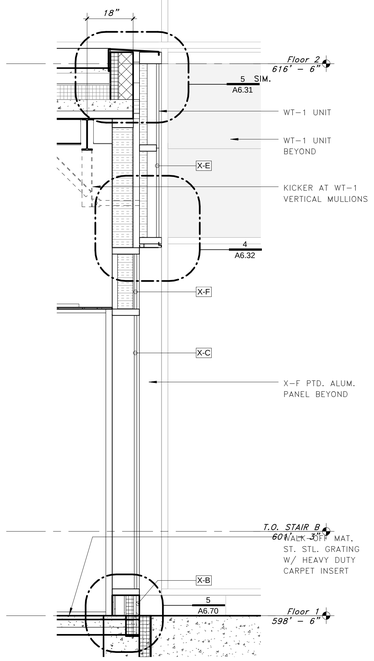
VESTIBULE A & CANOPY

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: As indicated

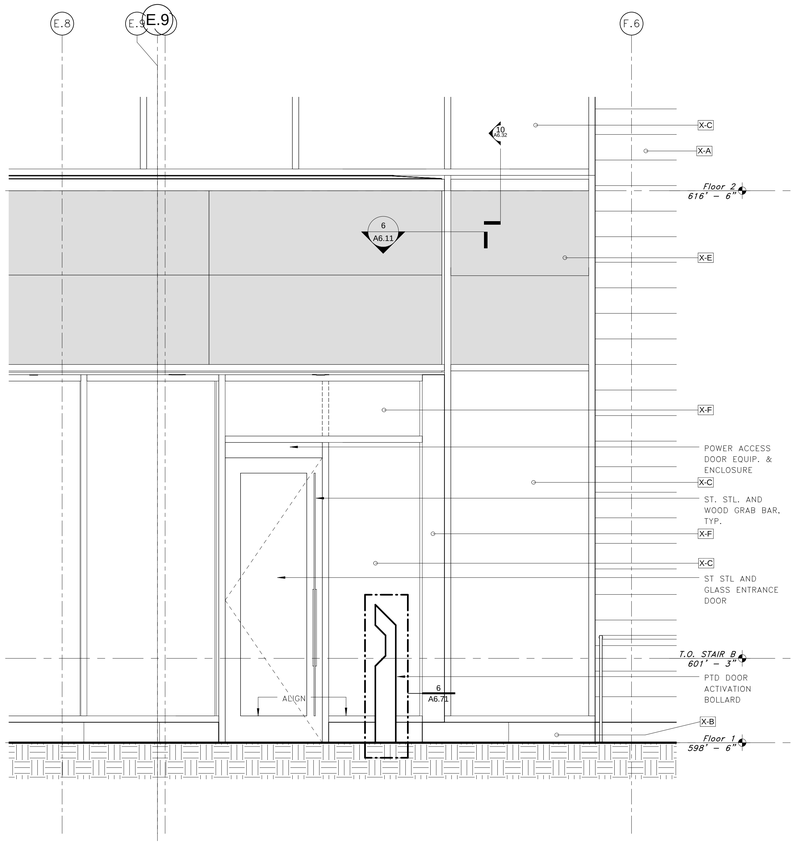
A4.04

EXTERIOR MATERIAL LEGEND

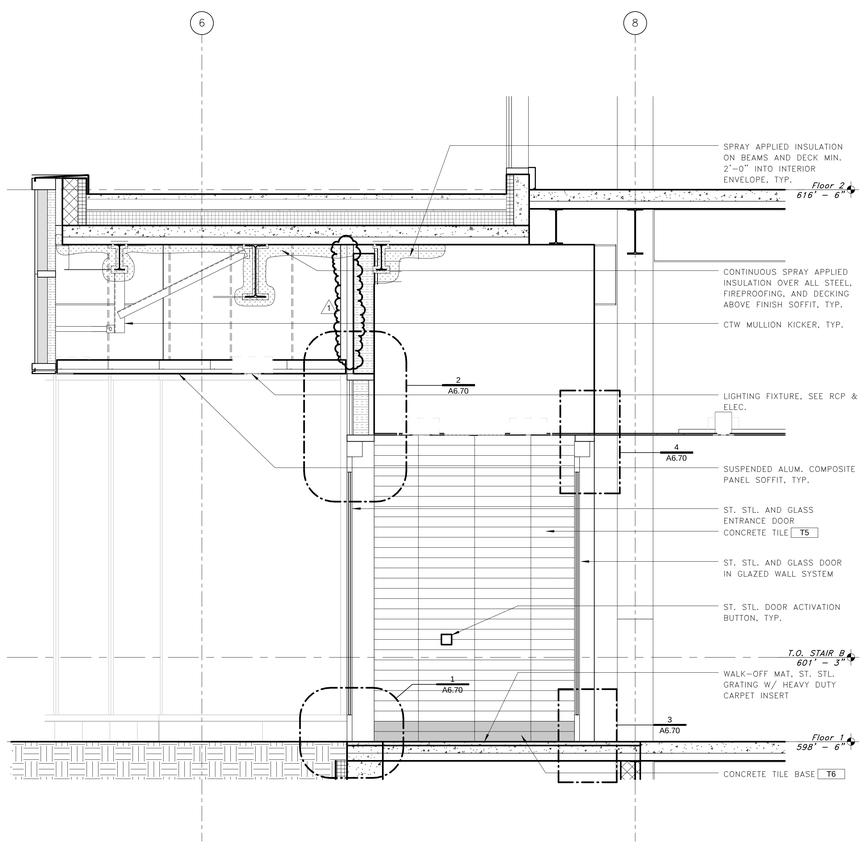
TAG	MATERIAL
X-A	TERRA COTTA RAINSCREEN – PANEL A TYPICAL (SEE 13/A6.00 FOR DIMS.)
X-B	STONE CLADDING
X-C	VISION GLASS [GL-1]
X-D	FRITTED GLASS [GL-2] (SEE SPECIFICATIONS FOR PATTERN)
X-E	SPANDREL GLASS [GL-1] W/ SHADOWBOX [P-X2]
X-F	PAINTED ALUMINUM [P-X1]
X-G	DICHROIC GLASS FINS [GL-3]
X-H	METAL SUNSHADE [P-X1]
X-K	STAINLESS STEEL
X-L	TERRA COTTA RAINSCREEN – PANEL B DEEP GROOVES (SEE 13/A6.00 FOR DIMS.)
X-M	TERRA COTTA RAINSCREEN LOUVER – BAGUETTES WITH ALUM. LOUVERS (SEE 13/A6.00 FOR DIMS.)
X-N	CORRUGATED METAL RAINSCREEN [P-X5]



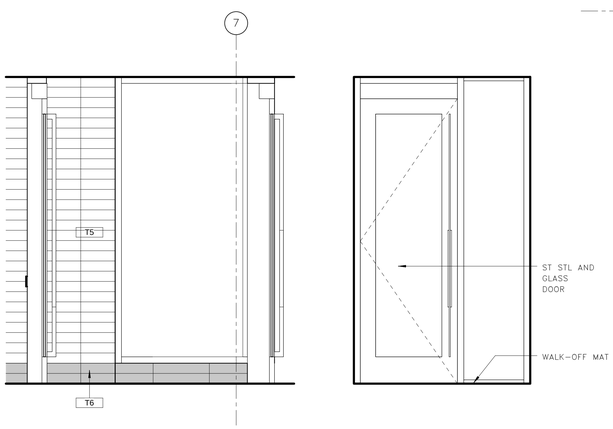
5 VESTIBULE B SECTION 2
SCALE: 1/2" = 1'-0"



4 VESTIBULE B ELEVATION
SCALE: 1/2" = 1'-0"

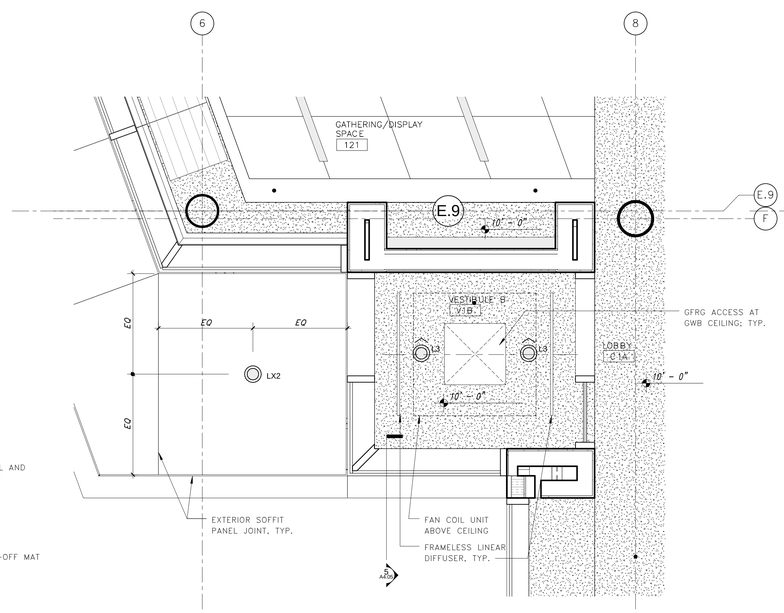


3 VESTIBULE B SECTION
SCALE: 1/2" = 1'-0"

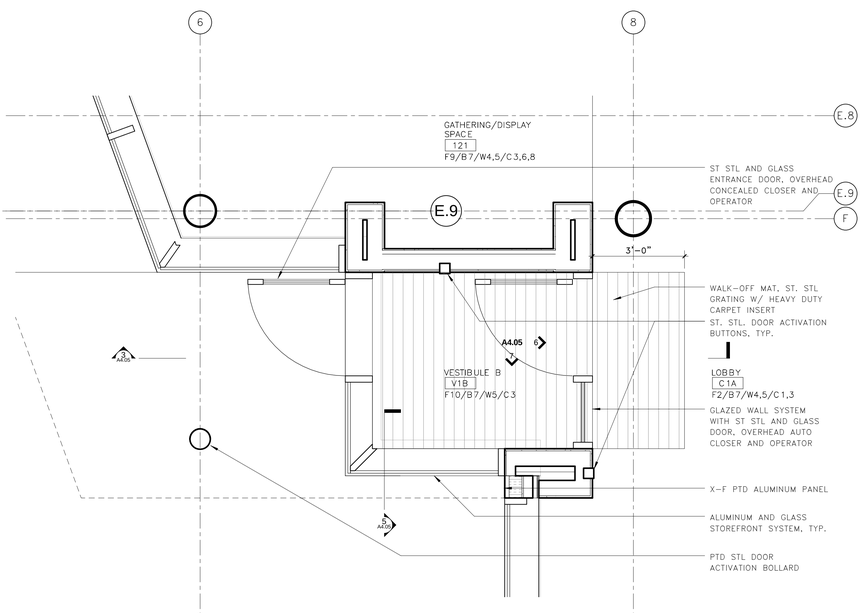


7 VESTIBULE B INTERIOR ELEVATION - SOUTH
SCALE: 1/2" = 1'-0"

6 VESTIBULE B INTERIOR ELEVATION - EAST
SCALE: 1/2" = 1'-0"



2 VESTIBULE B RCP
SCALE: 1/2" = 1'-0"



1 VESTIBULE B DETAIL PLAN
SCALE: 1/2" = 1'-0"

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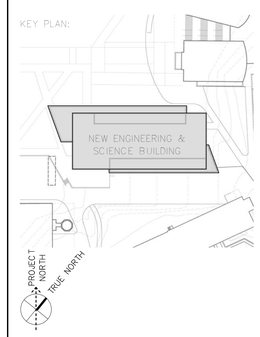
KEY PLAN:



PROJECT:
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:
VESTIBULE B

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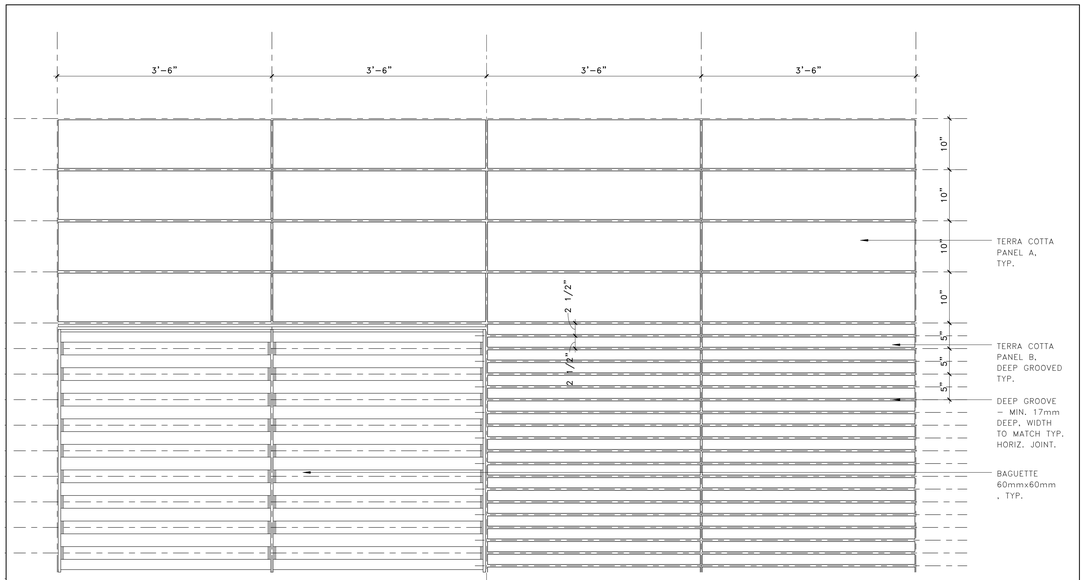
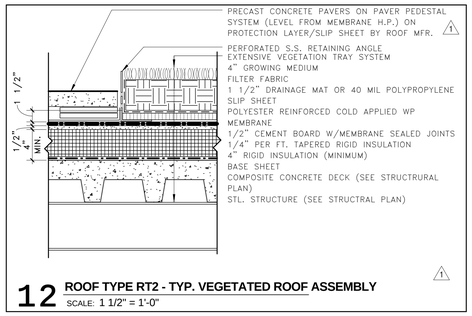
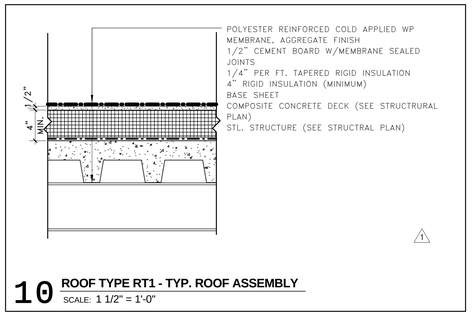
A4.05



13 TERRA COTTA PANEL DETAIL
SCALE: 1" = 1'-0"



12 ROOF TYPE RT2 - TYP. VEGETATED ROOF ASSEMBLY
SCALE: 1 1/2" = 1'-0"



10 ROOF TYPE RT1 - TYP. ROOF ASSEMBLY
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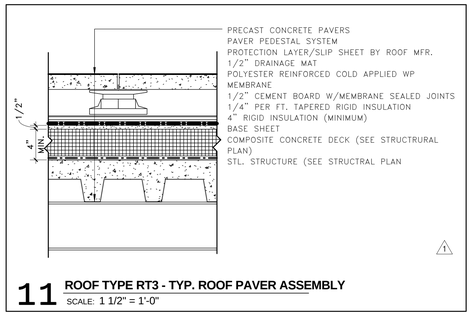
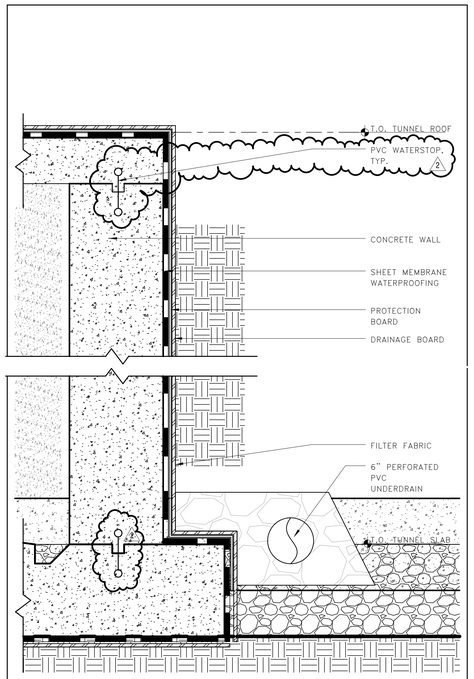
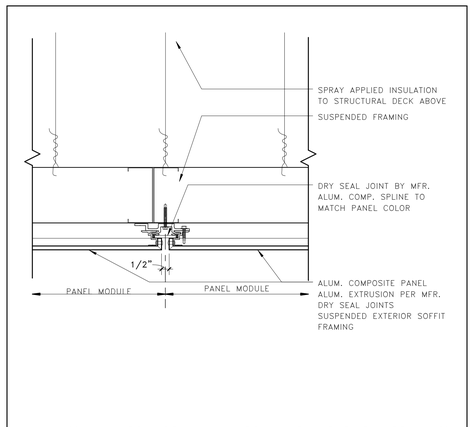


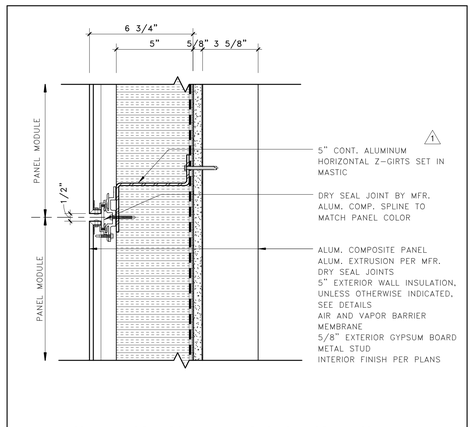
11 ROOF TYPE RT3 - TYP. ROOF PAVER ASSEMBLY
SCALE: 1 1/2" = 1'-0"



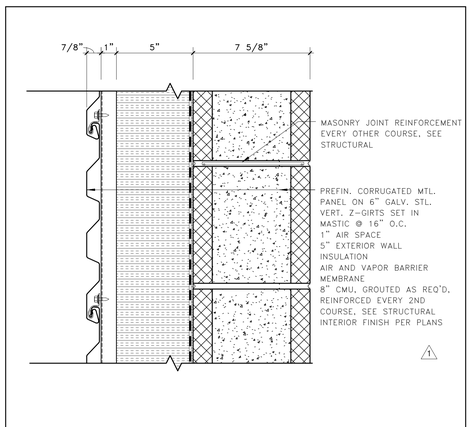
5 UTILITY TUNNEL DRAINAGE ASSEMBLY
SCALE: 1 1/2" = 1'-0"



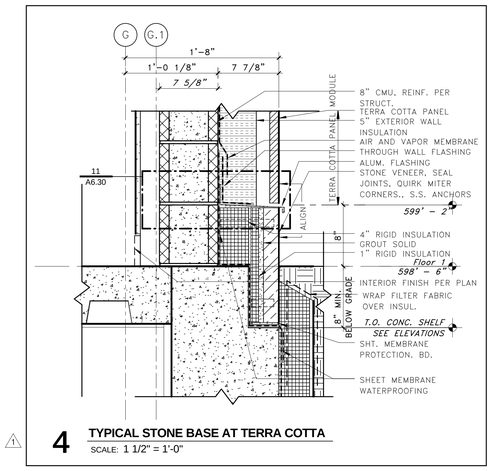
8 TYP ALUM COMPOSITE PANEL SOFFIT JOINT SECTION ASSEMBLY
SCALE: 3" = 1'-0"



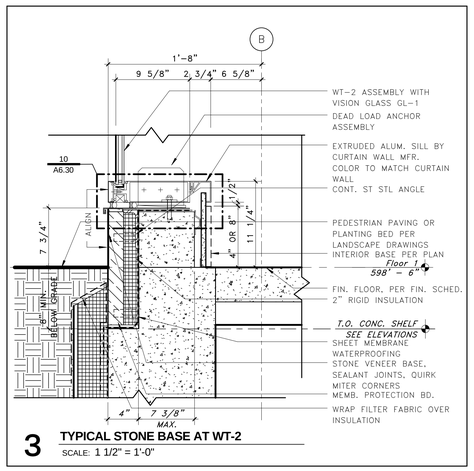
7 TYP ALUM COMPOSITE PANEL SECTION ASSEMBLY
SCALE: 3" = 1'-0"



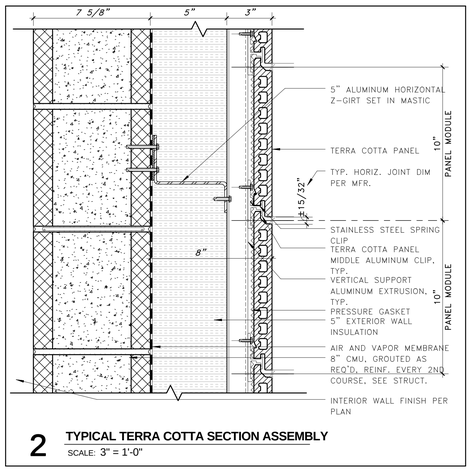
6 TYP CORRUGATED METAL SECTION ASSEMBLY
SCALE: 3" = 1'-0"



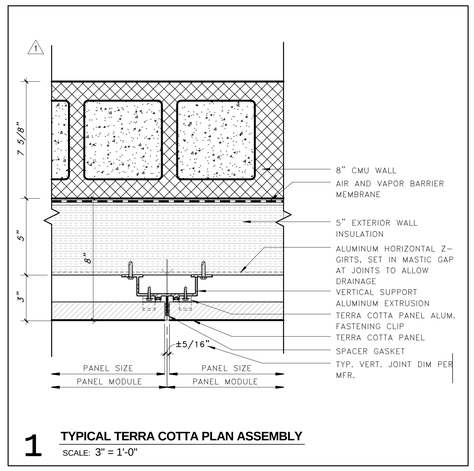
4 TYPICAL STONE BASE AT TERRA COTTA
SCALE: 1 1/2" = 1'-0"



3 TYPICAL STONE BASE AT WT-2
SCALE: 1 1/2" = 1'-0"



2 TYPICAL TERRA COTTA SECTION ASSEMBLY
SCALE: 3" = 1'-0"



1 TYPICAL TERRA COTTA PLAN ASSEMBLY
SCALE: 3" = 1'-0"

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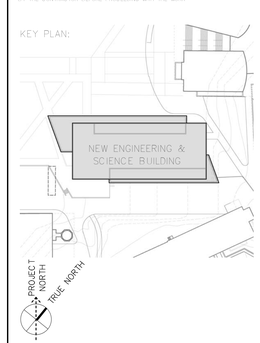


PROJECT:

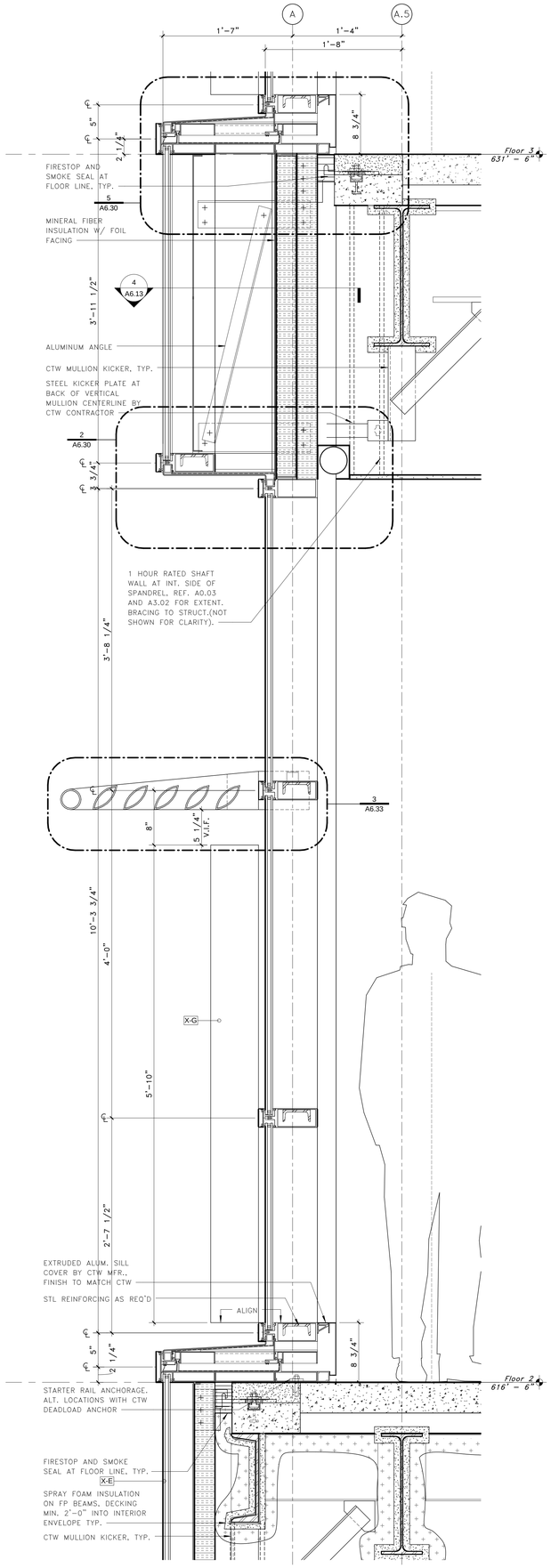
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

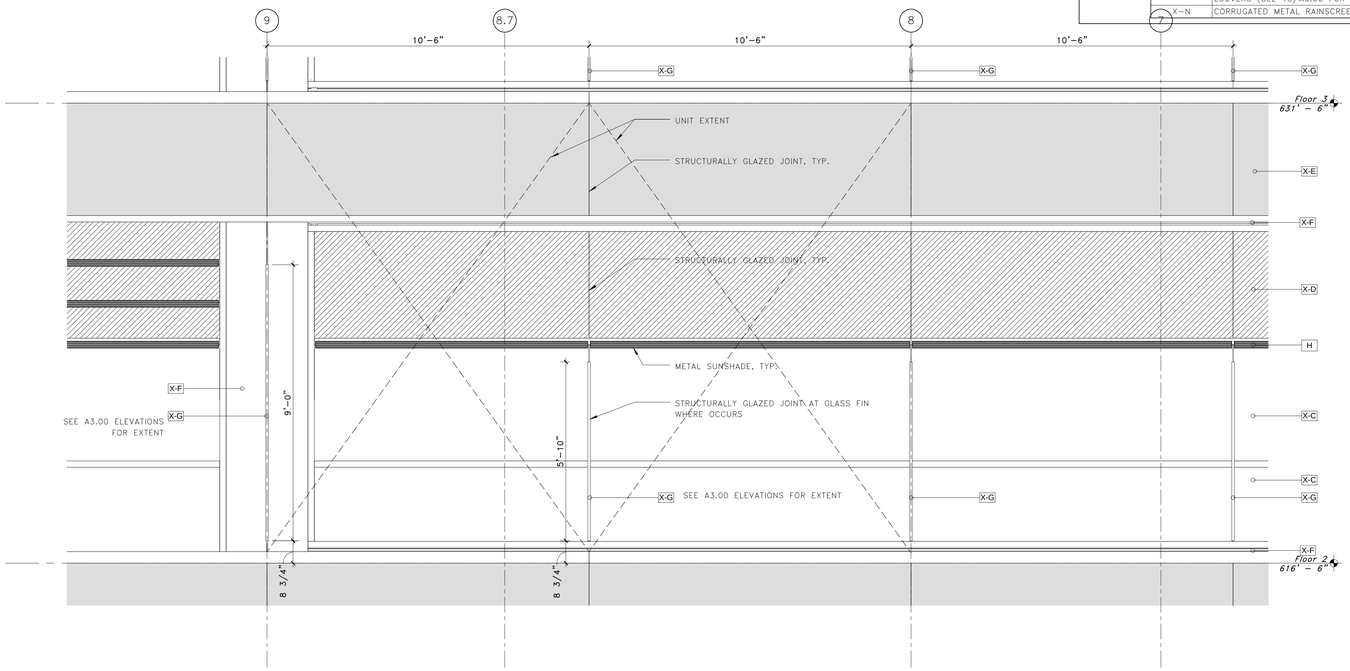
EXTERIOR ENVELOPE WALL & ROOF ASSEMBLY TYPES

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: As Indicated

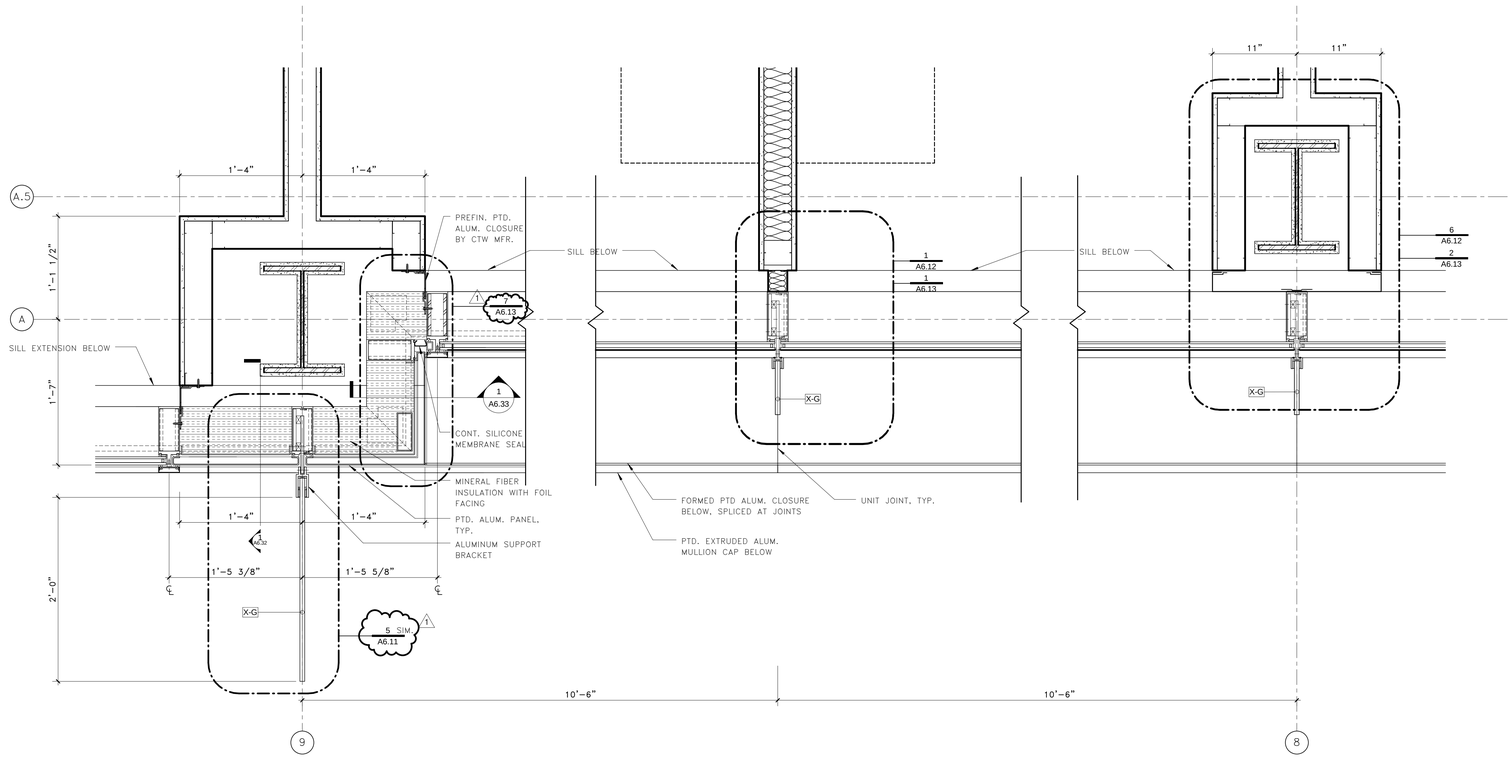
A6.00



3 DETAIL SECTION WT-1 w/ PROJECTION FEATURE
SCALE: 1 1/2" = 1'-0"



2 DETAIL ELEVATION WT-1 w/ PROJECTION FEATURE
SCALE: 1/2" = 1'-0"



1 DETAIL PLAN WT-1 w/ PROJECTION FEATURE
SCALE: 1 1/2" = 1'-0"

EXTERIOR MATERIAL LEGEND

TAG	MATERIAL
X-A	TERRA COTTA RAINSCREEN – PANEL A TYPICAL (SEE 13/A6.00 FOR DIMS.)
X-B	STONE CLADDING
X-C	VISION GLASS [GL-1]
X-D	FRITTED GLASS [GL-2] (SEE SPECIFICATIONS FOR PATTERN)
X-E	SPANDREL GLASS [GL-1] W/ SHADOWBOX [P-X2]
X-F	PAINTED ALUMINUM [P-X1]
X-G	DICHROIC GLASS FINS [GL-3]
X-H	METAL SUNSHADE [P-X1]
X-K	STAINLESS STEEL
X-L	TERRA COTTA RAINSCREEN – PANEL B DEEP GROOVES (SEE 13/A6.00 FOR DIMS.)
X-M	TERRA COTTA RAINSCREEN LOUVER – BAGUETTES WITH ALUM. LOUVERS (SEE 13/A6.00 FOR DIMS.)
X-N	CORRUGATED METAL RAINSCREEN [P-X5]

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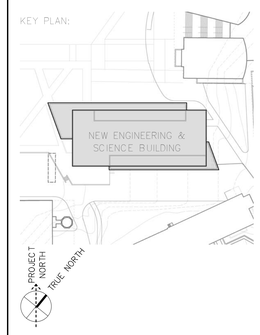
KEY PLAN:



PROJECT:
NEW ENGINEERING AND SCIENCE BUILDING

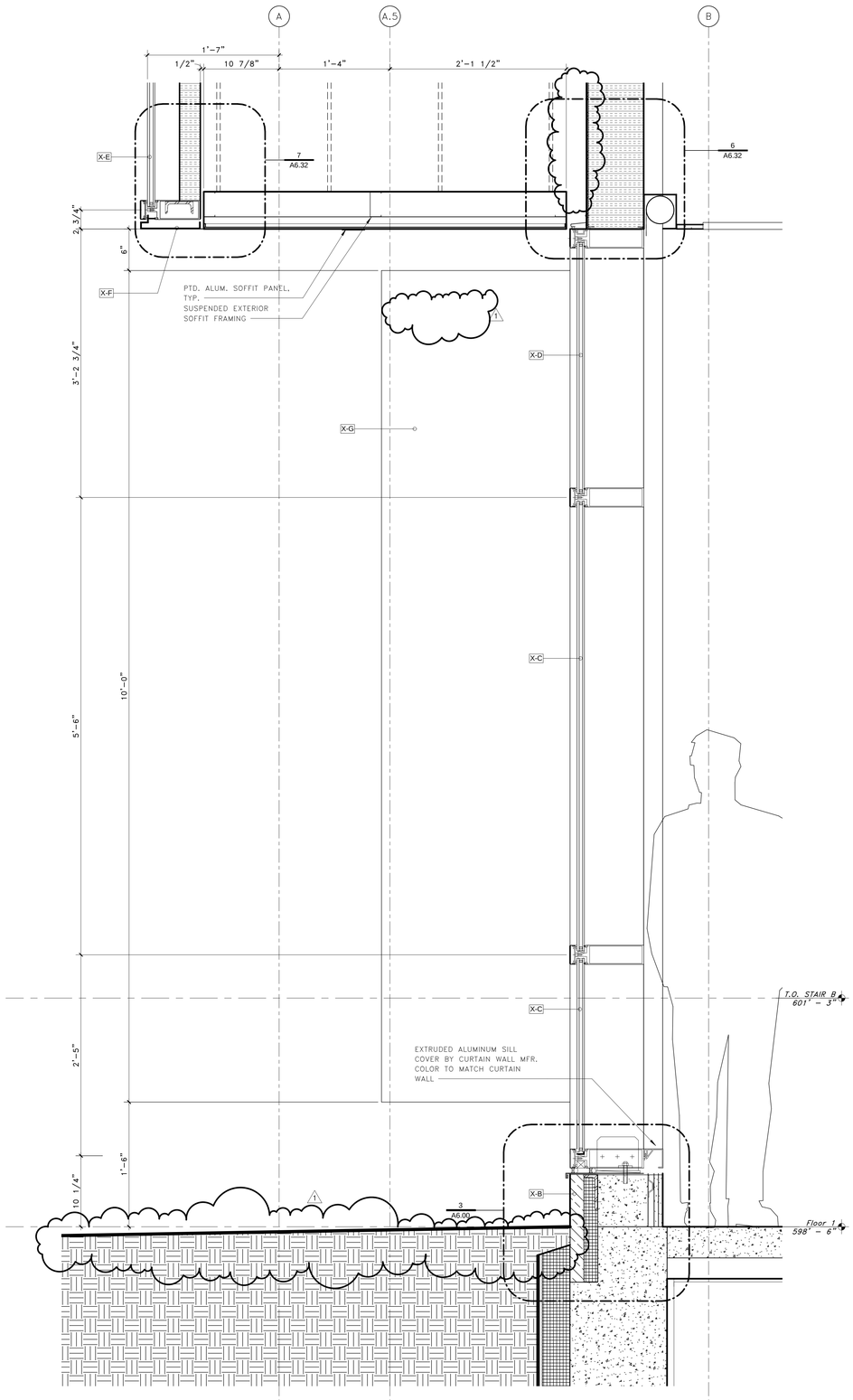
DRAWING TITLE:
EXTERIOR DETAILS

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: As indicated

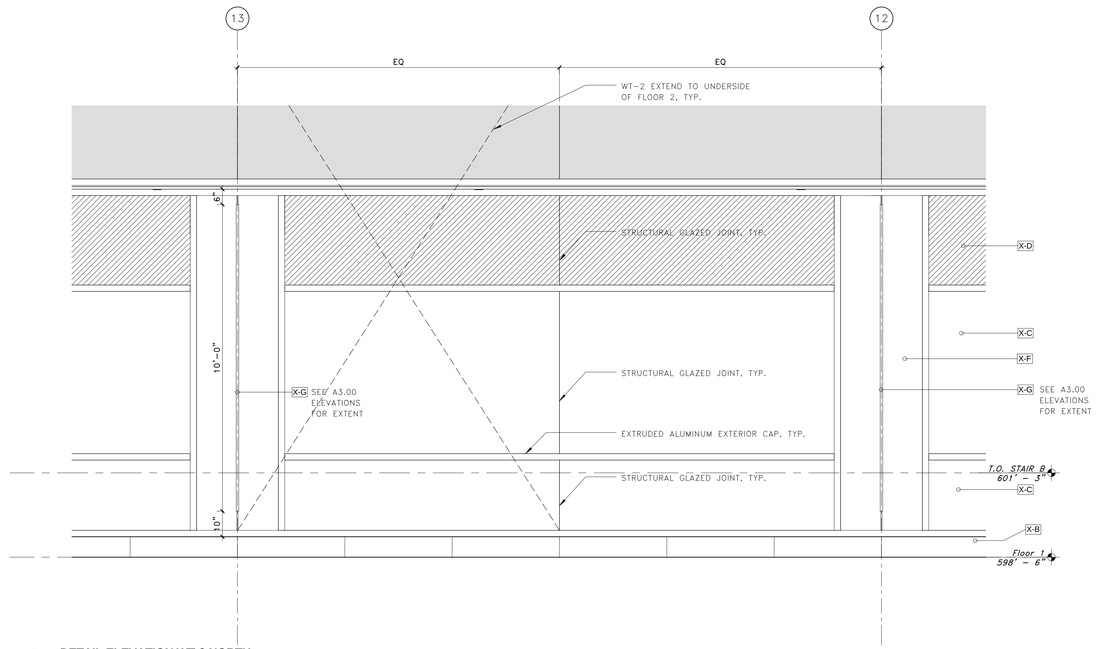
A6.02

EXTERIOR MATERIAL LEGEND

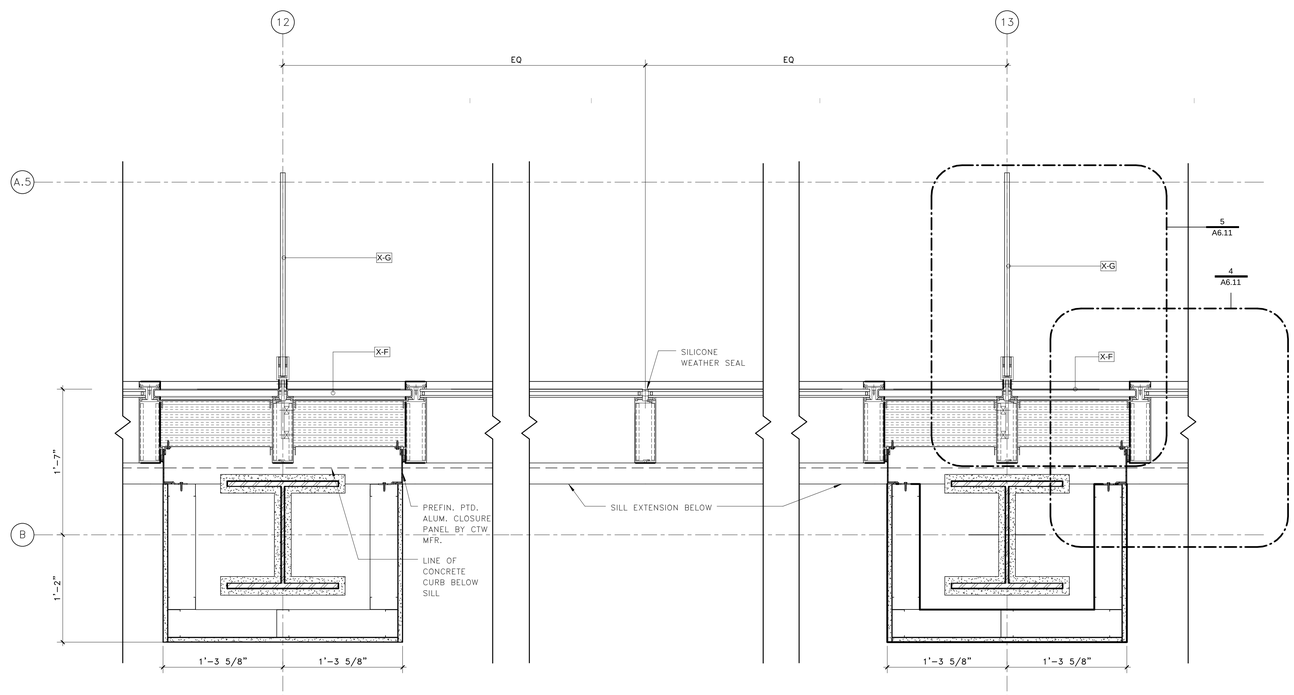
TAG	MATERIAL
X-A	TERRA COTTA RAINSCREEN – PANEL A TYPICAL (SEE 13/A6.00 FOR DIMS.)
X-B	STONE CLADDING
X-C	VISION GLASS [GL-1]
X-D	FRITTED GLASS [GL-2] (SEE SPECIFICATIONS FOR PATTERN)
X-E	SPANDREL GLASS [GL-1] W/ SHADOWBOX [P-X2]
X-F	PAINTED ALUMINUM [P-X1]
X-G	DICHROIC GLASS FINS [GL-3]
X-H	METAL SUNSHADE [P-X1]
X-K	STAINLESS STEEL
X-L	TERRA COTTA RAINSCREEN – PANEL B DEEP GROOVES (SEE 13/A6.00 FOR DIMS.)
X-M	TERRA COTTA RAINSCREEN LOUVER – BAGUETTES WITH ALUM. LOUVERS (SEE 13/A6.00 FOR DIMS.)
X-N	CORRUGATED METAL RAINSCREEN [P-X5]



3 DETAIL SECTION WT-2 NORTH
SCALE: 1 1/2" = 1'-0"



2 DETAIL ELEVATION WT-2 NORTH
SCALE: 1/2" = 1'-0"



1 DETAIL PLAN WT-2 NORTH
SCALE: 1 1/2" = 1'-0"

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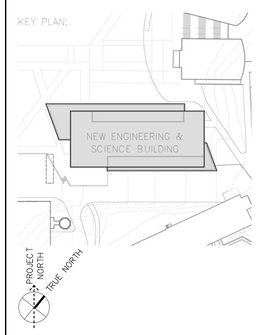


PROJECT:

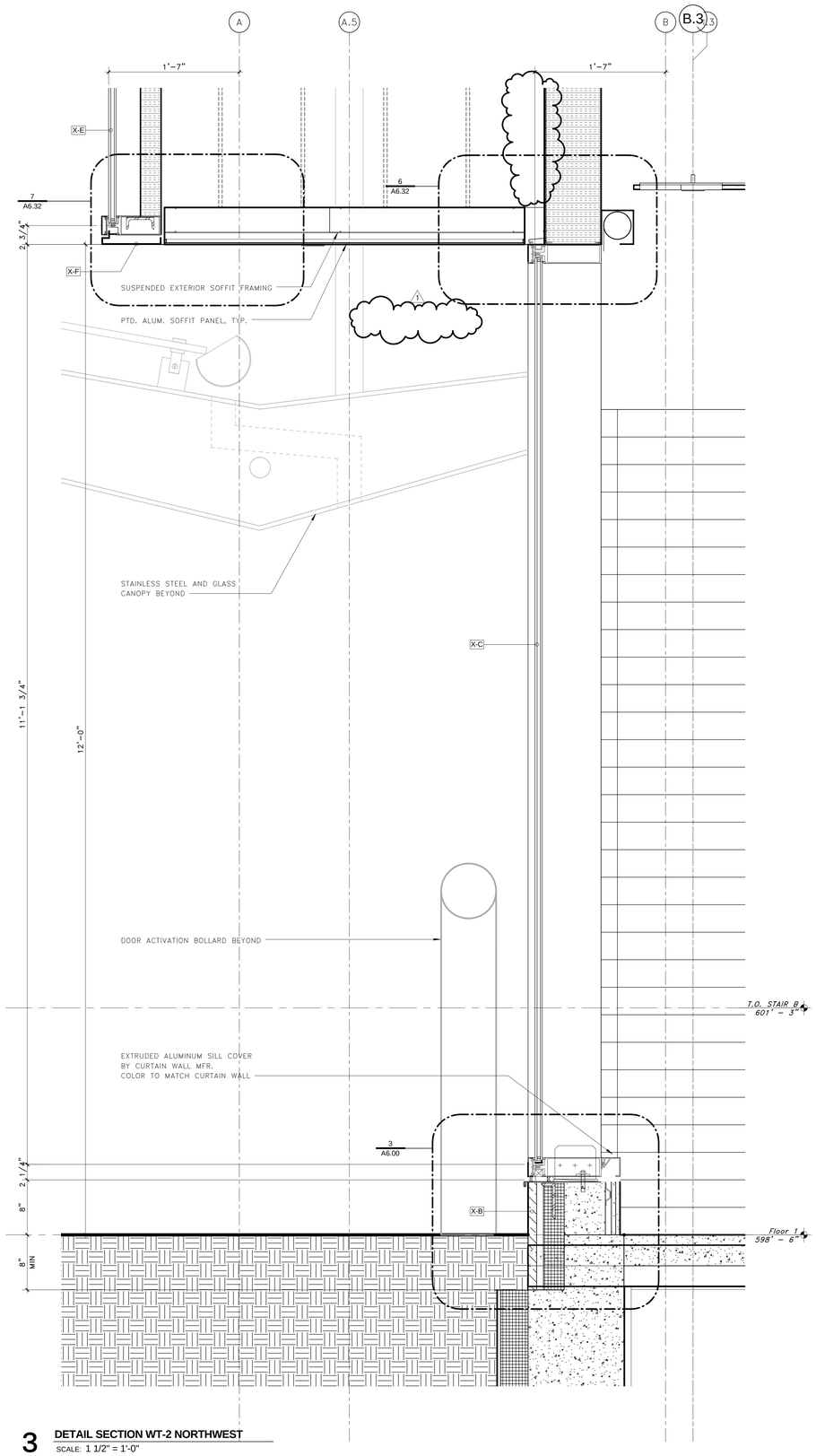
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

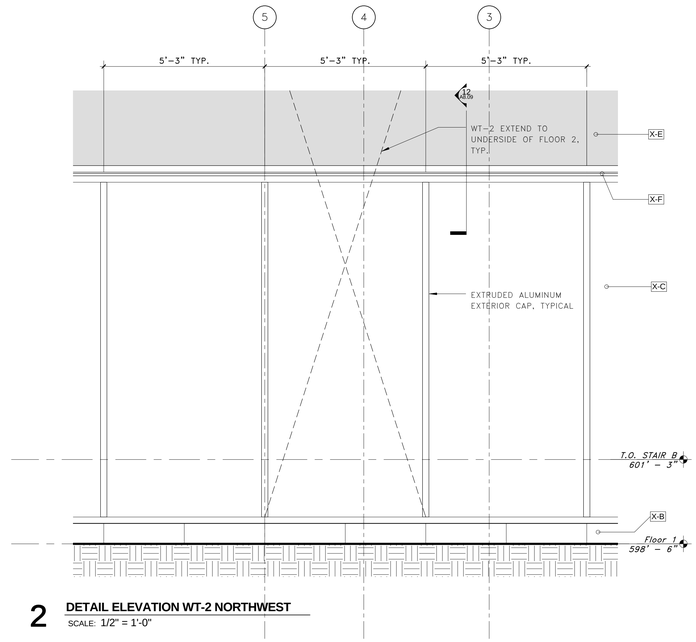
EXTERIOR DETAILS

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: As indicated

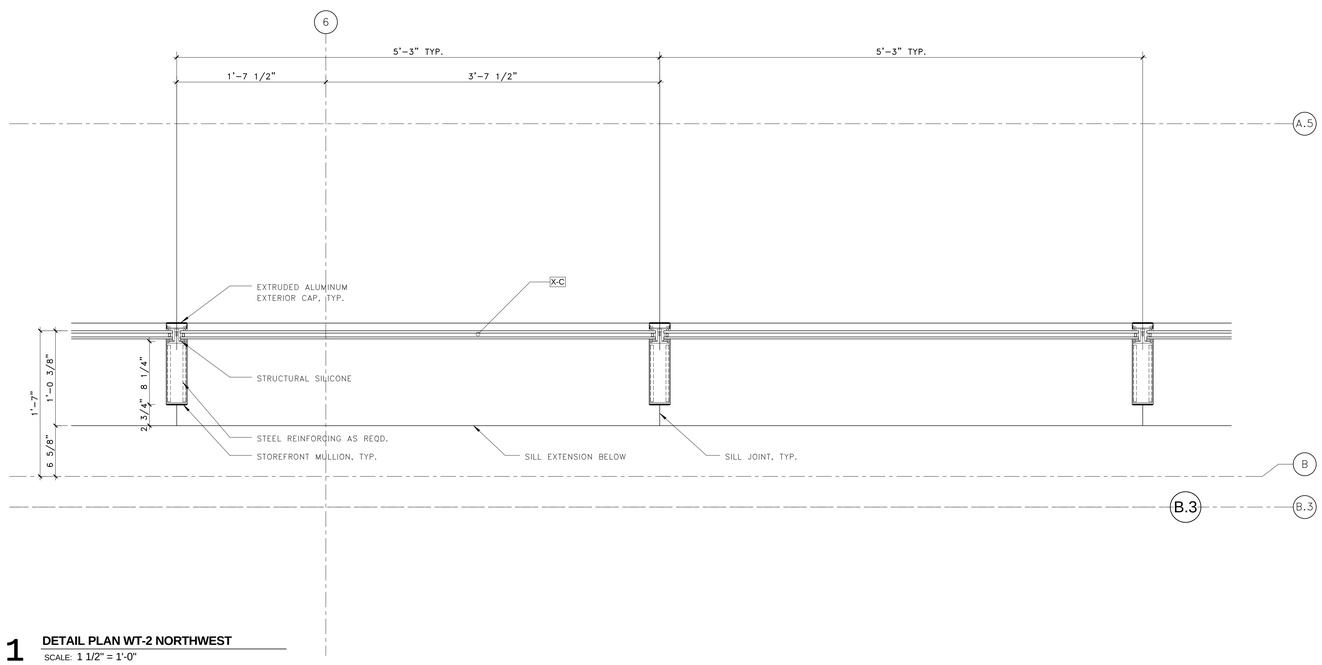
A6.04



3 DETAIL SECTION WT-2 NORTHWEST
SCALE: 1 1/2" = 1'-0"



2 DETAIL ELEVATION WT-2 NORTHWEST
SCALE: 1/2" = 1'-0"



1 DETAIL PLAN WT-2 NORTHWEST
SCALE: 1 1/2" = 1'-0"

EXTERIOR MATERIAL LEGEND

TAG	MATERIAL
X-A	TERRA COTTA RAINSCREEN – PANEL A TYPICAL (SEE 13/A6.00 FOR DIMS.)
X-B	STONE CLADDING
X-C	VISION GLASS [GL-1]
X-D	FRITTED GLASS [GL-2] (SEE SPECIFICATIONS FOR PATTERN)
X-E	SPANDREL GLASS [GL-1] W/ SHADOWBOX [P-X2]
X-F	PAINTED ALUMINUM [P-X1]
X-G	DICHROIC GLASS FINS [GL-3]
X-H	METAL SUNSHADE [P-X1]
X-K	STAINLESS STEEL
X-L	TERRA COTTA RAINSCREEN – PANEL B DEEP GROOVES (SEE 13/A6.00 FOR DIMS.)
X-M	TERRA COTTA RAINSCREEN LOUVER – BAGUETTES WITH ALUM. LOUVERS (SEE 13/A6.00 FOR DIMS.)
X-N	CORRUGATED METAL RAINSCREEN [P-X5]

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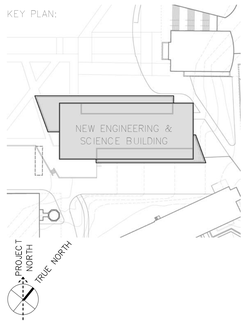

PROJECT:

NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

EXTERIOR DETAILS

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
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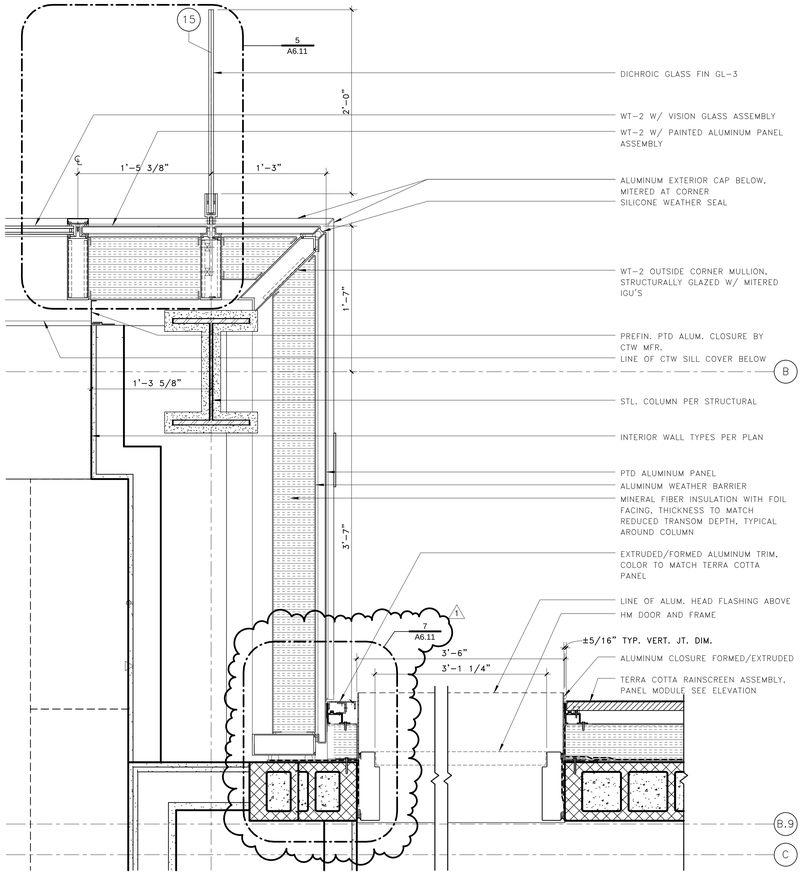
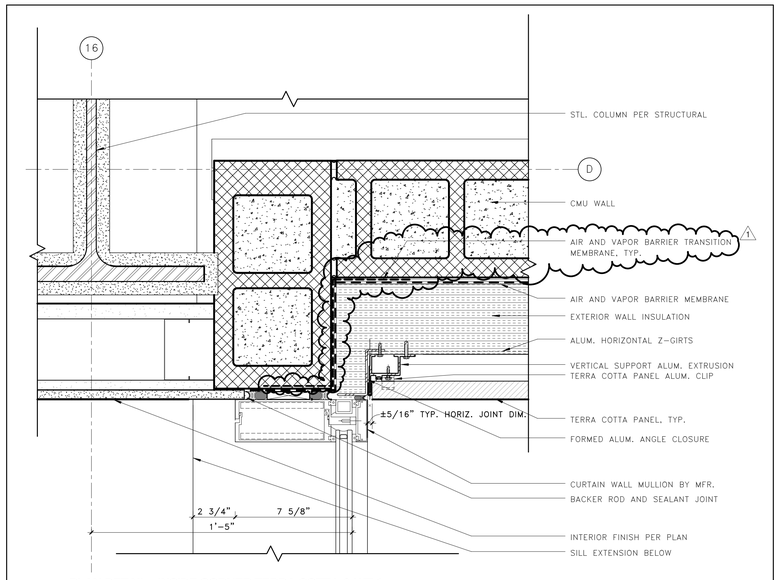
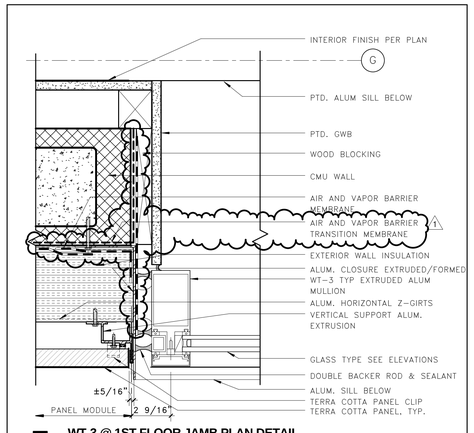
A6.05



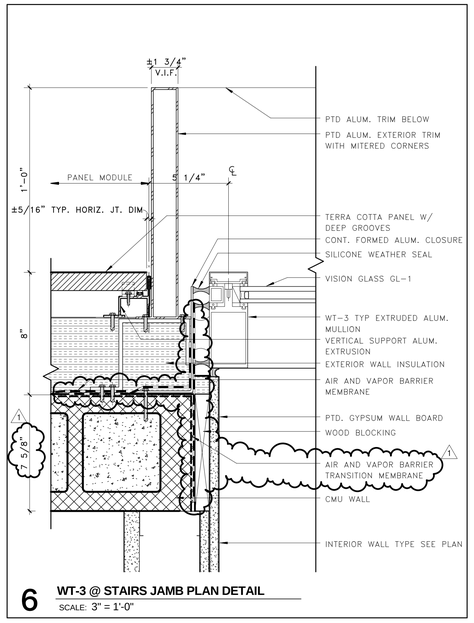
4 PLAN DETAIL - TRANSITION AT WT-2 & STAIR B
SCALE: 1 1/2" = 1'-0"



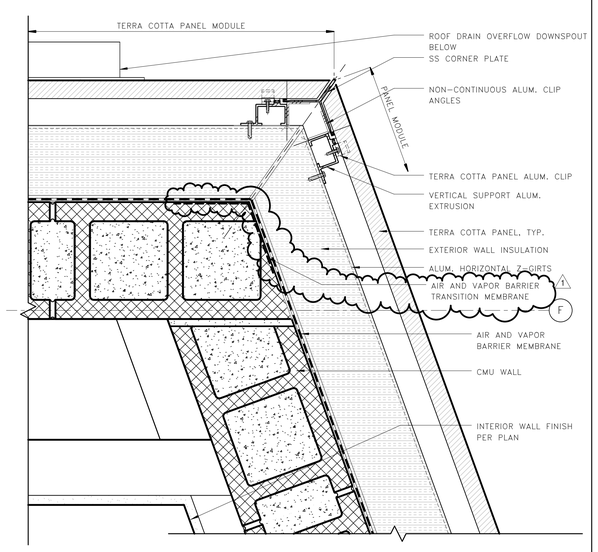
5 PLAN DETAIL - INSIDE CORNER TERRA COTTA & WT-1
SCALE: 3" = 1'-0"



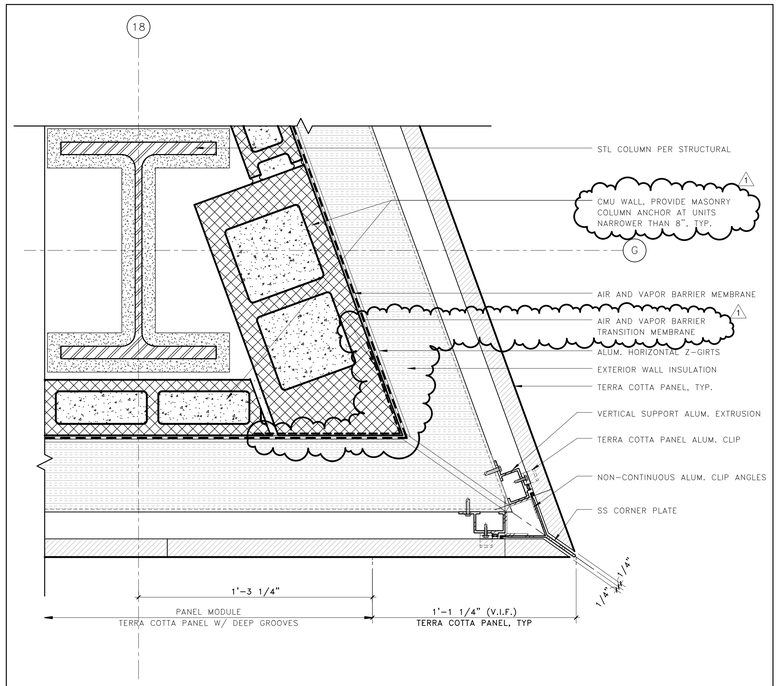
7 WT-3 @ 1ST FLOOR JAMB PLAN DETAIL
SCALE: 3" = 1'-0"



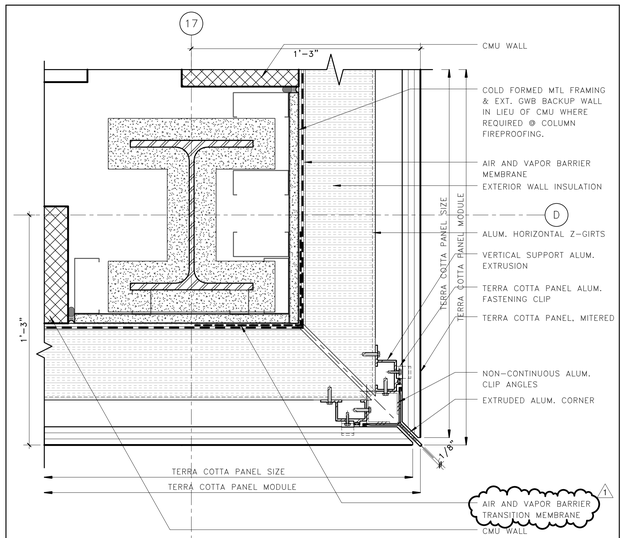
6 WT-3 @ STAIRS JAMB PLAN DETAIL
SCALE: 3" = 1'-0"



3 TERRA COTTA NORTH CORNER @ MEETING ROOM
SCALE: 3" = 1'-0"



2 TERRA COTTA SOUTH CORNER @ MEETING ROOM
SCALE: 3" = 1'-0"



1 TYP. TERRA COTTA CORNER PLAN DETAIL
SCALE: 3" = 1'-0"

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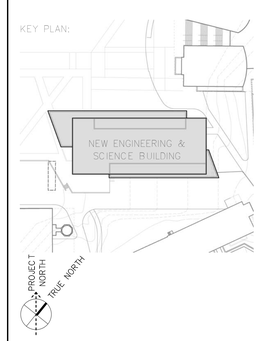

PROJECT:

NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

EXTERIOR PLAN DETAILS FIRST FLOOR

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
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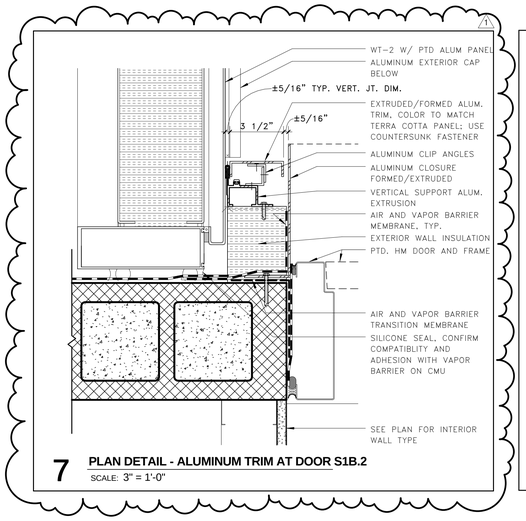
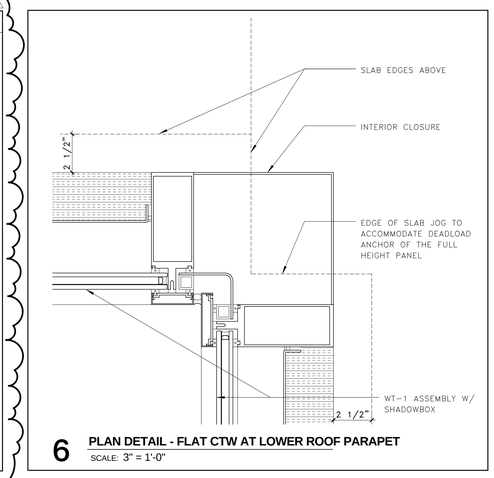
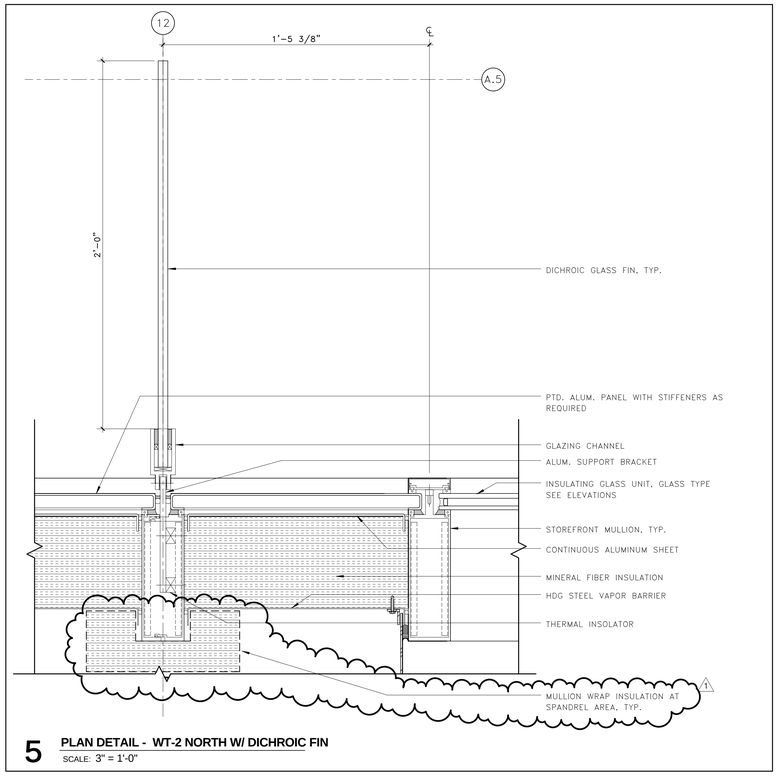
A6.10



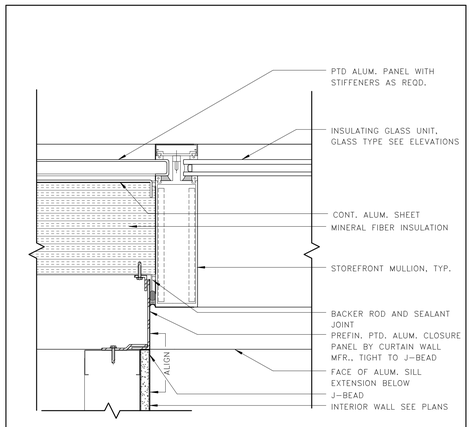
7 PLAN DETAIL - ALUMINUM TRIM AT DOOR S1B.2
SCALE: 3" = 1'-0"



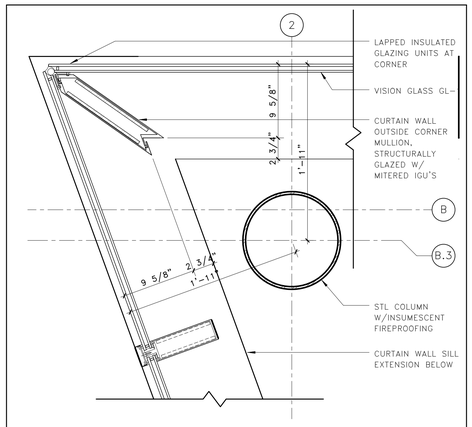
6 PLAN DETAIL - FLAT CTW AT LOWER ROOF PARAPET
SCALE: 3" = 1'-0"



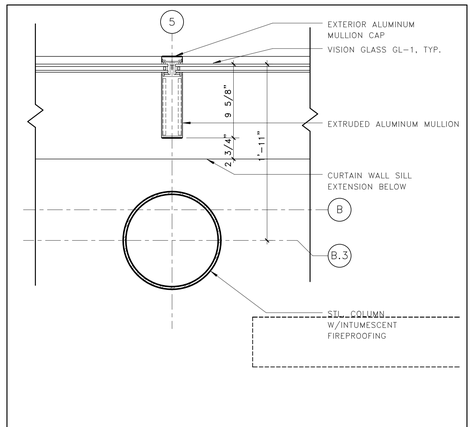
5 PLAN DETAIL - WT-2 NORTH W/ DICHROIC FIN
SCALE: 3" = 1'-0"



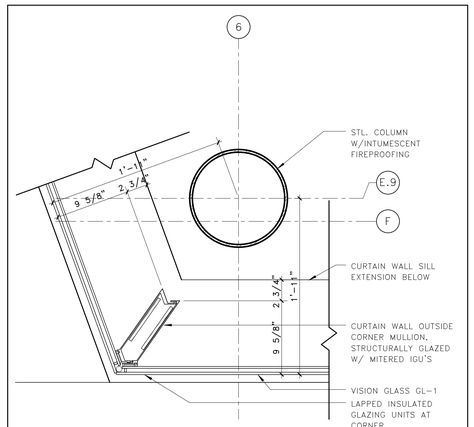
4 PLAN DETAIL - ALUM. CLOSURE AT WT-2 NORTH
SCALE: 3" = 1'-0"



3 PLAN DETAIL - WT-2 NORTHWEST CORNER
SCALE: 1 1/2" = 1'-0"



2 PLAN DETAIL - WT-2 AT CIRCULAR COLUMN
SCALE: 1 1/2" = 1'-0"



1 PLAN DETAIL - WT-2 SOUTHWEST CORNER
SCALE: 1 1/2" = 1'-0"

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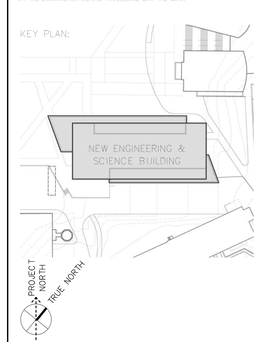

PROJECT:

NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

EXTERIOR PLAN DETAILS FIRST FLOOR

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
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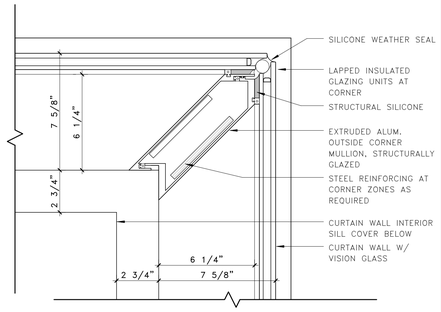
A6.11



10 TYP. CURTAIN WALL CORNER PLAN DETAIL
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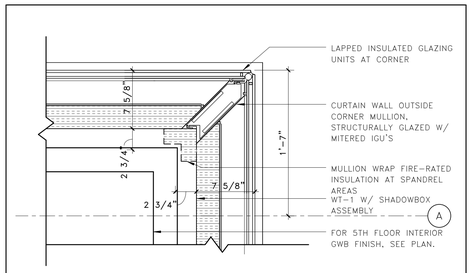

9 TYP. WT-1 CORNER AT SHADOWBOX PLAN DETAIL
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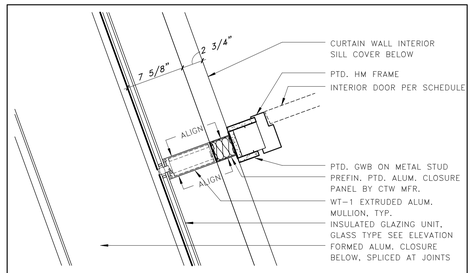
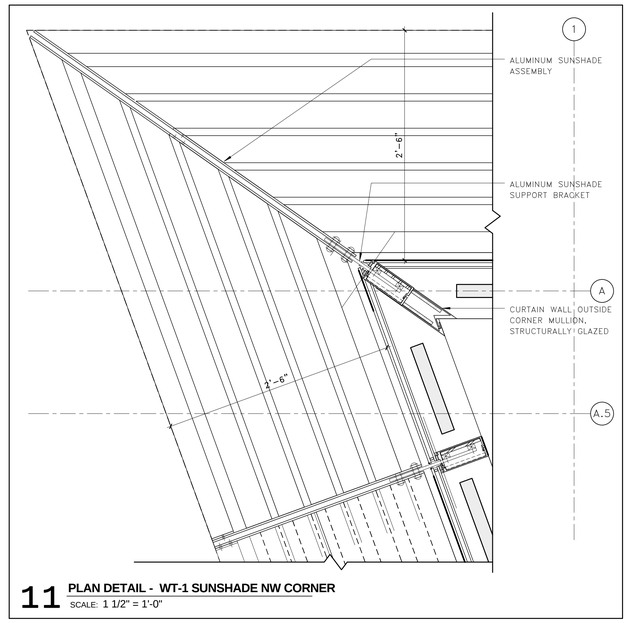
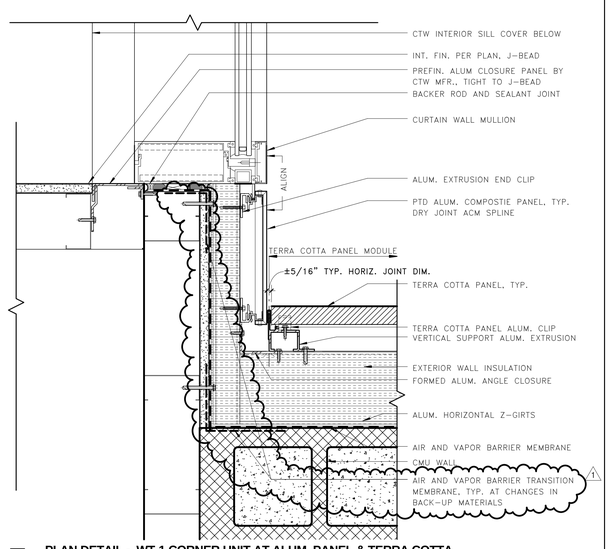


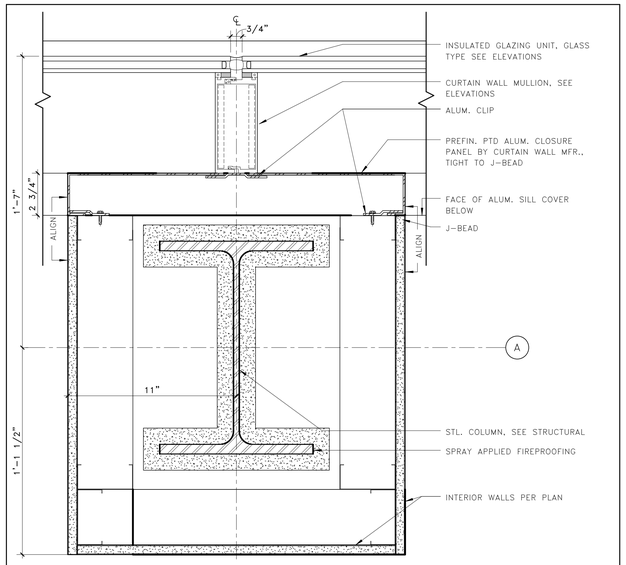
8 PLAN DETAIL - HM FRAME AT WT-1 MULLION
SCALE: 1 1/2" = 1'-0"



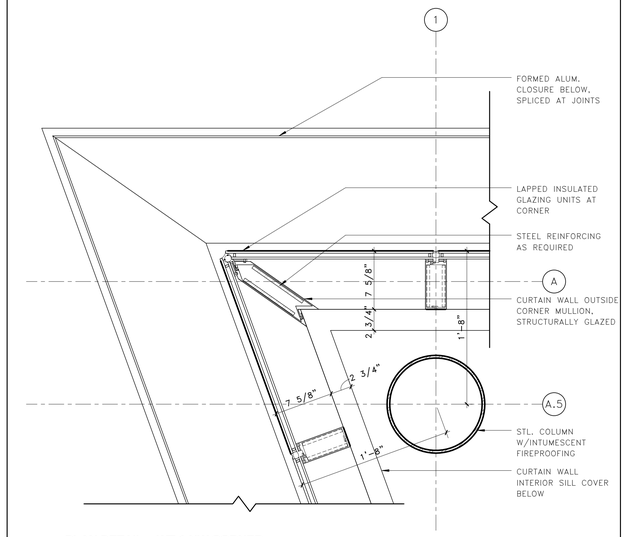
11 PLAN DETAIL - WT-1 SUNSHADE NW CORNER
SCALE: 1 1/2" = 1'-0"



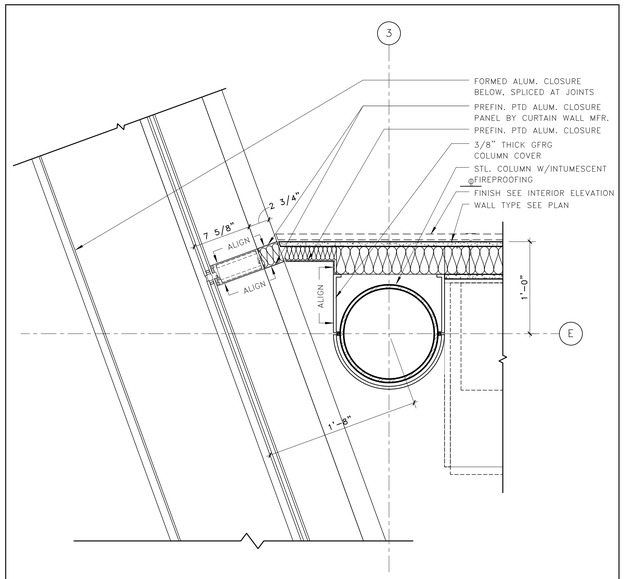
7 PLAN DETAIL - WT-1 CORNER UNIT AT ALUM. PANEL & TERRA COTTA
SCALE: 3" = 1'-0"



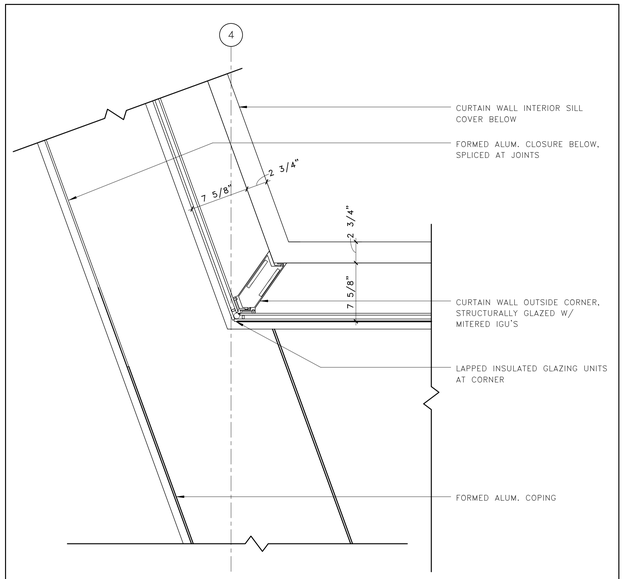
6 PLAN DETAIL - TYP. COLUMN ENCLOSURE AT WT-1
SCALE: 3" = 1'-0"



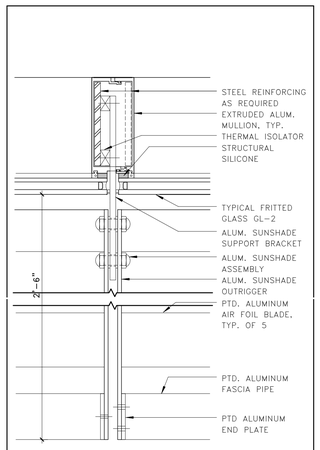
5 PLAN DETAIL - WT-1 NW CORNER
SCALE: 1 1/2" = 1'-0"



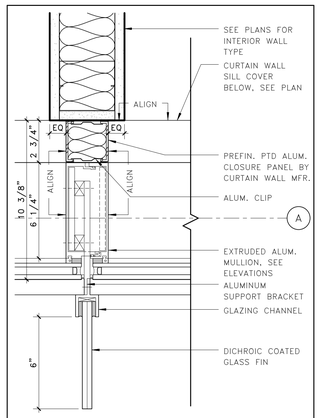
4 PLAN DETAIL - ALUM. CLOSURE AT WT-1 & CIRCULAR COLUMN
SCALE: 1 1/2" = 1'-0"



3 PLAN DETAIL - WT-1 CORNER @ 2ND FLOOR ROOF
SCALE: 1 1/2" = 1'-0"



2 TYPICAL WT-1 MULLION WITH SUNSHADE
SCALE: 3" = 1'-0"



1 TYP WT-1 MULLION W/ DICHROIC FIN
SCALE: 3" = 1'-0"

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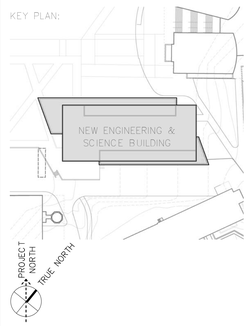

PROJECT:

NEW ENGINEERING AND SCIENCE BUILDING

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EXTERIOR PLAN DETAILS SECOND TO FIFTH FLOOR

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
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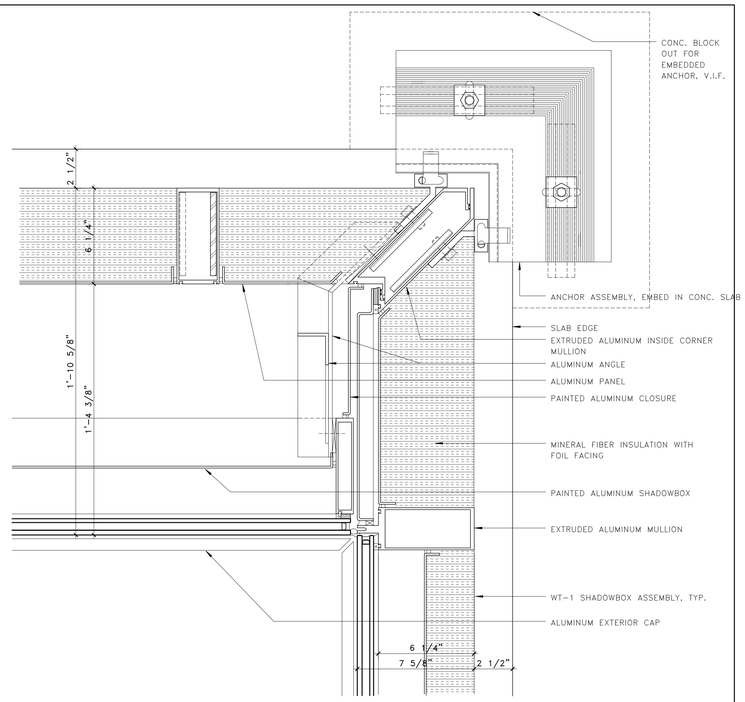
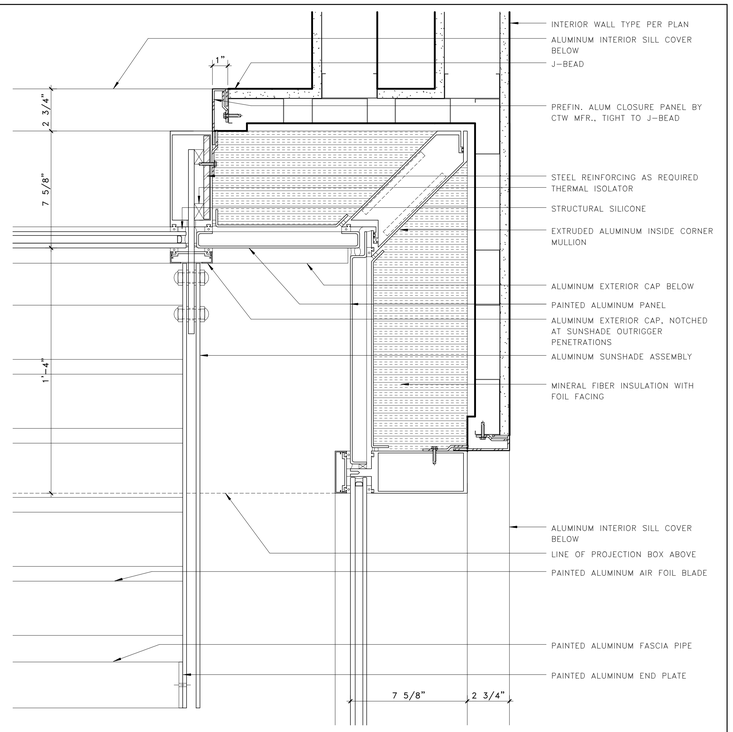
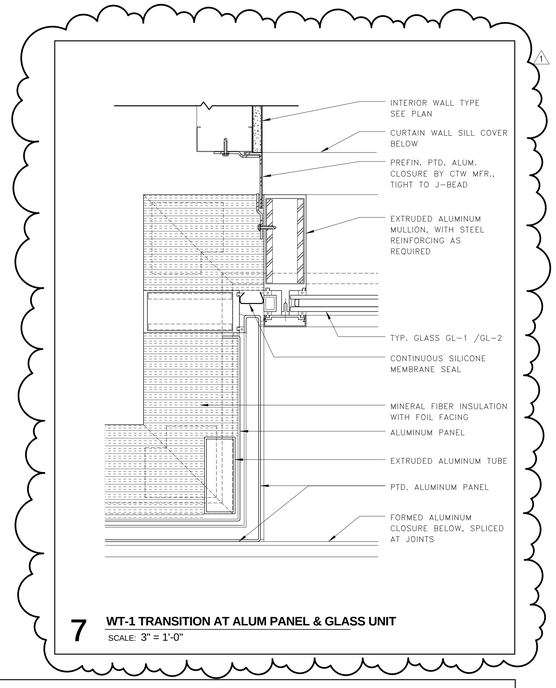
A6.12



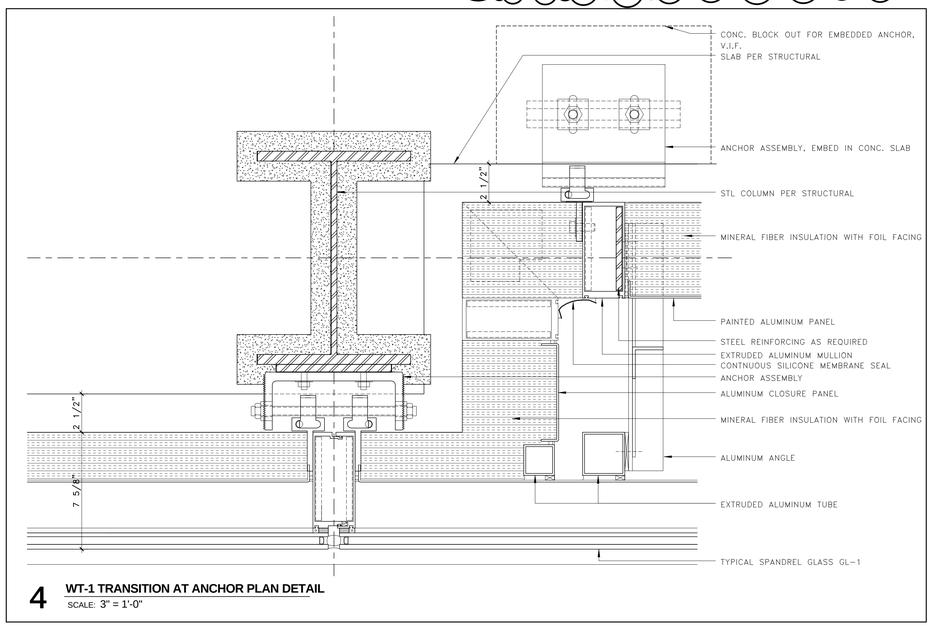
6 PLAN DETAIL - WT-1 INSIDE CORNER AT PROJECTION BOX
SCALE: 3" = 1'-0"



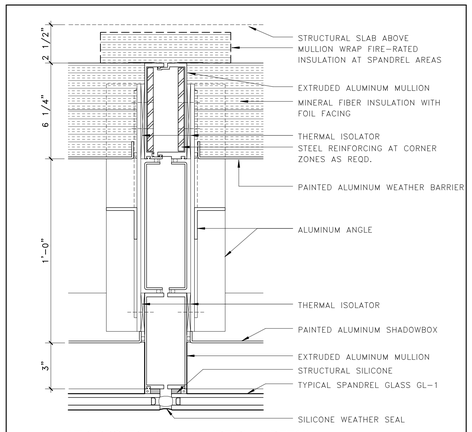
5 PLAN DETAIL - WT-1 INSIDE CORNER TRANSITION W/ SUNSHADE
SCALE: 3" = 1'-0"



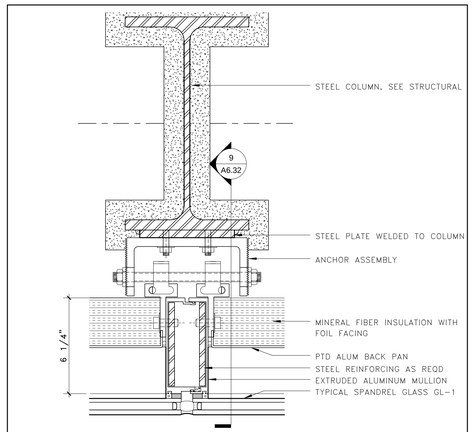
7 WT-1 TRANSITION AT ALUM PANEL & GLASS UNIT
SCALE: 3" = 1'-0"



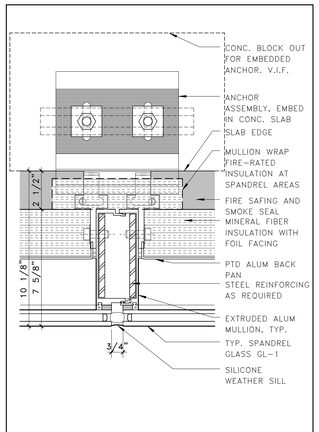
4 WT-1 TRANSITION AT ANCHOR PLAN DETAIL
SCALE: 3" = 1'-0"



3 WT-1 PROJECTION FEATURE PLAN DETAIL
SCALE: 3" = 1'-0"



2 WT-1 TYP ANCHOR AT COLUMN PLAN DETAIL
SCALE: 3" = 1'-0"



1 WT-1 TYPICAL ANCHOR PLAN DETAIL
SCALE: 3" = 1'-0"

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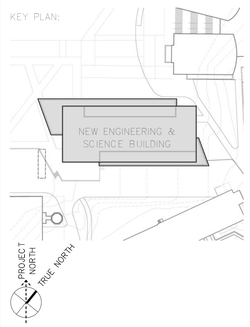

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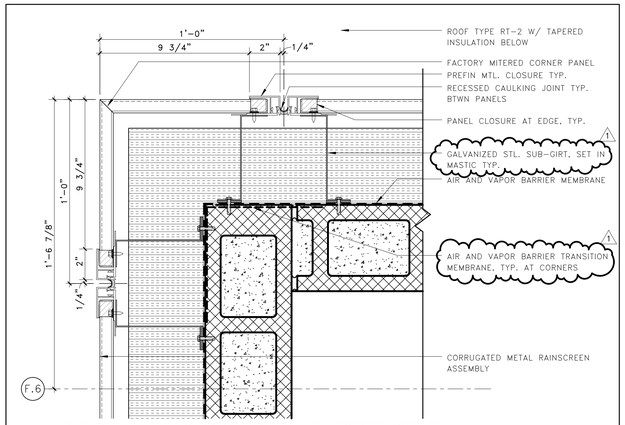
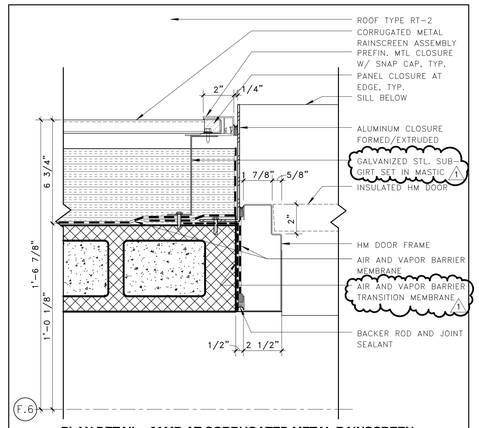
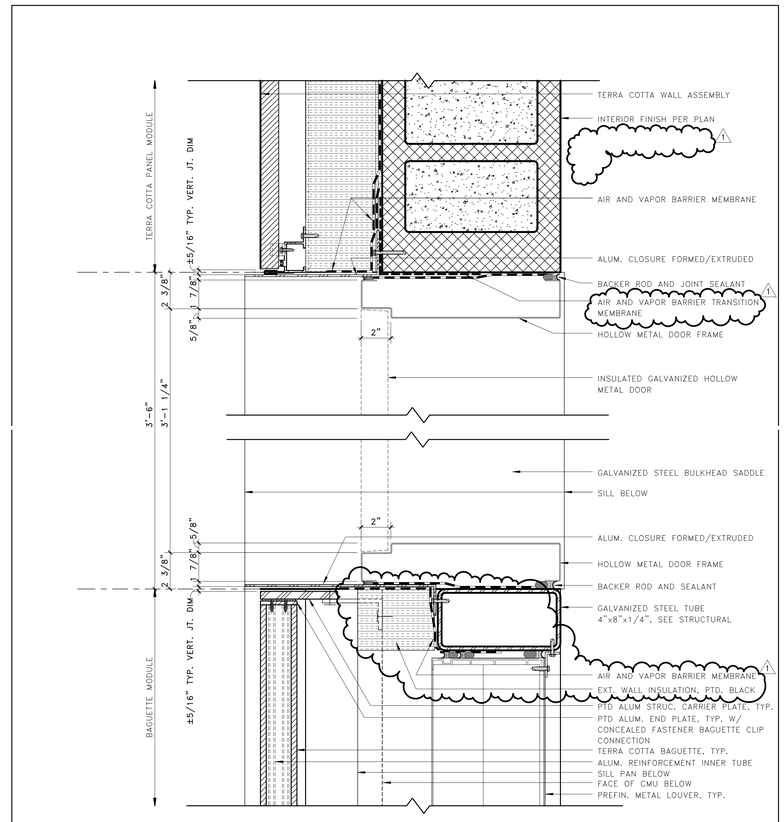


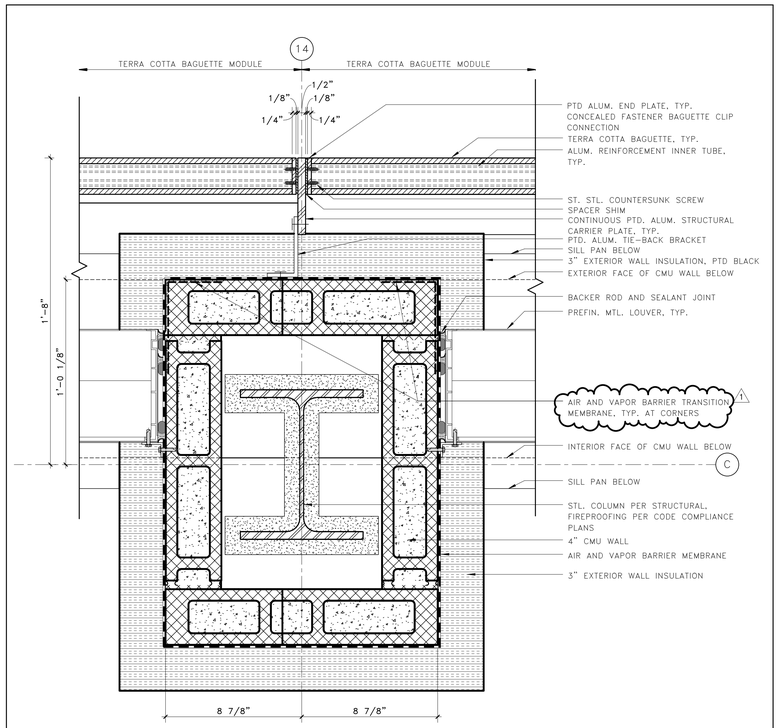
5 PLAN DETAIL - TYP. CORRUGATED METAL RAINSCREEN CORNER
SCALE: 3" = 1'-0"



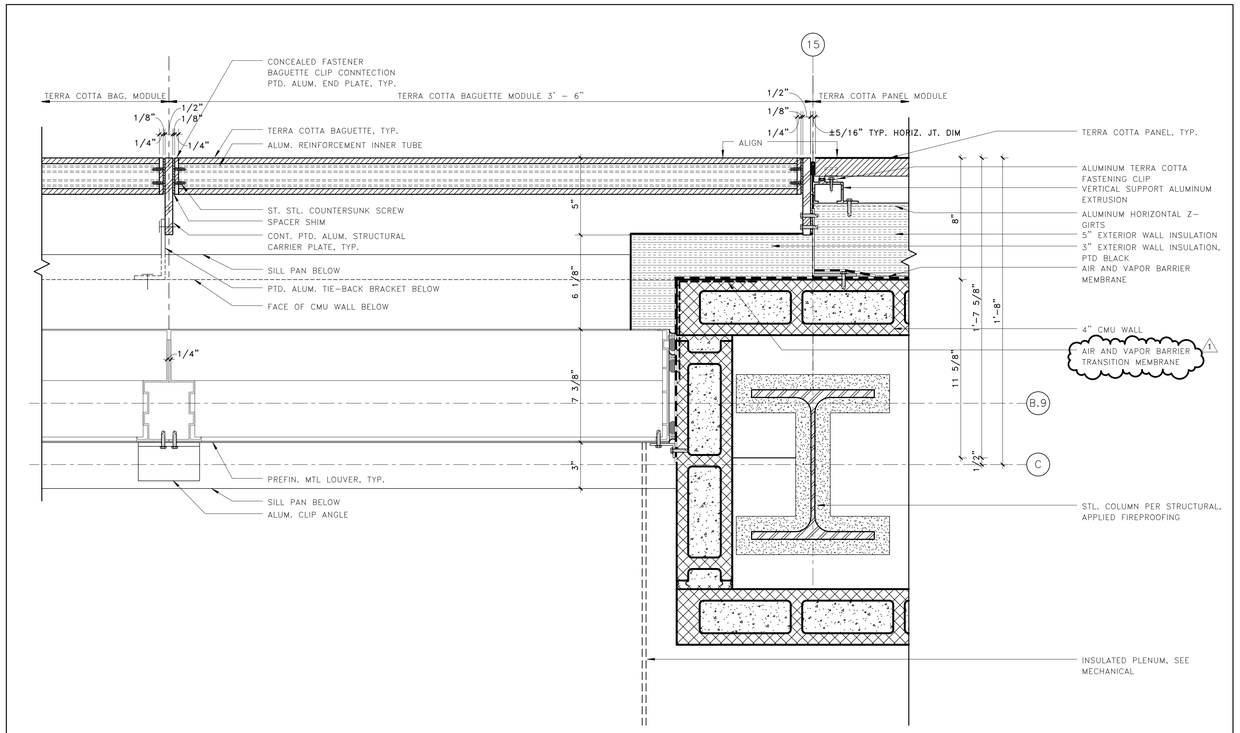
4 PLAN DETAIL - JAMB AT CORRUGATED METAL RAINSCREEN
SCALE: 3" = 1'-0"



3 PLAN DETAIL - DOOR PH1.2 AT TERRA COTTA & LOUVERS
SCALE: 3" = 1'-0"



2 PLAN DETAIL - TERRA COTTA BAGUETTE & LOUVER AT COLUMN
SCALE: 3" = 1'-0"



1 PLAN DETAIL - TERRA COTTA BAGUETTE & LOUVER AT TERRA COTTA WALL
SCALE: 3" = 1'-0"

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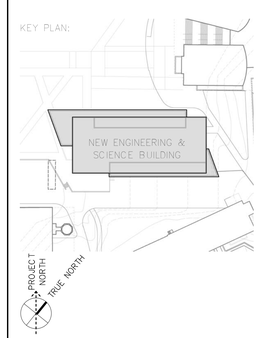

PROJECT:

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EXTERIOR PLAN DETAIL PENTHOUSE & BULKHEAD

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
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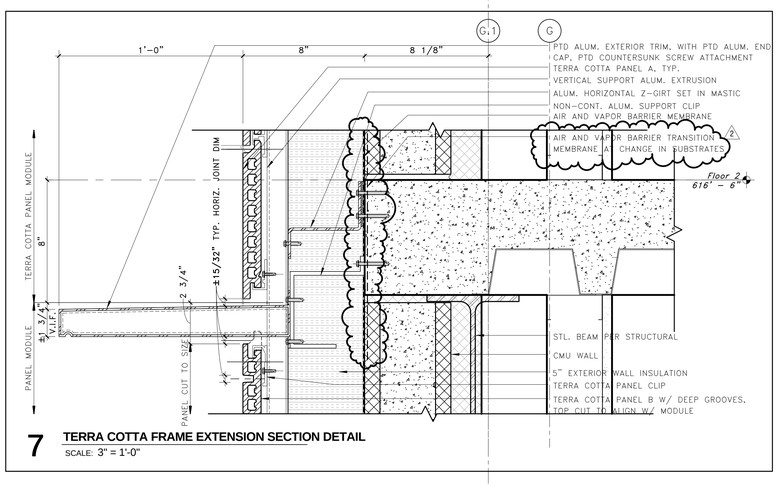
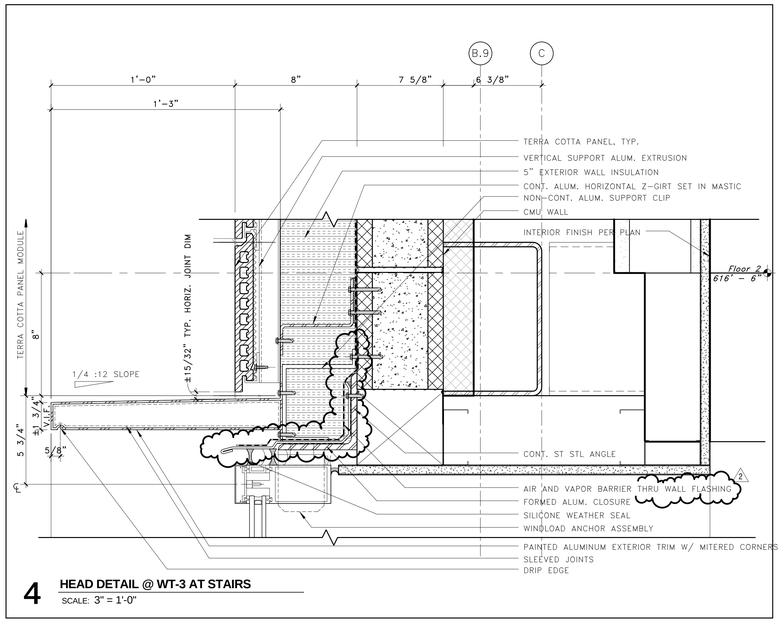
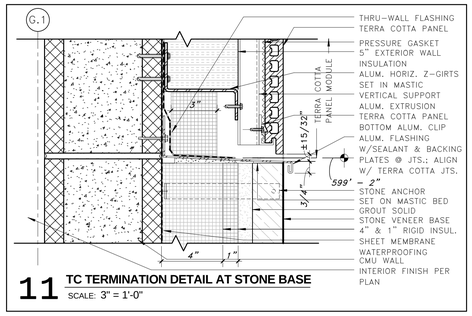


7 TERRA COTTA FRAME EXTENSION SECTION DETAIL
SCALE: 3" = 1'-0"



4 HEAD DETAIL @ WT-3 AT STAIRS
SCALE: 3" = 1'-0"



11 TC TERMINATION DETAIL AT STONE BASE
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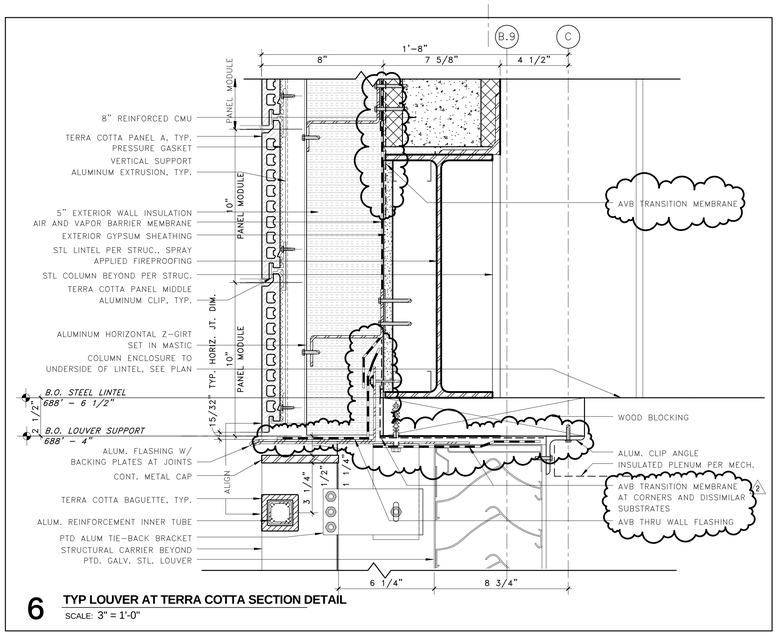
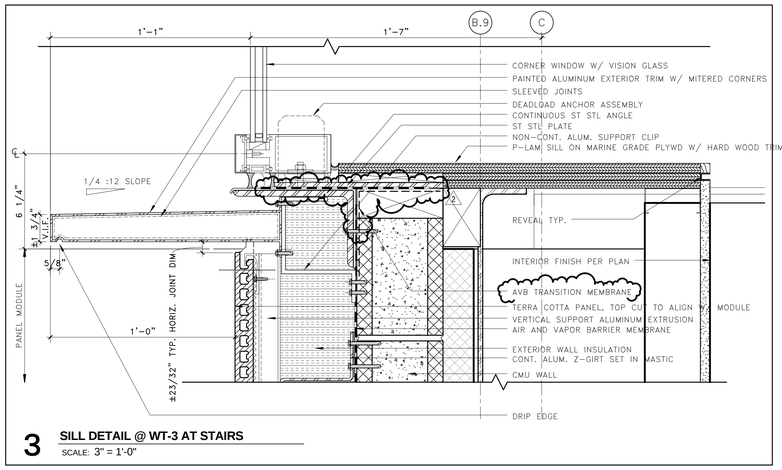
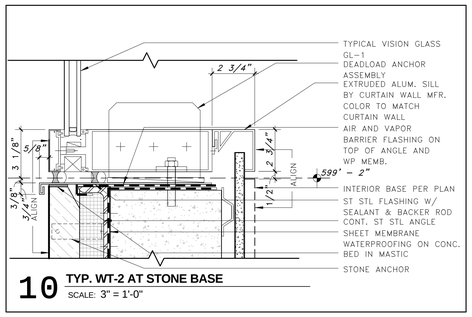


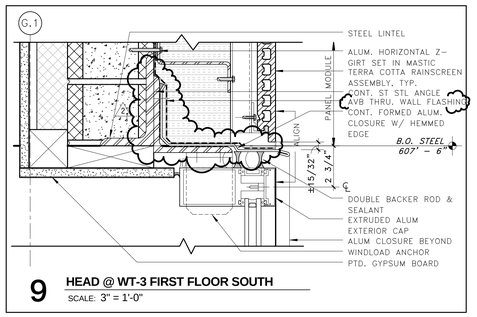
6 TYP LOUVER AT TERRA COTTA SECTION DETAIL
SCALE: 3" = 1'-0"



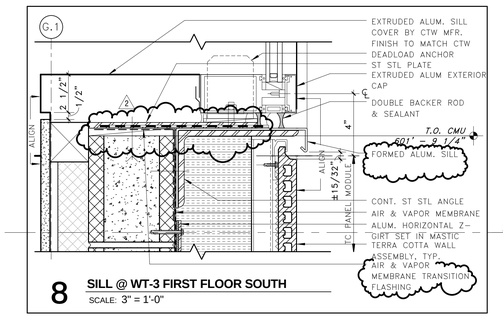
3 SILL DETAIL @ WT-3 AT STAIRS
SCALE: 3" = 1'-0"



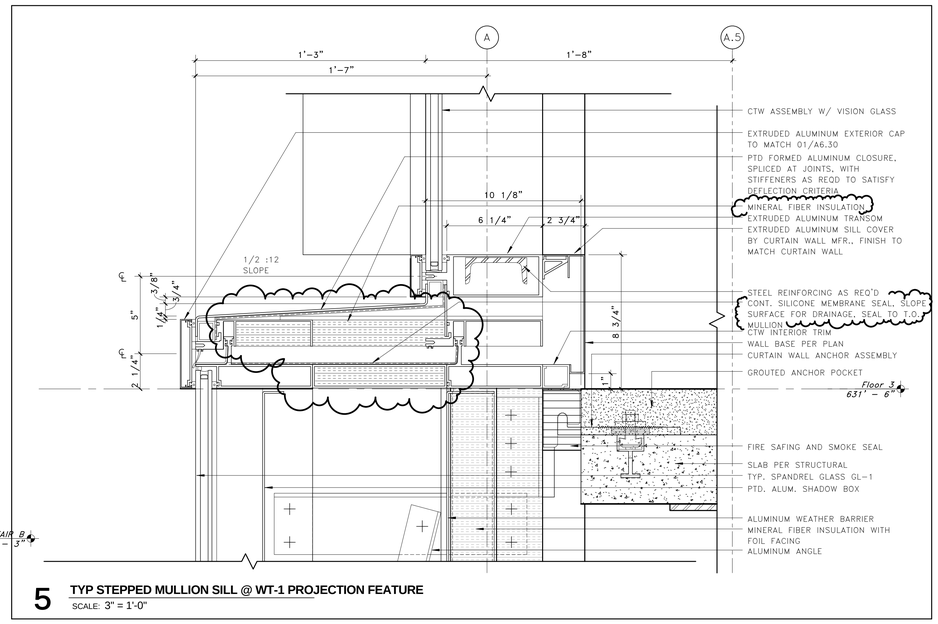
10 TYP. WT-2 AT STONE BASE
SCALE: 3" = 1'-0"



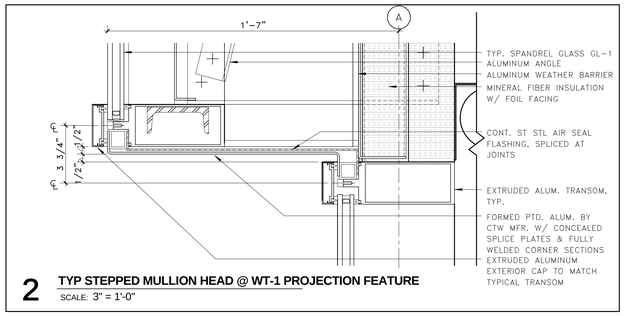
9 HEAD @ WT-3 FIRST FLOOR SOUTH
SCALE: 3" = 1'-0"



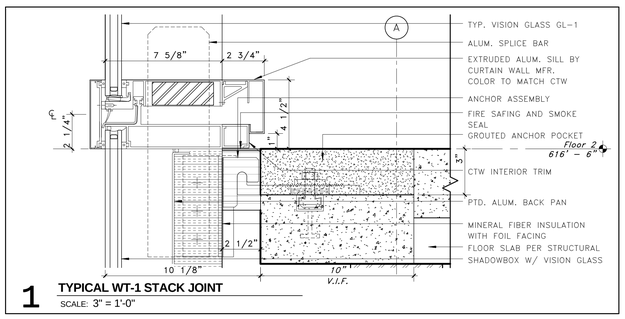
8 SILL @ WT-3 FIRST FLOOR SOUTH
SCALE: 3" = 1'-0"



5 TYP STEPPED MULLION SILL @ WT-1 PROJECTION FEATURE
SCALE: 3" = 1'-0"



2 TYP STEPPED MULLION HEAD @ WT-1 PROJECTION FEATURE
SCALE: 3" = 1'-0"



1 TYPICAL WT-1 STACK JOINT
SCALE: 3" = 1'-0"

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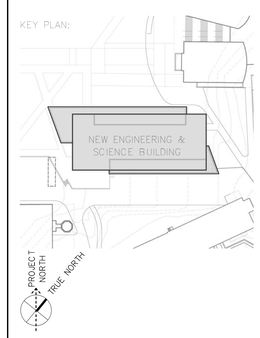
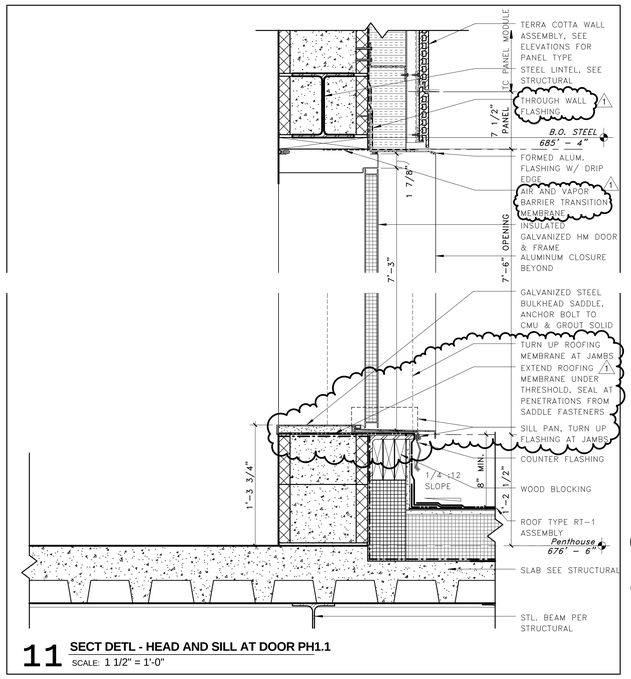


PROJECT:
NEW ENGINEERING AND SCIENCE BUILDING

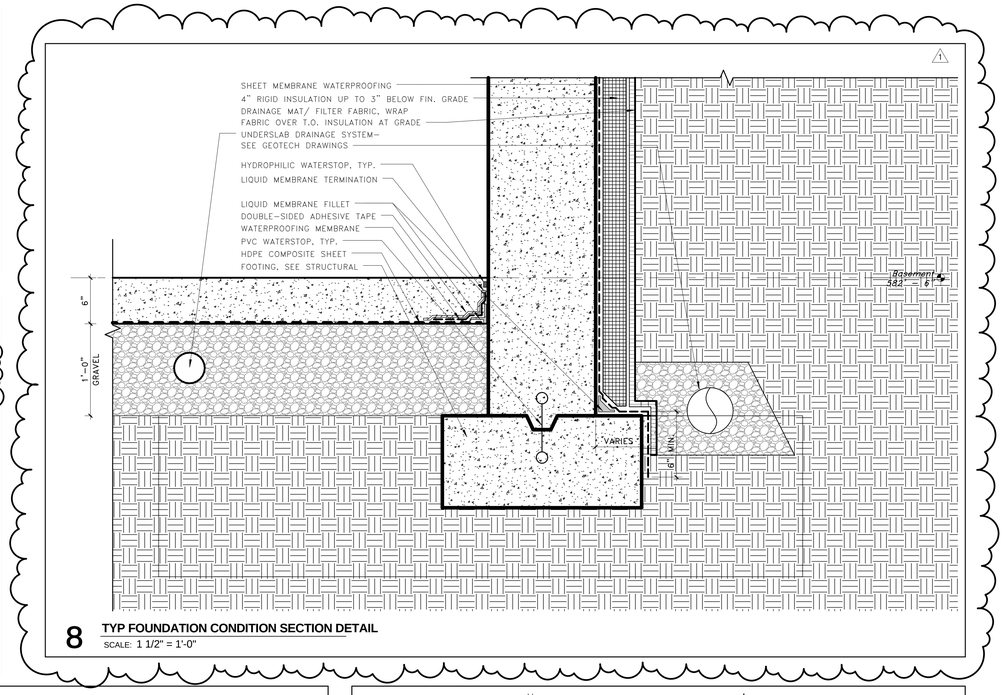
DRAWING TITLE:
EXTERIOR SECTION DETAILS

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: 3" = 1'-0"

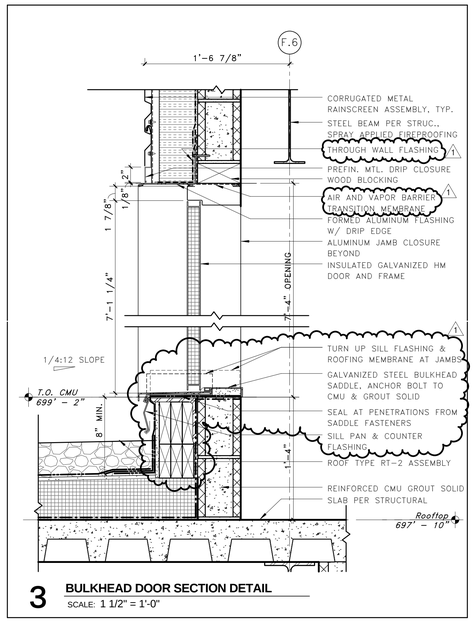
A6.30



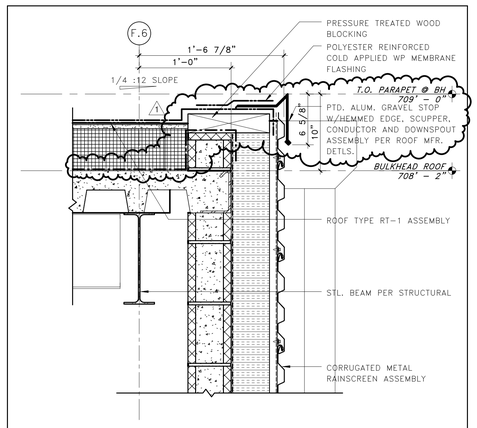
11 SECT DETL - HEAD AND SILL AT DOOR PH1.1
SCALE: 1 1/2" = 1'-0"



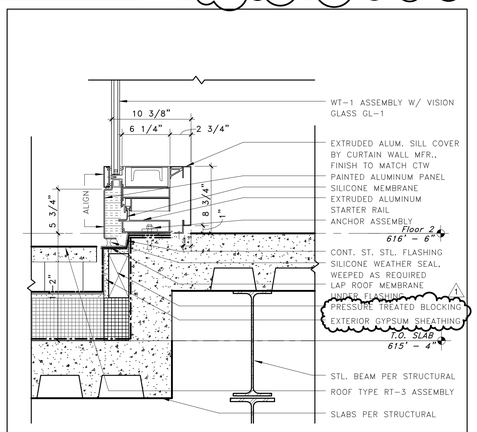
8 TYP FOUNDATION CONDITION SECTION DETAIL
SCALE: 1 1/2" = 1'-0"



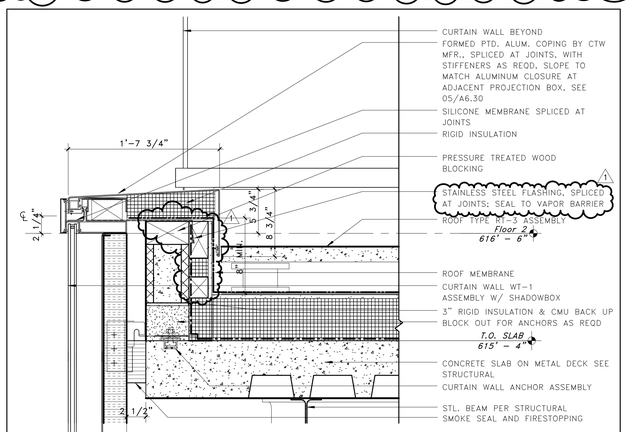
3 BULKHEAD DOOR SECTION DETAIL
SCALE: 1 1/2" = 1'-0"



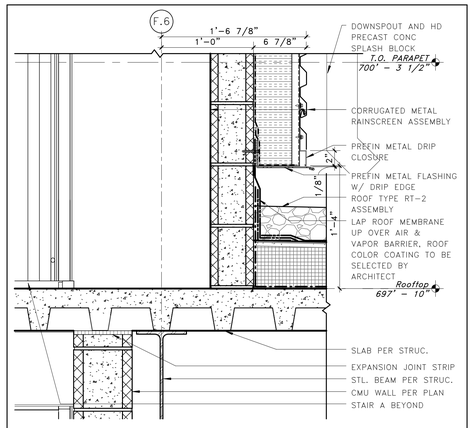
10 SECT. DETL - GRAVEL STOP AT CORRUGATED METAL RAINSCREEN
SCALE: 1 1/2" = 1'-0"



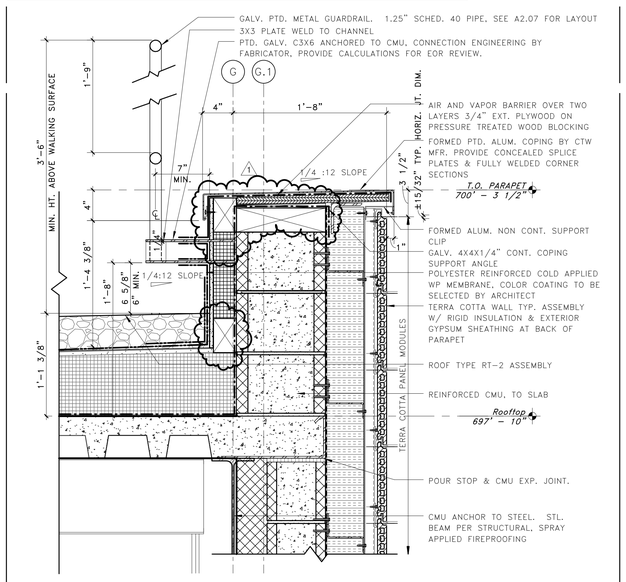
7 SECT. DETL - WT-1 AT RT-3 & FLOOR
SCALE: 1 1/2" = 1'-0"



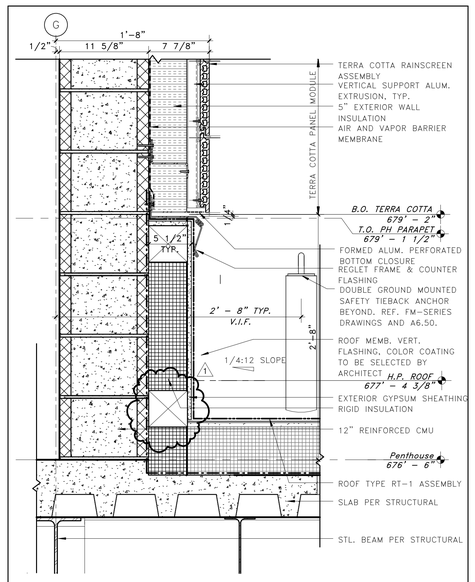
5 SECT. DETL - PARAPET AT SECOND FLOOR
SCALE: 1 1/2" = 1'-0"



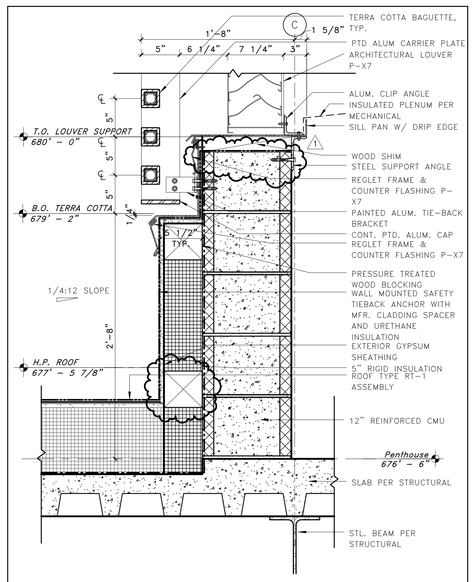
2 SECT. DETL - CORRUGATED METAL RAINSCREEN AT RT-2
SCALE: 1 1/2" = 1'-0"



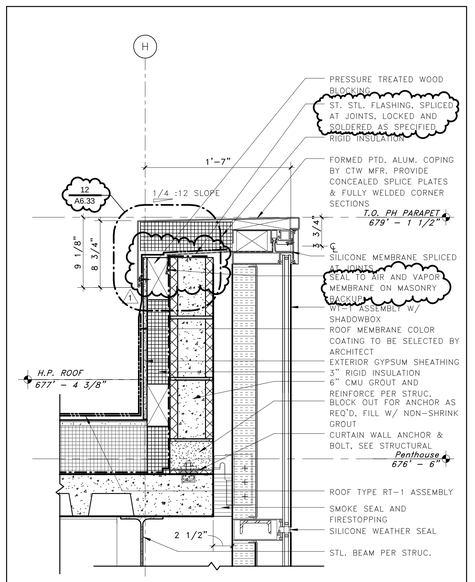
9 SECT. DETL - TYP PARAPET AT TERRA COTTA WALL
SCALE: 1 1/2" = 1'-0"



6 SECT. DETL - TYP. TERRA COTTA AT RT-1
SCALE: 1 1/2" = 1'-0"



4 SECT. DETL - TYP. TERRA COTTA BAGUETTES W/ LOUVER AT RT-1
SCALE: 1 1/2" = 1'-0"



1 SECT. DETL - TYP PARAPET AT WT-1
SCALE: 1 1/2" = 1'-0"

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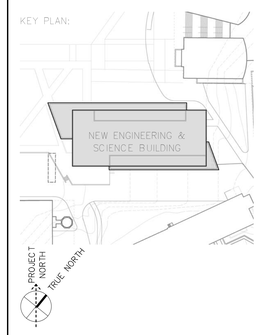

PROJECT:

NEW ENGINEERING AND SCIENCE BUILDING

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EXTERIOR SECTION DETAILS

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
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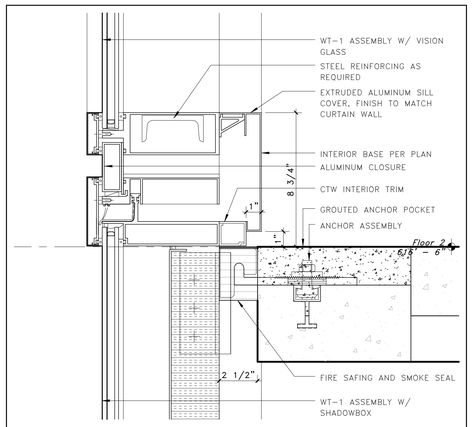
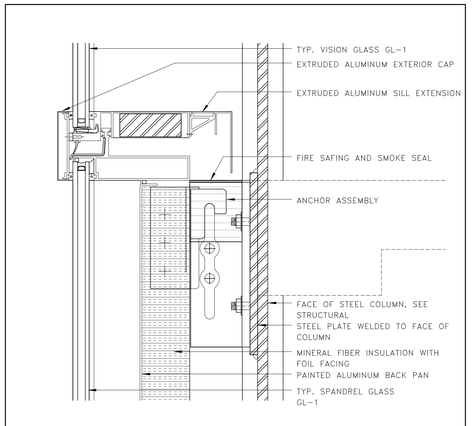
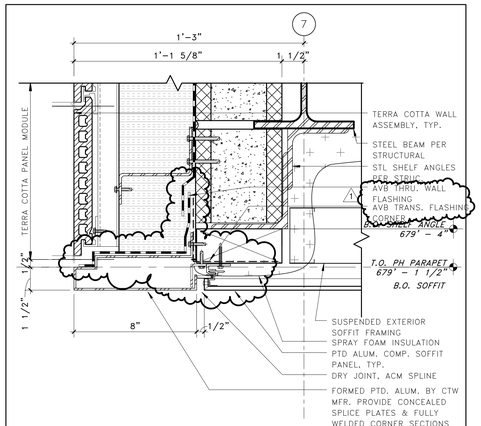
A6.31



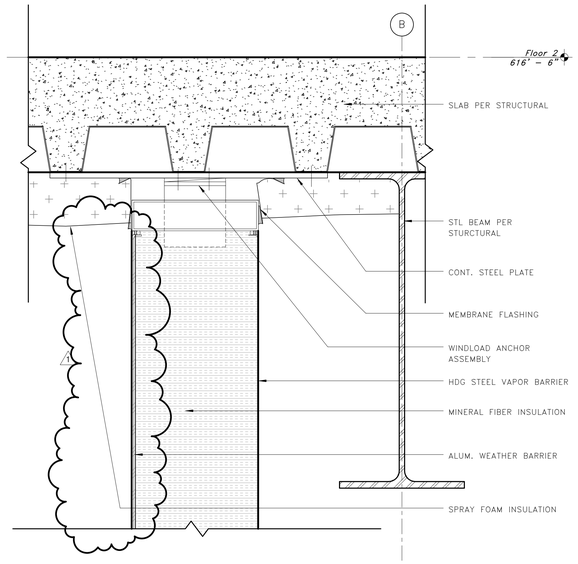
10 SECTION DETAIL - STACK JONIT AT FLAT CTW 2ND FLOOR
SCALE: 3" = 1'-0"



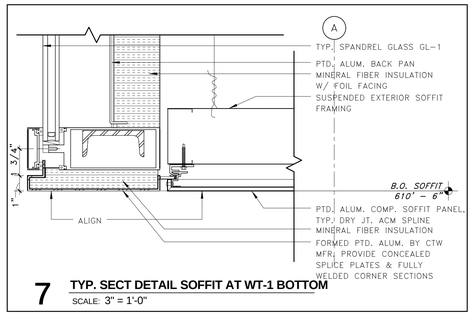
9 SECTION DETAIL - TYP WT-1 STACK JOINT AT COLUMN
SCALE: 3" = 1'-0"



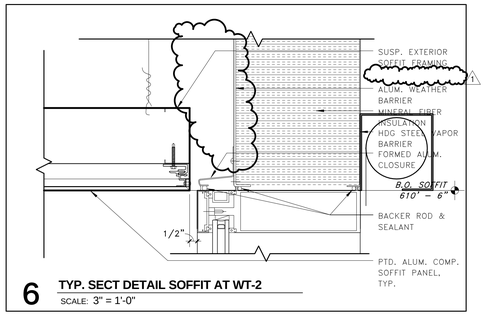
3 TERRA COTTA AT ALUM. SOFFIT @ PENTHOUSE
SCALE: 3" = 1'-0"



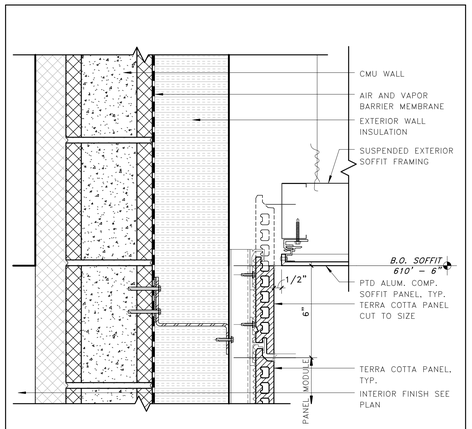
8 SECTION DETAIL - WT-2 HEAD ANCHOR
SCALE: 3" = 1'-0"



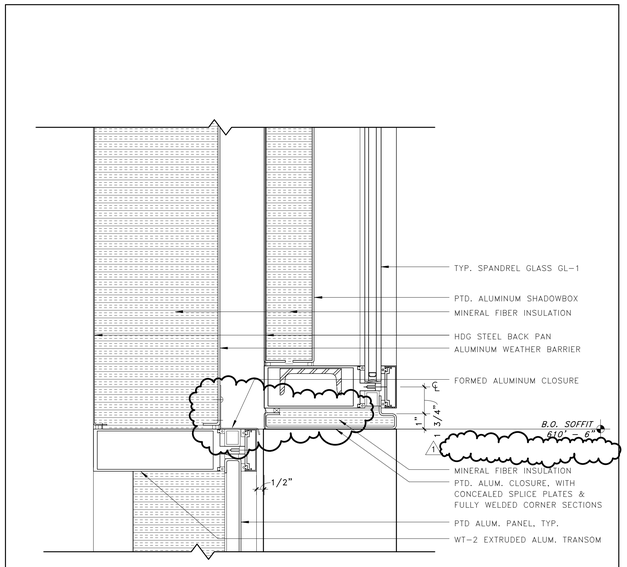
7 TYP. SECT DETAIL SOFFIT AT WT-1 BOTTOM
SCALE: 3" = 1'-0"



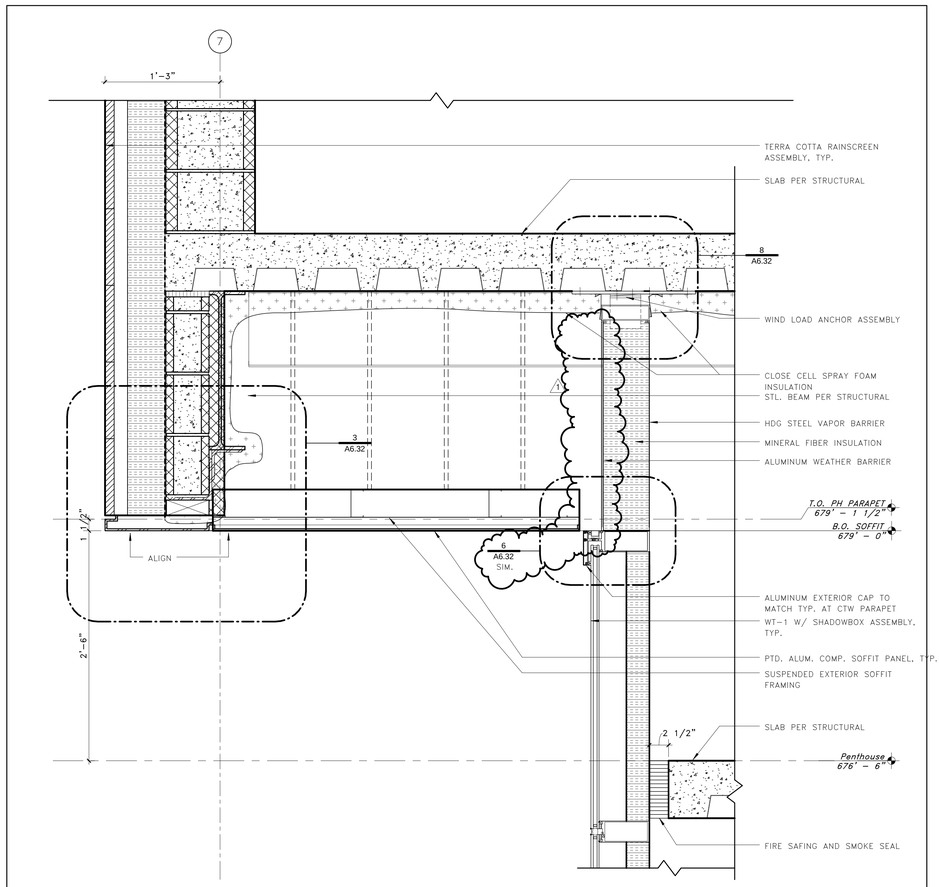
6 TYP. SECT DETAIL SOFFIT AT WT-2
SCALE: 3" = 1'-0"



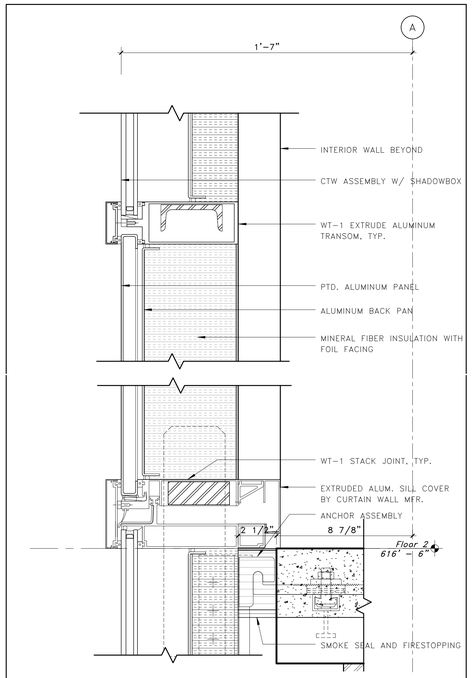
2 ALUM. SOFFIT AT TERRA COTTA WALL @ 1ST FLOOR
SCALE: 3" = 1'-0"



4 SECTION DETAIL - WT-1 & PTD ALUM. PANEL AT VESTIBULE B
SCALE: 3" = 1'-0"



5 SECTION DETAIL - SOFFIT AT PENTHOUSE
SCALE: 1 1/2" = 1'-0"



1 SECTION DETAIL - WT-1 W/ ALUM PANEL & SHADOWBOX
SCALE: 3" = 1'-0"

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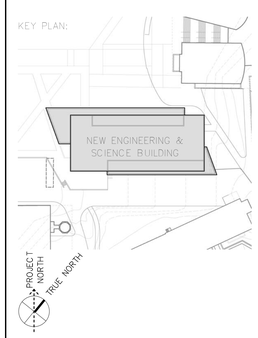


PROJECT:

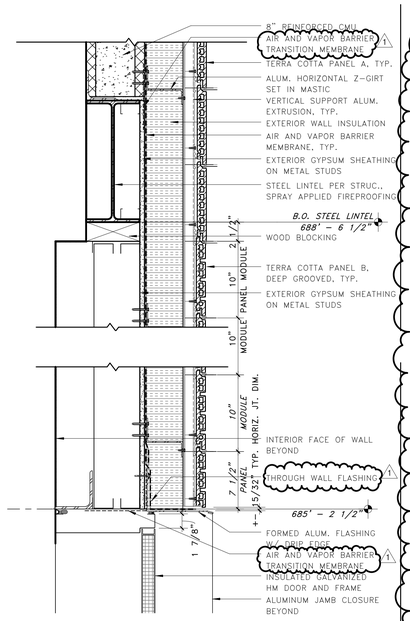
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

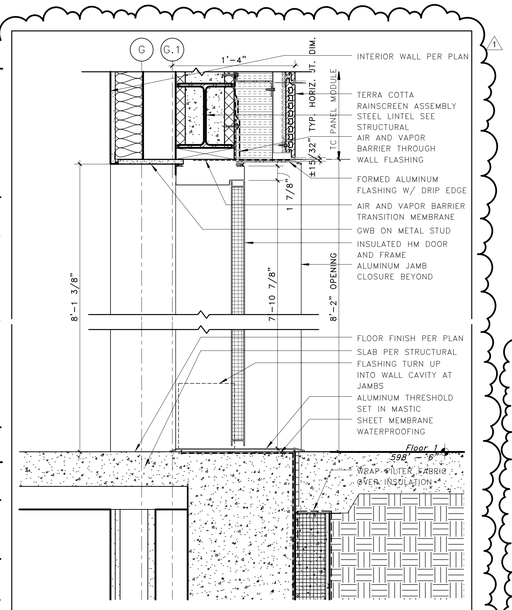
EXTERIOR SECTION DETAILS

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: As indicated

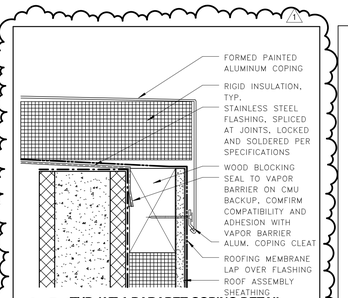
A6.32



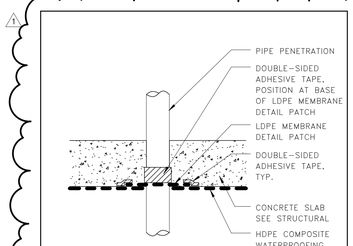
8 SECT DETL - HEAD AT DOOR PH1.2
SCALE: 1 1/2" = 1'-0"



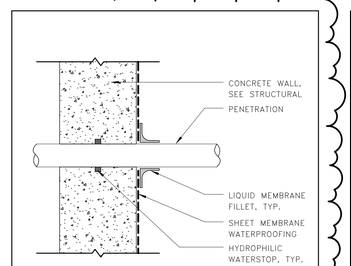
4 SECT. DETL - EXTERIOR DOOR AT STAIR A 1ST FLOOR
SCALE: 1 1/2" = 1'-0"



12 TYP. WT-1 PARAPET COPING DETAIL
SCALE: 3" = 1'-0"



11 TYPICAL SLAB PENETRATION DETAIL
SCALE: 1 1/2" = 1'-0"



10 TYPICAL WALL PENETRATION DETAIL
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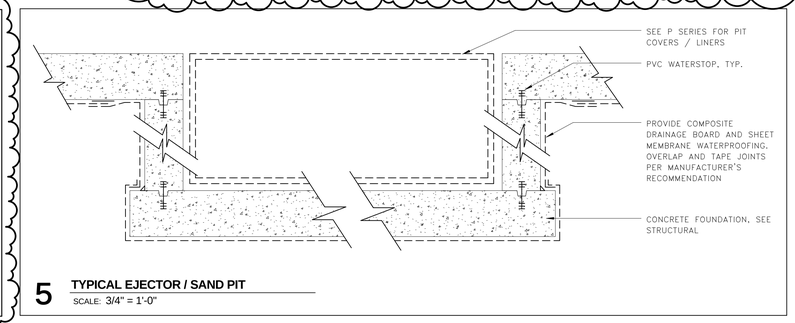
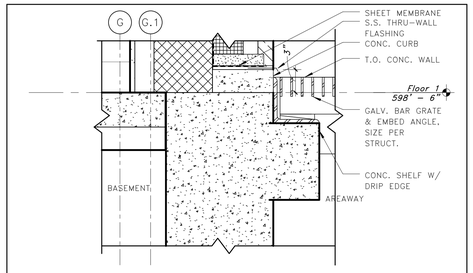
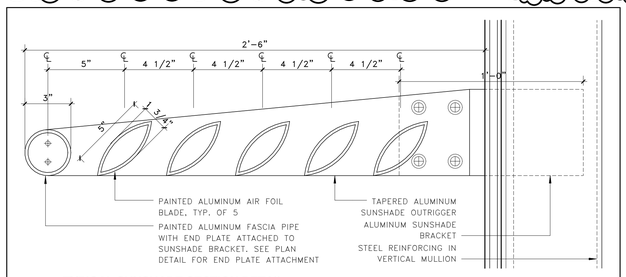


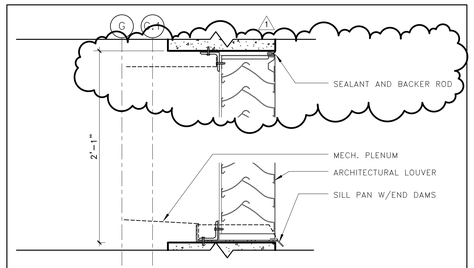
5 TYPICAL EJECTOR / SAND PIT
SCALE: 3/4" = 1'-0"



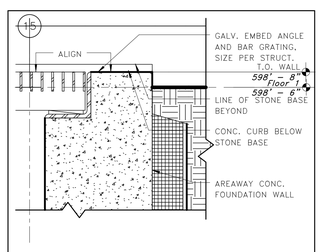
7 STONE BASE AT BAR GRATING
SCALE: 1 1/2" = 1'-0"



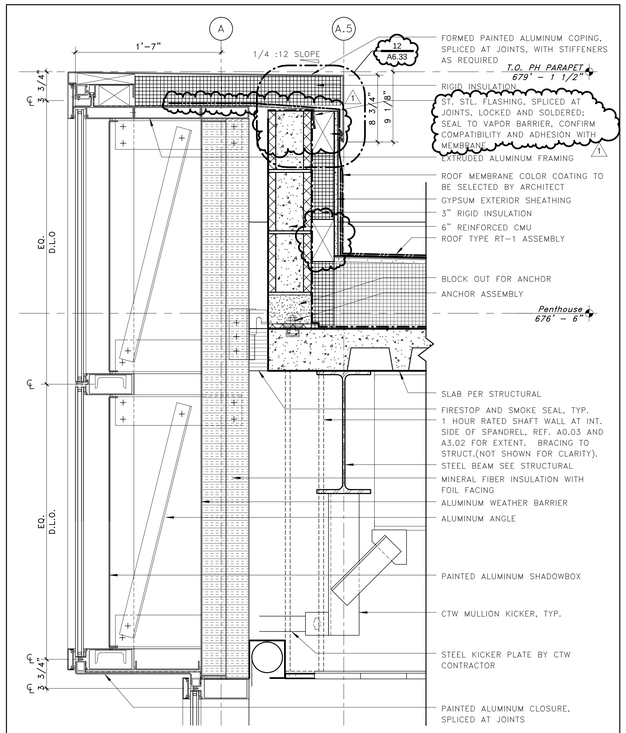
3 TYPICAL SUNSHADE SECTION DETAIL
SCALE: 3" = 1'-0"



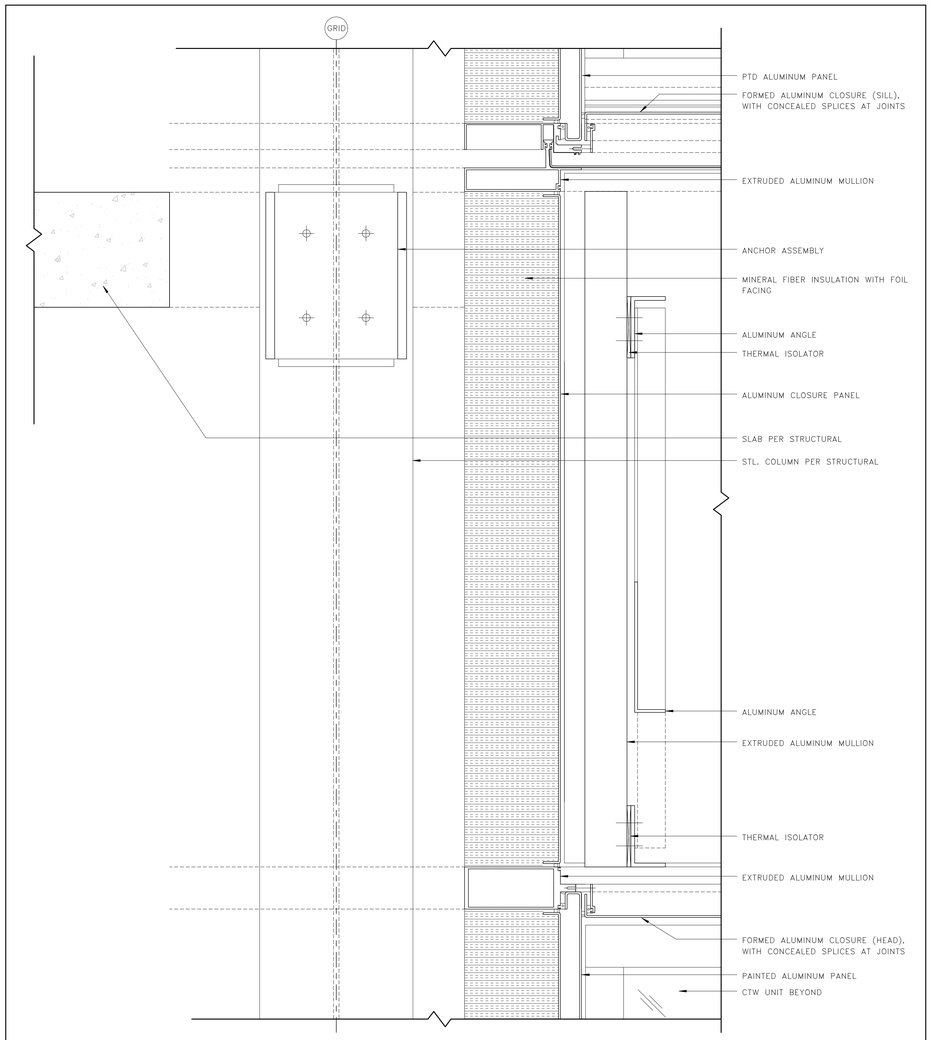
6 LOUVER AT AREAWAY SECTION DETAIL
SCALE: 1 1/2" = 1'-0"



9 AREAWAY BAR GRATING SECTION
SCALE: 1 1/2" = 1'-0"



2 SECT DETL - TYP PARAPET AT WT-1 PROJECTION BOX
SCALE: 1 1/2" = 1'-0"



1 SECT. DETL - WT-1 PROJECTION BOX AT METAL PANEL AT COLUMN RETURN
SCALE: 3" = 1'-0"

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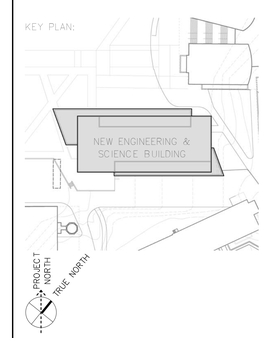
KEY PLAN:



PROJECT:

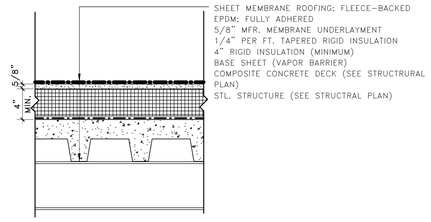
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

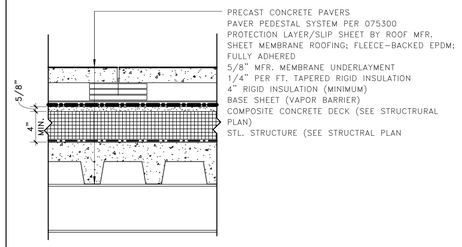
EXTERIOR SECTION DETAILS

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: As indicated

A6.33



7 ROOF TYPE RT1 - ALT. 7 ROOF ASSEMBLY
SCALE: 1 1/2" = 1'-0"



8 RT-3 ALT. 7 ROOF PAVER ASSEMBLY
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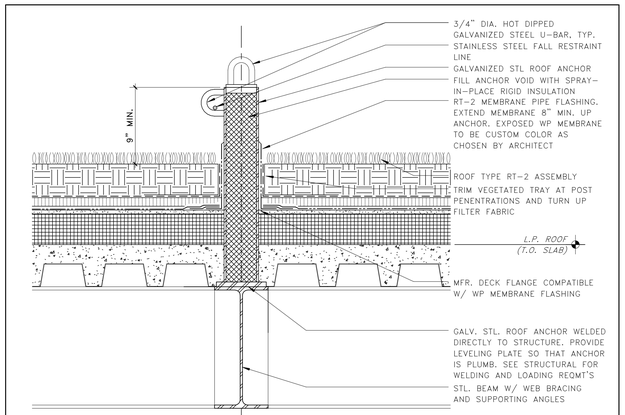
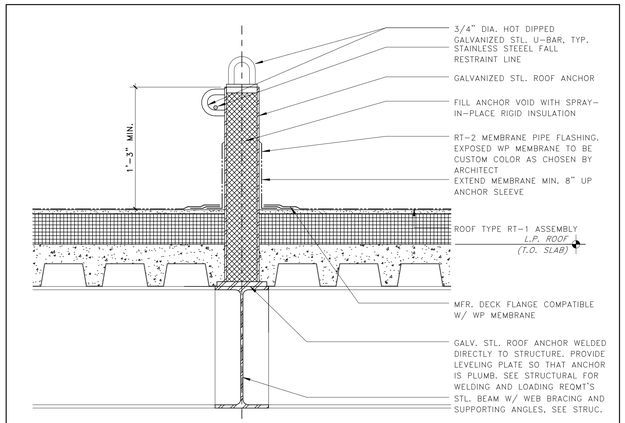
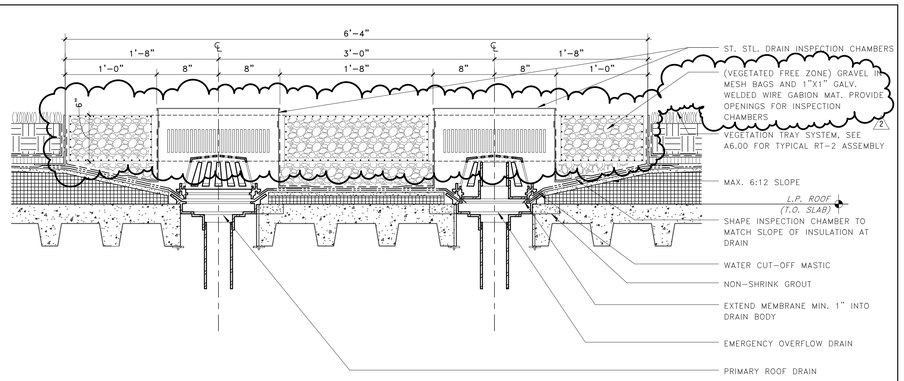


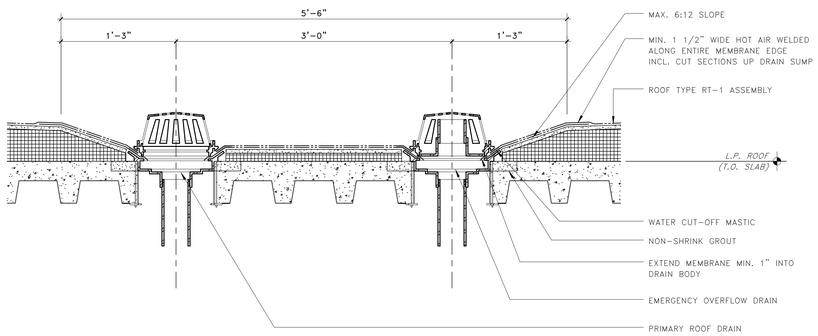
6 SECT DETL- TYP. ROOF ANCHOR AT ROOF RT-2
SCALE: 1 1/2" = 1'-0"



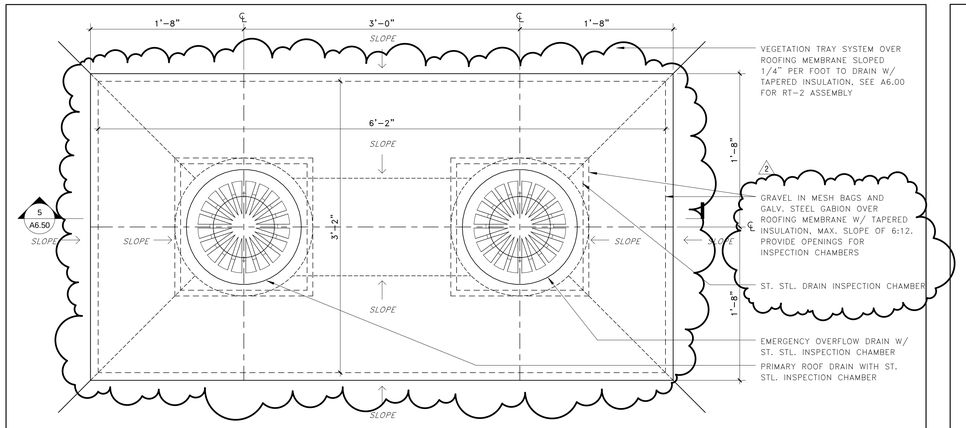
3 SECT DETL - TYP. ROOF ANCHOR AT ROOF RT-1
SCALE: 1 1/2" = 1'-0"



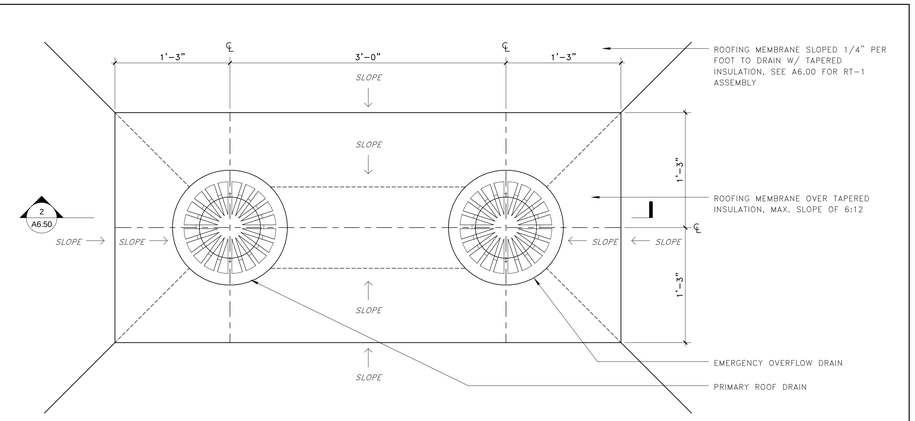
5 SECTION DETAIL - TYP. ROOF DRAIN & EMERGENCY OVERFLOW DRAIN AT ROOF RT-2
SCALE: 1 1/2" = 1'-0"



2 SECTION DETAIL - TYP. ROOF DRAIN & EMERGENCY OVERFLOW DRAIN AT ROOF RT-1
SCALE: 1 1/2" = 1'-0"



4 PLAN DETAIL - TYP. ROOF DRAIN & EMERGENCY OVERFLOW DRAIN AT RT-2
SCALE: 1 1/2" = 1'-0"



1 PLAN DETAIL - TYP. ROOF DRAIN & EMERGENCY OVERFLOW DRAIN AT RT-1
SCALE: 1 1/2" = 1'-0"

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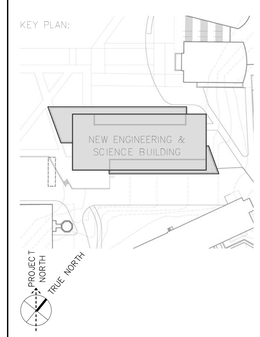


PROJECT:

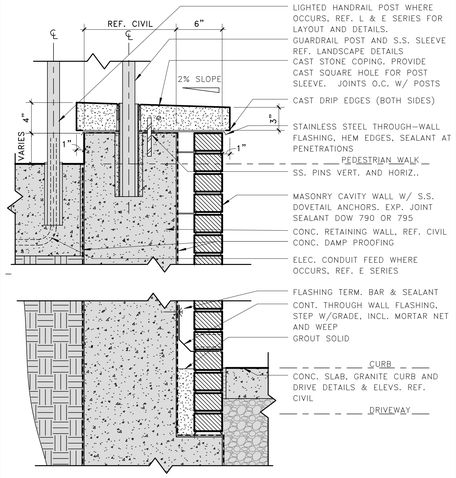
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

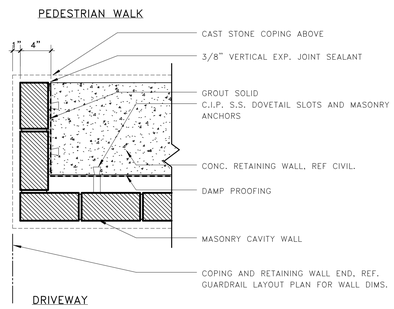
EXTERIOR ROOF DETAILS

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: 1 1/2" = 1'-0"

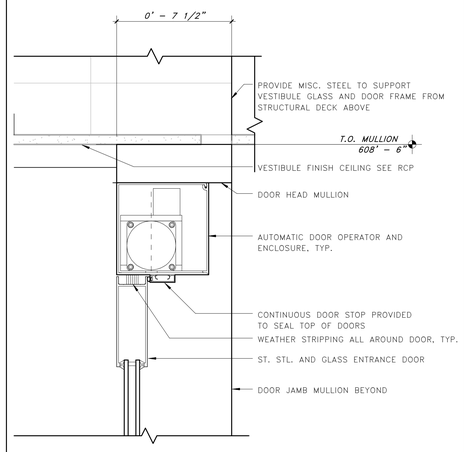
A6.50



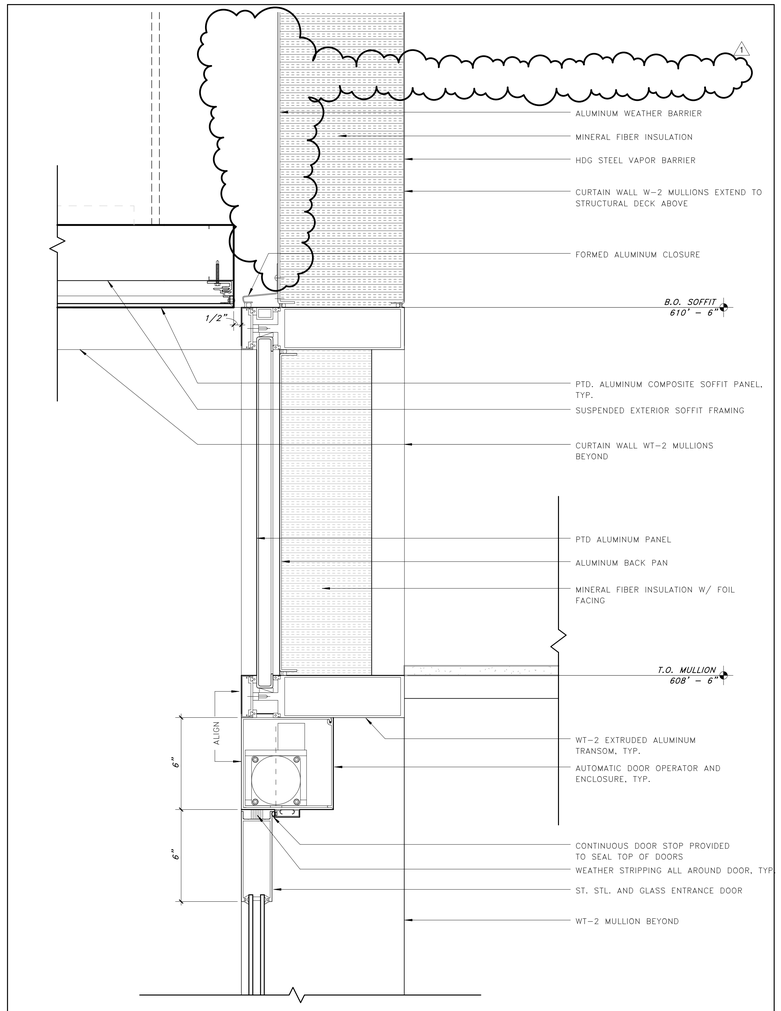
6 RETAINING WALL SECTION
SCALE: 1 1/2" = 1'-0"



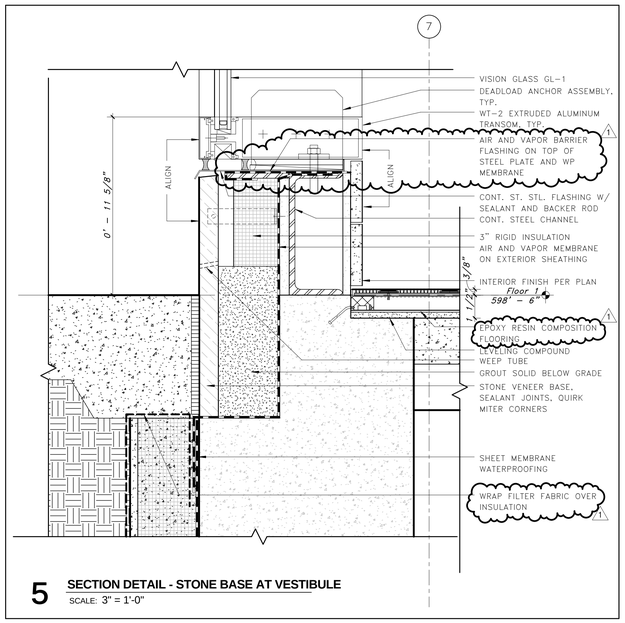
7 RETAINING WALL END PLAN
SCALE: 1 1/2" = 1'-0"



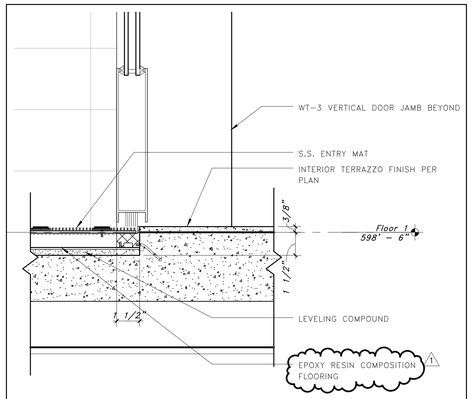
4 SECTION DETAIL - HEAD AT DOOR V1A.2
SCALE: 3" = 1'-0"



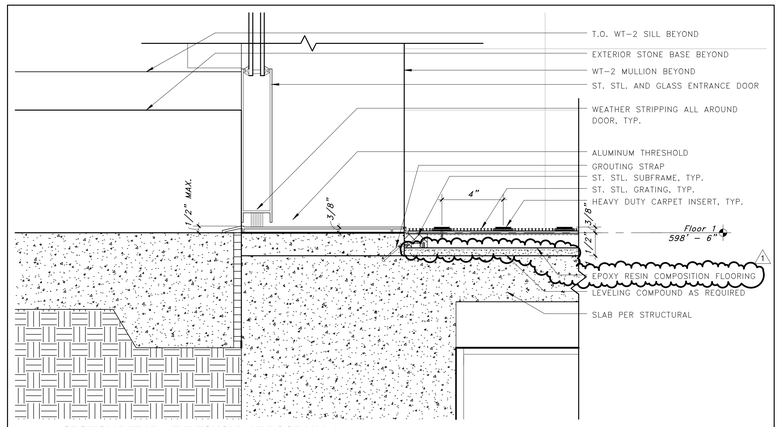
2 SECTION DETAIL - HEAD AT DOOR V1A.1 & SOFFIT
SCALE: 3" = 1'-0"



5 SECTION DETAIL - STONE BASE AT VESTIBULE
SCALE: 3" = 1'-0"



3 SECTION DETAIL - THRESHOLD AT DOOR V1A.2
SCALE: 3" = 1'-0"



1 SECTION DETAIL - THRESHOLD AT DOOR V1A.1
SCALE: 3" = 1'-0"

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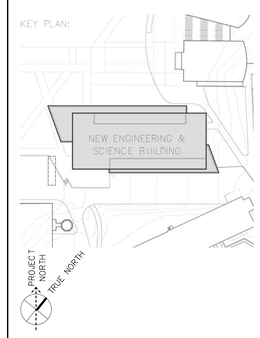
KEY PLAN:



PROJECT:

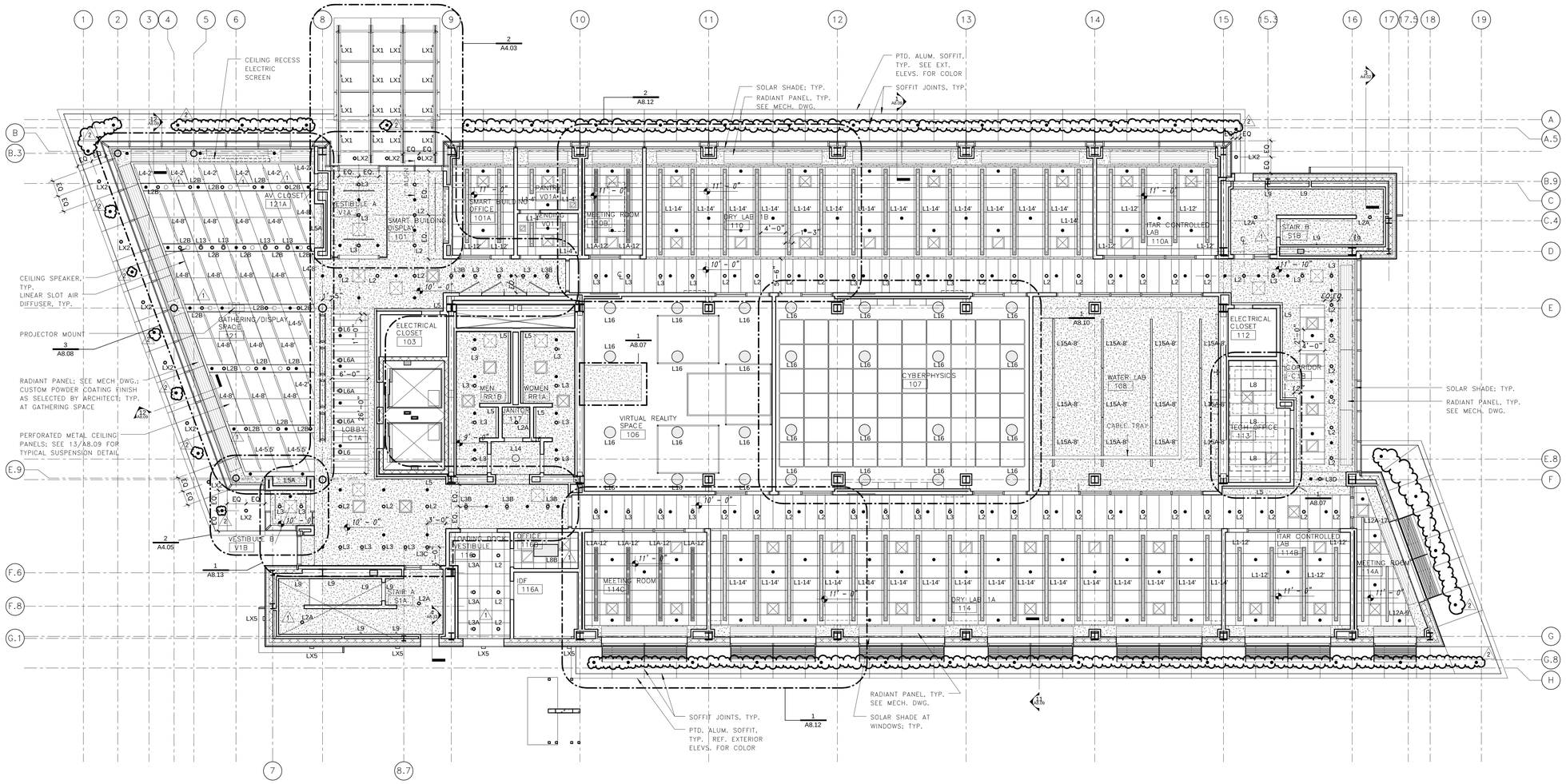
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

SITE AND VESTIBULE DETAILS

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: As indicated

A6.70



NOTE:
1. REFER TO CEILING LEGEND ON A8.07.
2. SPRINKLER HEADS ARE SHOWN FOR ARCHITECTURAL LAYOUT ALIGNMENT ONLY; SEE FIRE PROTECTION DRAWINGS FOR SPECIFICATIONS AND PROTECTION REQUIREMENTS.

1 FLOOR 1 - REFLECTED CEILING PLAN
SCALE: 1/8" = 1'-0"

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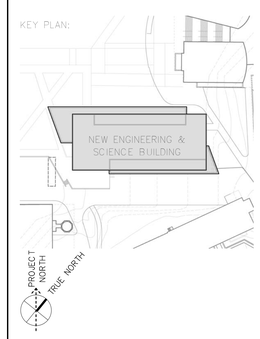


PROJECT:

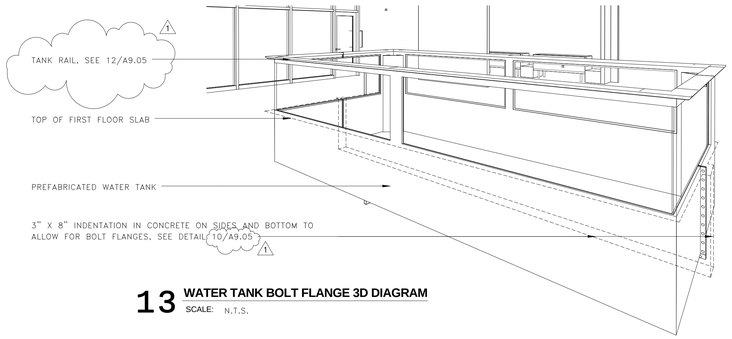
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

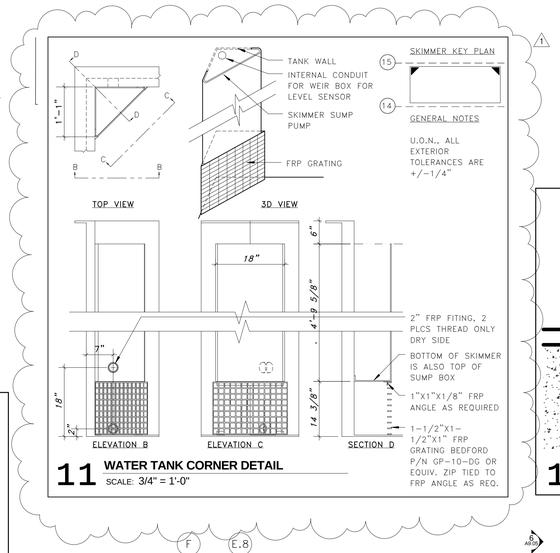
FIRST FLOOR REFLECTED CEILING PLAN

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: 1/8" = 1'-0"

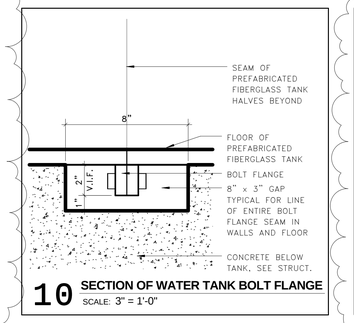
A8.01



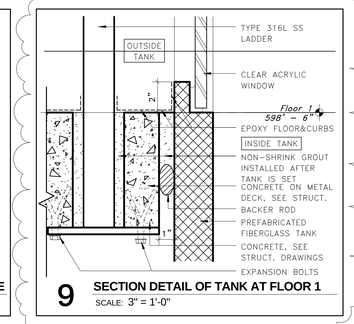
13 WATER TANK BOLT FLANGE 3D DIAGRAM
SCALE: N.T.S.



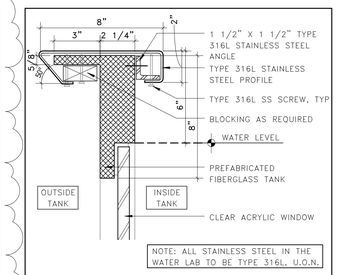
11 WATER TANK CORNER DETAIL
SCALE: 3/4" = 1'-0"



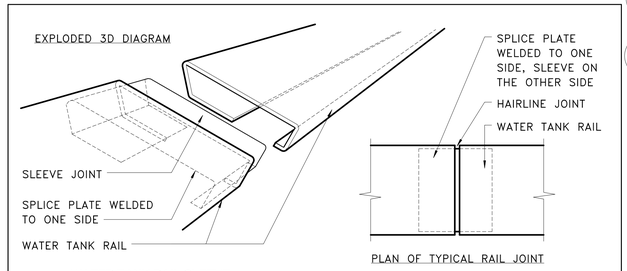
10 SECTION OF WATER TANK BOLT FLANGE
SCALE: 3" = 1'-0"



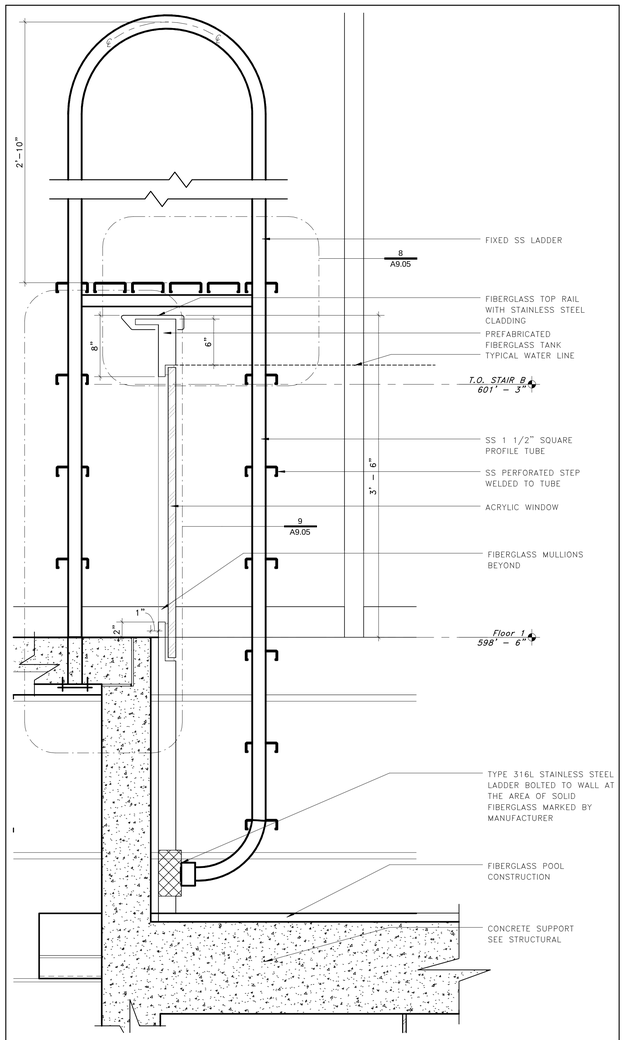
9 SECTION DETAIL OF TANK AT FLOOR 1
SCALE: 3" = 1'-0"



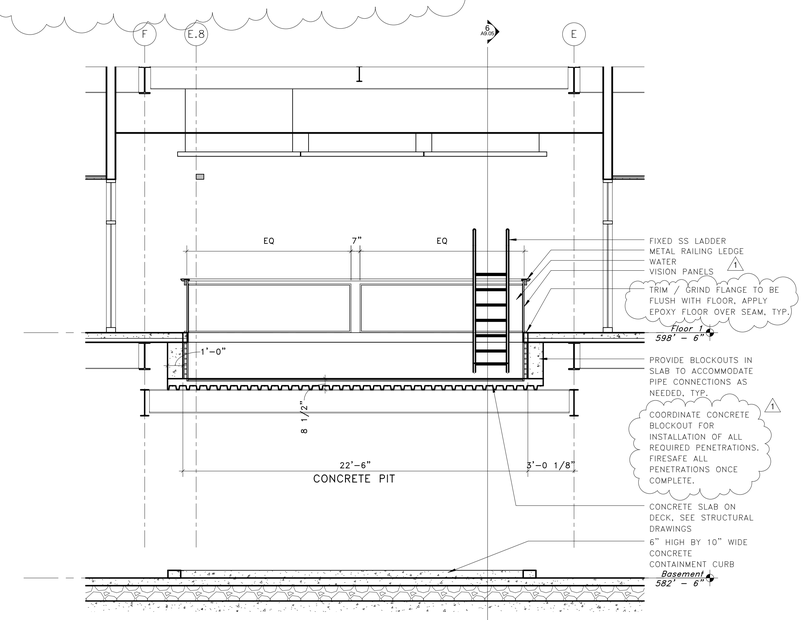
8 SECTION DETAIL AT TANK RAIL
SCALE: 3" = 1'-0"



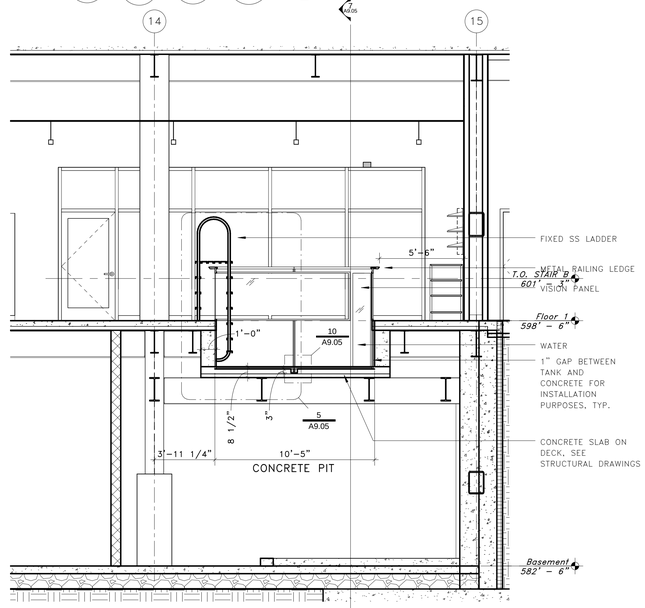
12 WATER TANK RAIL SLEEVE
SCALE: 6" = 1'-0"



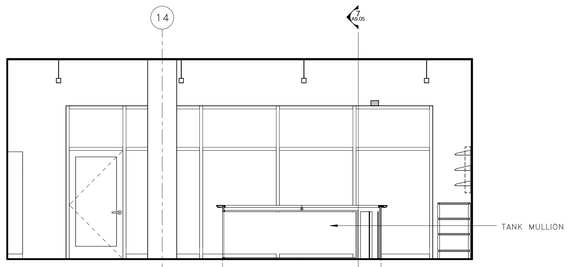
5 WATER TANK SECTION DETAIL
SCALE: 1 1/2" = 1'-0"



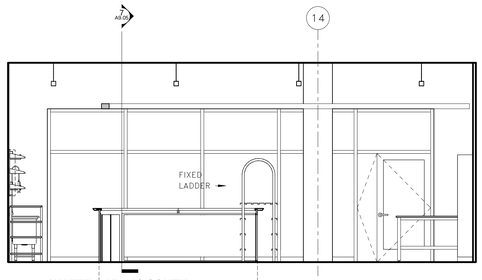
7 WATER TANK SECTION 2
SCALE: 1/4" = 1'-0"



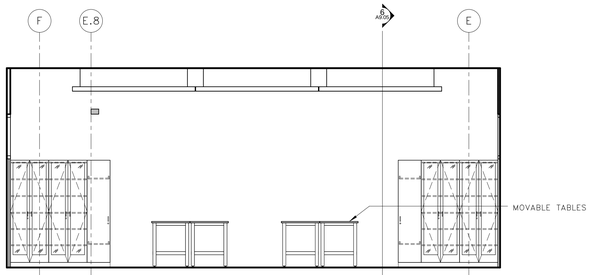
6 WATER TANK SECTION
SCALE: 1/4" = 1'-0"



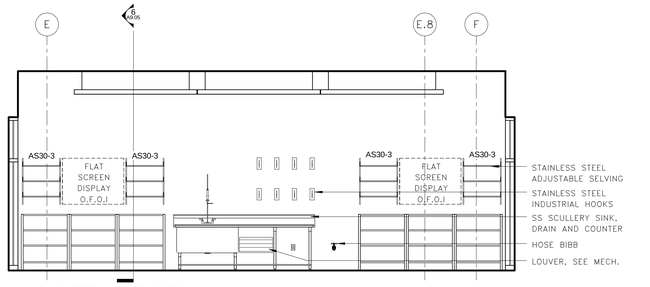
4 WATER LAB 118 NORTH
SCALE: 1/4" = 1'-0"



3 WATER LAB 118 SOUTH
SCALE: 1/4" = 1'-0"



2 WATER LAB 118 WEST
SCALE: 1/4" = 1'-0"



1 WATER LAB 118 EAST
SCALE: 1/4" = 1'-0"

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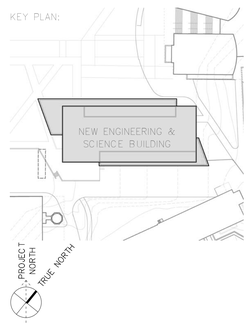
KEY PLAN:



PROJECT:

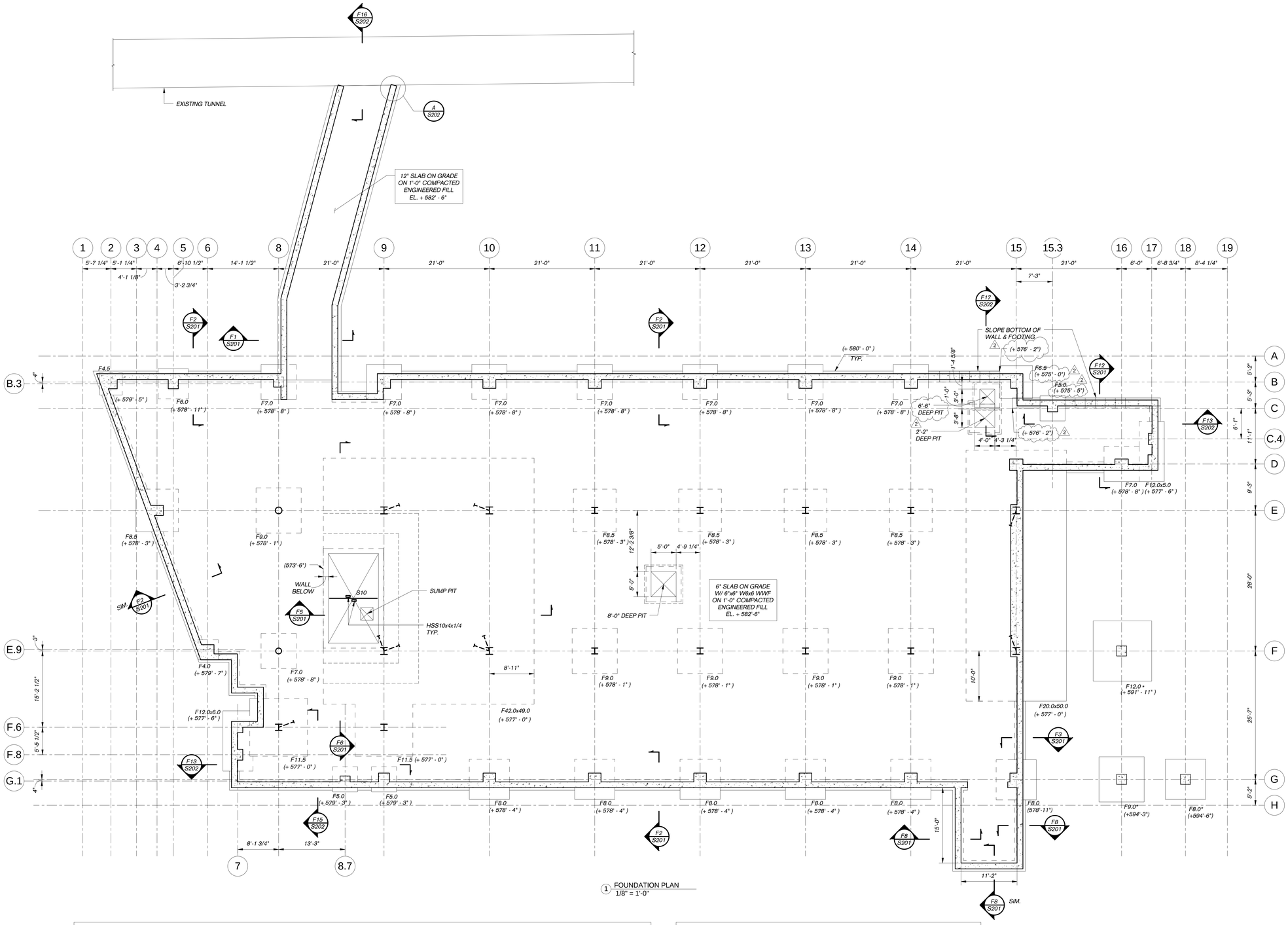
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

1ST FLOOR WATER LAB

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: As indicated

A9.05



1 FOUNDATION PLAN
1/8" = 1'-0"

FOOTING SCHEDULE (ALLOWABLE SOIL BEARING = 5 TSF)

MARK	SIZE	THICKNESS	TOP REINF. (EACH WAY, U.O.N.)	BOTTOM REINF. (EACH WAY, U.O.N.)	REMARKS
F4.0	4'-0" x 4'-0"	17"	-	6 - #4	
F4.5	4'-6" x 4'-6"	19"	-	5 - #5	
F5.0	5'-0" x 5'-0"	21"	-	7 - #5	
F6.0	6'-0" x 6'-0"	25"	-	7 - #6	
F6.5	6'-6" x 6'-6"	26"	-	8 - #6	
F7.0	7'-0" x 7'-0"	28"	-	9 - #6	
F8.0	8'-0" x 8'-0"	32"	-	7 - #8	

MARK	SIZE	THICKNESS	TOP REINF. (EACH WAY, U.O.N.)	BOTTOM REINF. (EACH WAY, U.O.N.)	REMARKS
F8.5	8'-6" x 8'-6"	33"	-	8 - #8	
F9.0	9'-0" x 9'-0"	35"	-	7 - #9	
F11.0	11'-6" x 11'-6"	48"	-	10 - #10	
F12.0 x 5.0	12'-0" x 5'-0"	42"	-	8 - #10 LONG BARS	
F12.0 x 6.0	12'-0" x 6'-0"	42"	-	10 - #10 LONG BARS 10 - #6 SHORT BARS	
F20.0 x 50.0	20'-0" x 50'-0"	48"	-	#6 @ 12" O.C. T.&B. EACH WAY	
F42.0 x 49.0	42'-0" x 49'-0"	48"	-	#6 @ 12" O.C. T.&B. EACH WAY	

FOOTING SCHEDULE (ALLOWABLE SOIL BEARING = 3 TSF)*

MARK	SIZE	THICKNESS	TOP REINF. (EACH WAY, U.O.N.)	BOTTOM REINF. (EACH WAY, U.O.N.)	REMARKS
F8.0*	8'-0" x 8'-0"	26"	-	7 - #7	
F9.0*	9'-0" x 9'-0"	29"	-	9 - #7	
F12.0*	12'-0" x 12'-0"	37"	-	12 - #8	

NOTES:

1. ALL ELEVATIONS ARE PROJECT ELEVATIONS.
2. TOP OF SLAB ELEVATION IS +582'-6" UNLESS OTHERWISE NOTED THUS EL. +__'-__" ON PLAN.
4. BOTTOM OF FOOTING ELEVATIONS ARE NOTED THUS (+__'-__") ON PLAN.
5. FOR GENERAL NOTES, SEE S-600.
6. FOR COLUMN SCHEDULE, SEE S-501 & S-502.
7. FOR TYPICAL DETAILS, SEE S-601 THRU S-603.

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1	2015-03-20	BID ADDENDUM 01
2	2015-04-20	BID ADDENDUM 03

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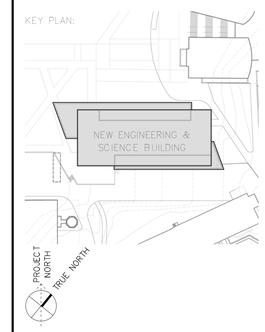
KEY PLAN:



PROJECT:

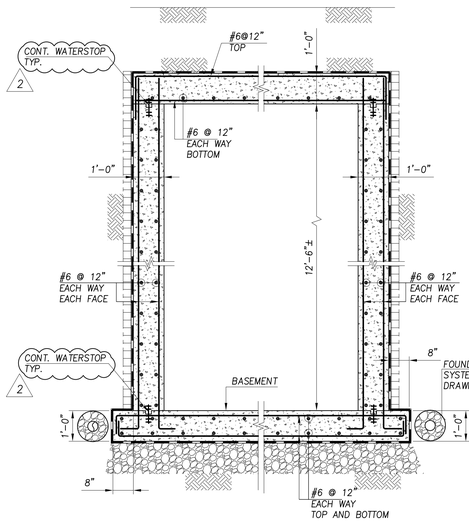
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

FOUNDATION PLAN

PROJECT NO: 13724-01	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: As indicated

S-100



SECTION F1 / S201
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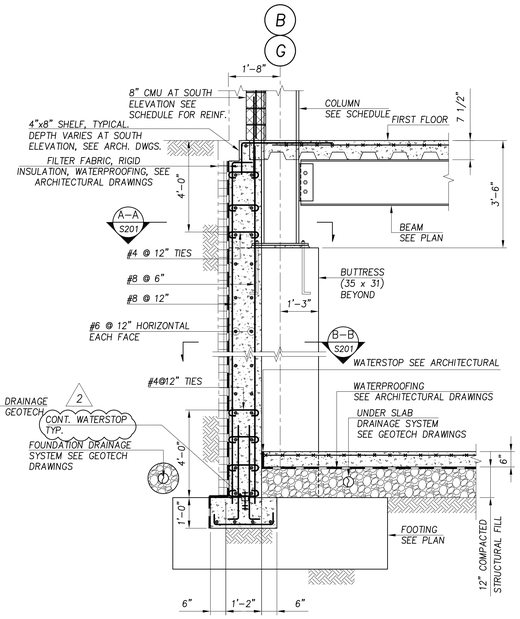

SECTION F2 / S201
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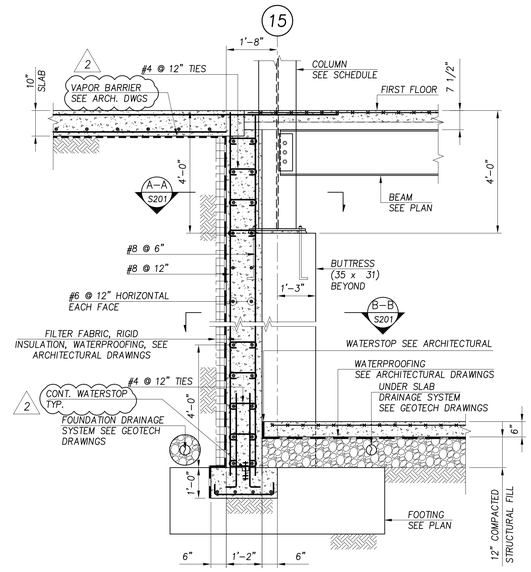

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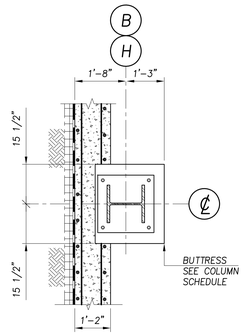
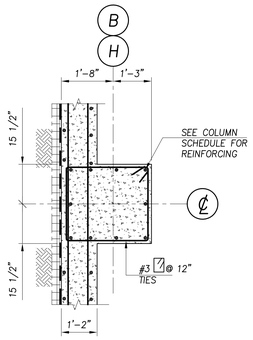


SECTION A-A / S201
1/2" = 1'-0"



SECTION B-B / S201
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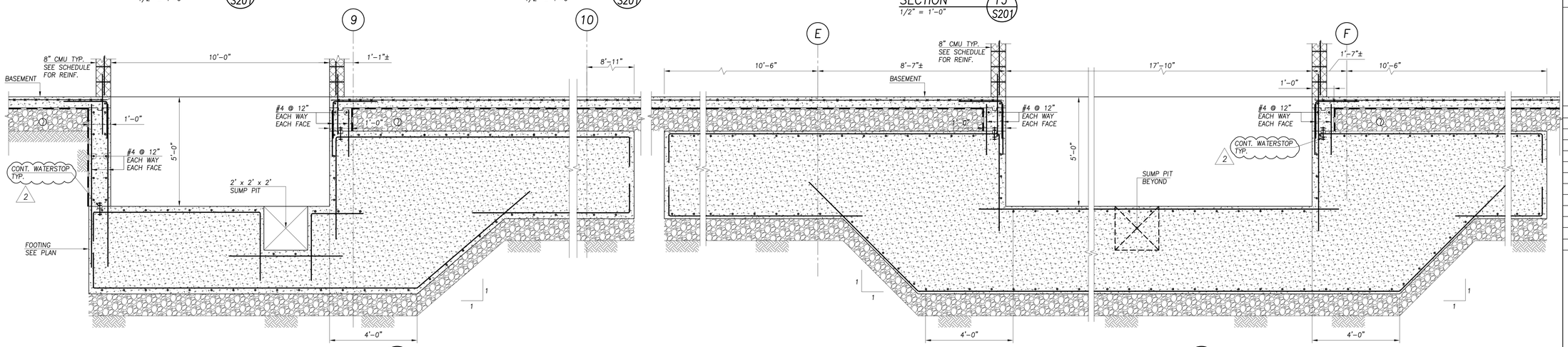
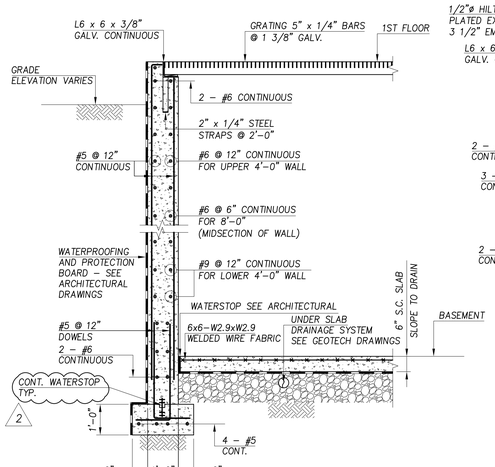
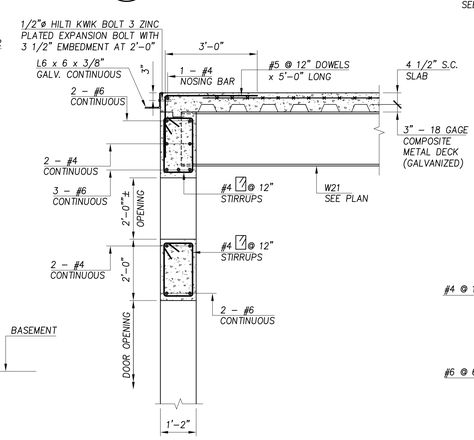


SECTION F5 / S201
1/2" = 1'-0"

SECTION F6 / S201
1/2" = 1'-0"

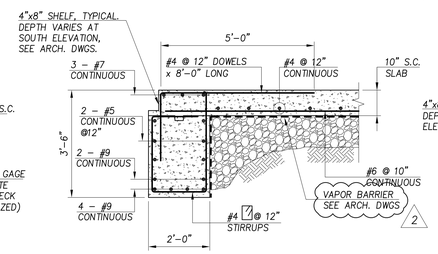


SECTION F8 / S201
1/2" = 1'-0"



NOTE: FOR BALANCE OF INFORMATION SEE SECTION F2/THIS DRAWING

SECTION F9 / S201
1/2" = 1'-0"



SECTION F10 / S201
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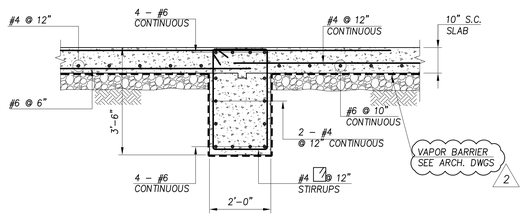

SECTION F11 / S201
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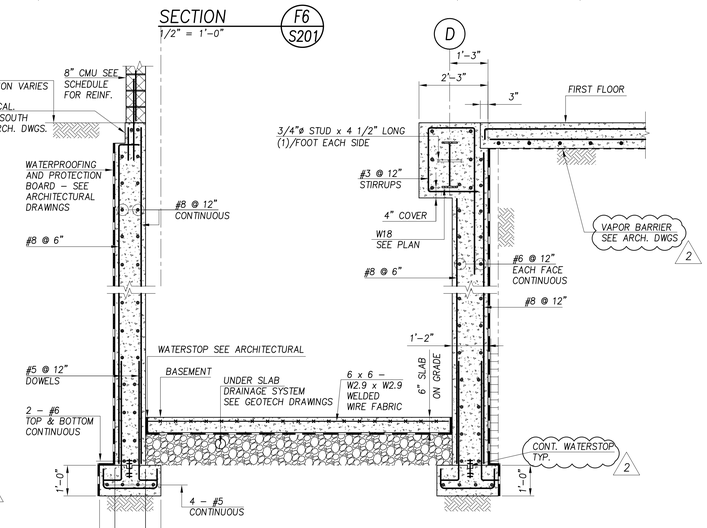

SECTION F12 / S201
1/2" = 1'-0"

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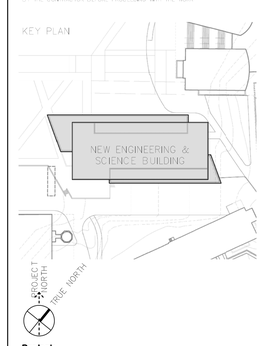


Project:

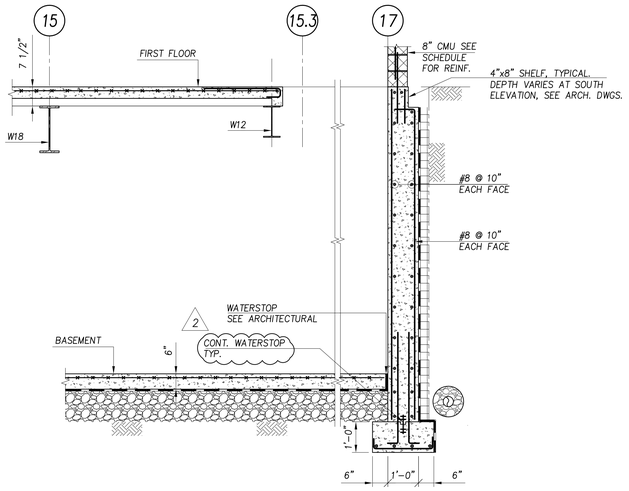
NEW ENGINEERING AND SCIENCE BUILDING

Drawing Title:

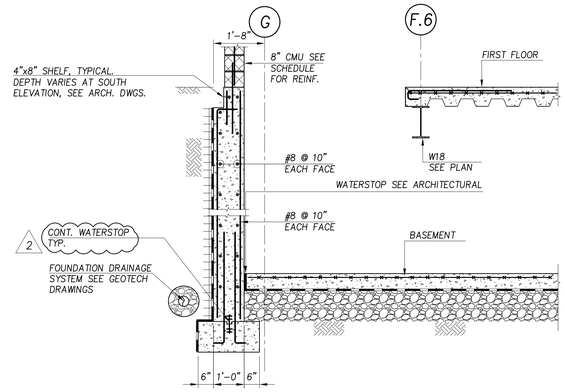
FOUNDATION SECTIONS AND DETAILS – I

PROJECT NO: 13724-01	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMNETS	SCALE: AS NOTED

S–201



SECTION F13/S202
1/2" = 1'-0"



SECTION F15/S202
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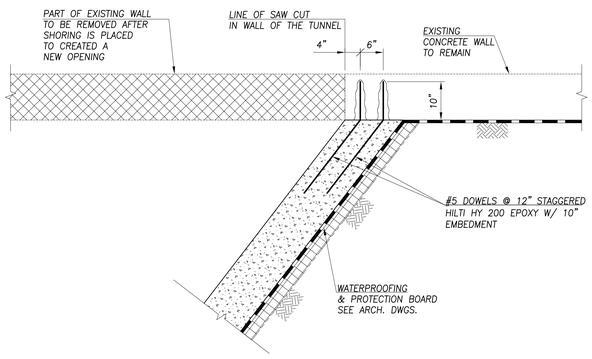
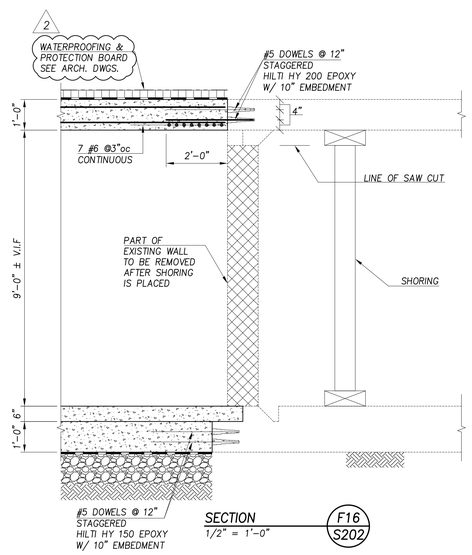


DETAIL A/S202
3/4" = 1'-0"

NOTE: WALL REINFORCEMENT NOT SHOWN FOR CLARITY



SECTION F16/S202
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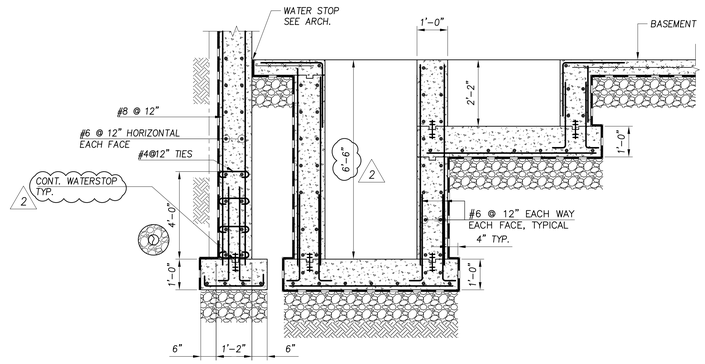

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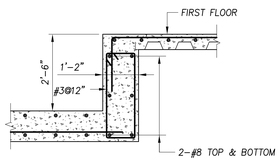

SECTION F18/S202
1/2" = 1'-0"

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02	04.20.15	BID ADDENDUM 03
01	03.20.15	BID ADDENDUM 01

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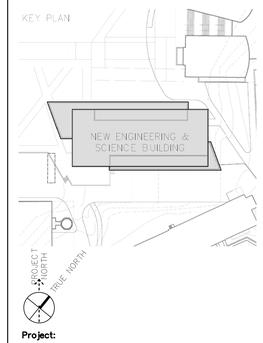
KEY PLAN



Project:

NEW ENGINEERING AND SCIENCE BUILDING

Drawing Title:

FOUNDATION SECTIONS AND DETAILS – II

PROJECT NO: 13724-01	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMNETS	SCALE: AS NOTED

S-202

ADDITIONAL WORK:
AS PART OF THE ENABLING CONTRACT (3) 16" STEAM ISOLATION VALVES SHALL BE REPLACED IN TOTAL. (2) VALVES ARE LOCATED WITHIN THE CUP AT PRV-1 AND (1) VALVE IS LOCATED WITHIN THE UTILITY TUNNEL AT THE POINT WHERE PRV-1 TIES INTO THE STEAM DISTRIBUTION HEADER. REPLACEMENT OF SAID VALVES SHALL ENABLE PRV-1 DIRECT BURY PIPING IN CONFLICT WITH NESB SITE WORK TO BE COMPLETELY ISOLATED FROM STEAM PRESSURE. REFER TO UNDERGROUND PIPING SPEC FOR STEAM VALVE REQUIREMENTS.

VALVE SPEC:

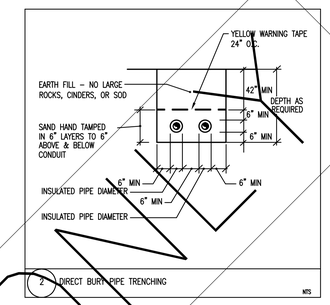
1. STEAM ISOLATION VALVES TO BE USED IN BELOW GRADE LOCATIONS INCLUDING UNDERGROUND TUNNELS AND VAULTS SHALL BE TRI-CON TRIPLE-OFFSET ROTARY ISOLATION VALVES MANUFACTURED BY ZWICK VALVES FOR STEAM, 150LB CLASS, WITH CARBON STEEL BODY AND STAINLESS STEEL SEAT, WITH CAST IRON GEAR OPERATOR SHALL BE 100% PACKED WITH HIGH TEMPERATURE GREASE FOR SUBMERGED SERVICE PER STANDARD IP68 STANDARD WITH VITON SEALS AND THREE-PART MARINE EPOXY COATING. A STAINLESS STEEL METAL INLAY SHALL BE PROVIDED TO STRENGTHEN THE CARBON GRAPHITE LAYERS IN THE LAMINATED SEAL RING. ALL VALVES SHALL BE PROVIDED WITH HAND-WHEEL AND A 2 INCH SQUARE OPERATING NUT ON THE CENTER OF THE HAND-WHEEL FOR REMOTE OPERATION USING A STANDARD TEE-HANDLE.

2. STEAM AND CONDENSATE VALVES 3" AND LARGER ABOVE GRADE APPLICATIONS – ZWICK TRI-CON TRIPLE-OFFSET ROTARY ISOLATION VALVES FOR STEAM OR CRANE FLOWSEAL VALVES FOR STEAM. ALL VALVES SHALL BE PROVIDED WITH HAND-WHEEL AND A 2 INCH SQUARE OPERATING NUT ON THE CENTER OF THE HAND-WHEEL FOR REMOTE OPERATION USING A STANDARD TEE-HANDLE.

3. TEMPORARY DIRECT BURY UNDERGROUND ISOLATION VALVES SHALL NOT BE HELD TO THE ABOVE REQUIREMENTS. SAID VALVES SHALL BE BE CAST IRON, 150LB CLASS, NON-RISING STEM FOR STEAM AND CONDENSATE SERVICE. THE CONTRACTOR SHALL PROVIDE A PROPOSED MFG. AND VALVE SUBMITTAL FOR OWNER AND ENGINEER APPROVAL.

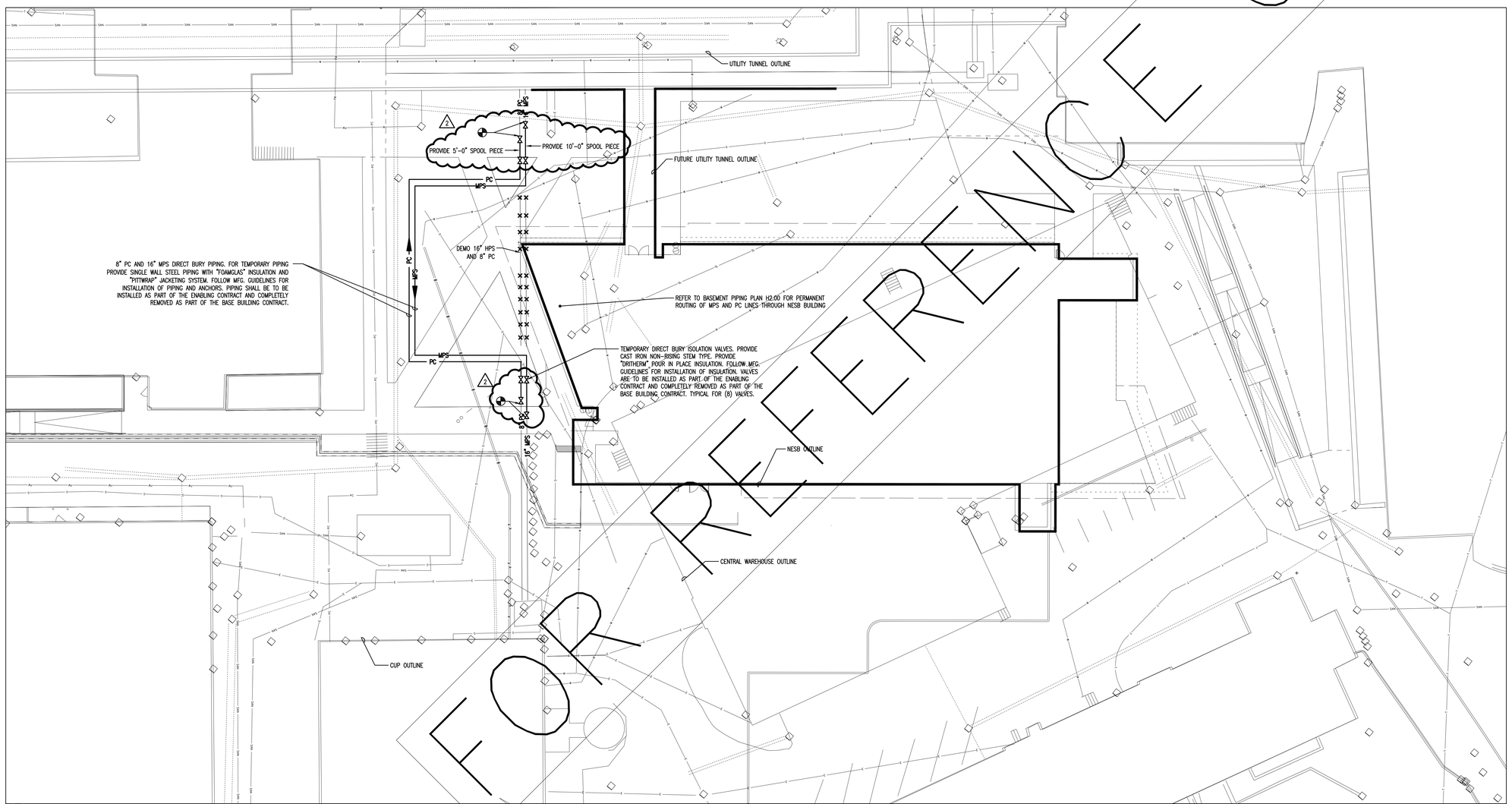
4. BLOCK AND BLEED VALVE ARRANGEMENTS SHOULD BE LOCATED AT LOCATIONS TO ISOLATE LOGICAL PORTIONS OF STEAM SYSTEM FOR MAINTENANCE OR EMERGENCY REPAIRS. BLEED/VENT SHALL BE ACCESSIBLE AND OPERABLE.

3 ADDITIONAL NOTES



2 DIRECT BURY PIPE TRENCHING

NTS



1 SITE PLAN

SCALE: 1/16" = 1'-0"

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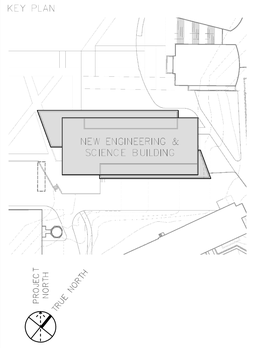


Project:

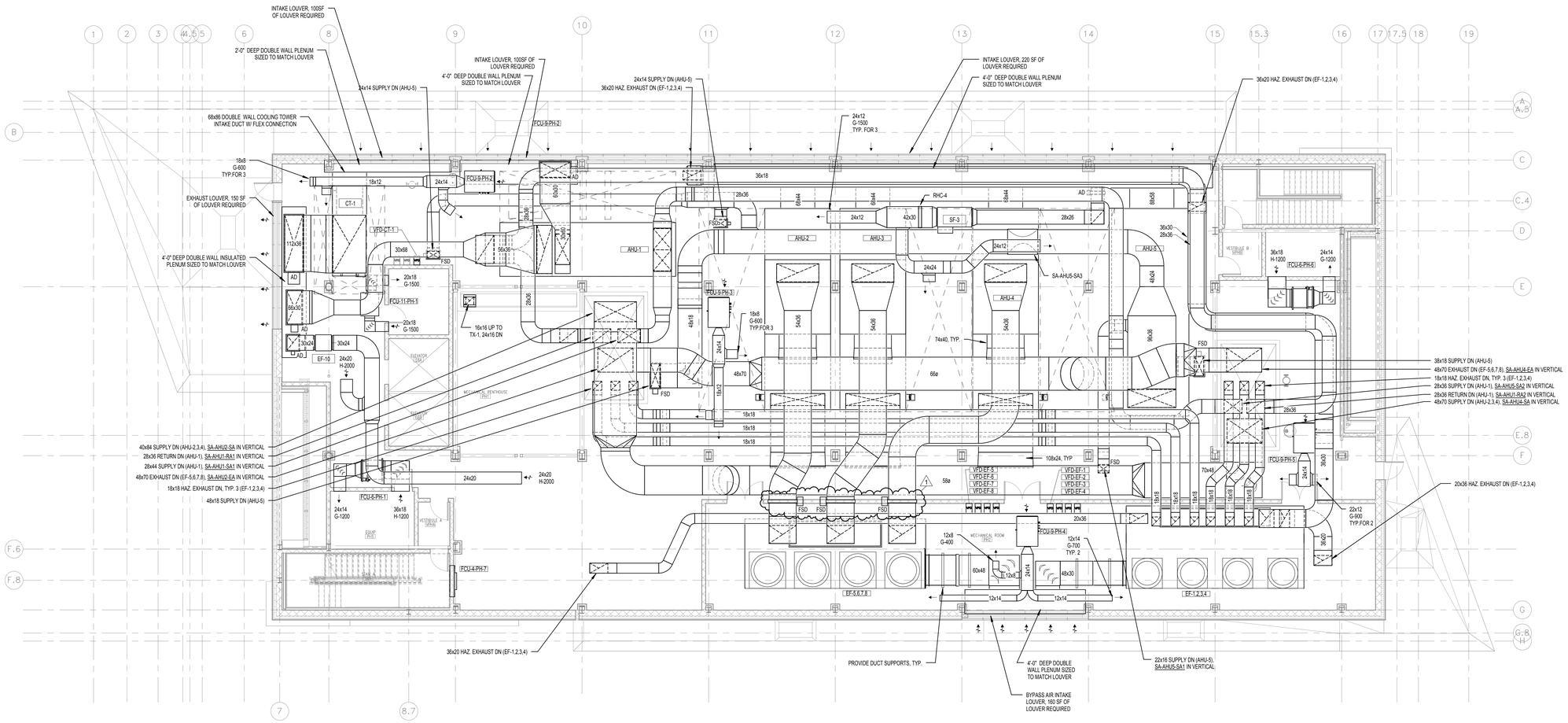
NEW ENGINEERING AND SCIENCE BUILDING: SITE ENABLING

Drawing Title:

HVAC ENABLING SITE PLAN

PROJECT NO:	DATE:
PHASE:	SCALE: AS NOTED

H0.10



01 PENTHOUSE DUCTWORK PLAN
1/8" = 1'-0"

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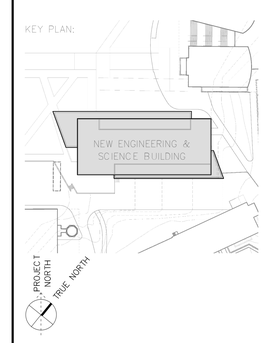
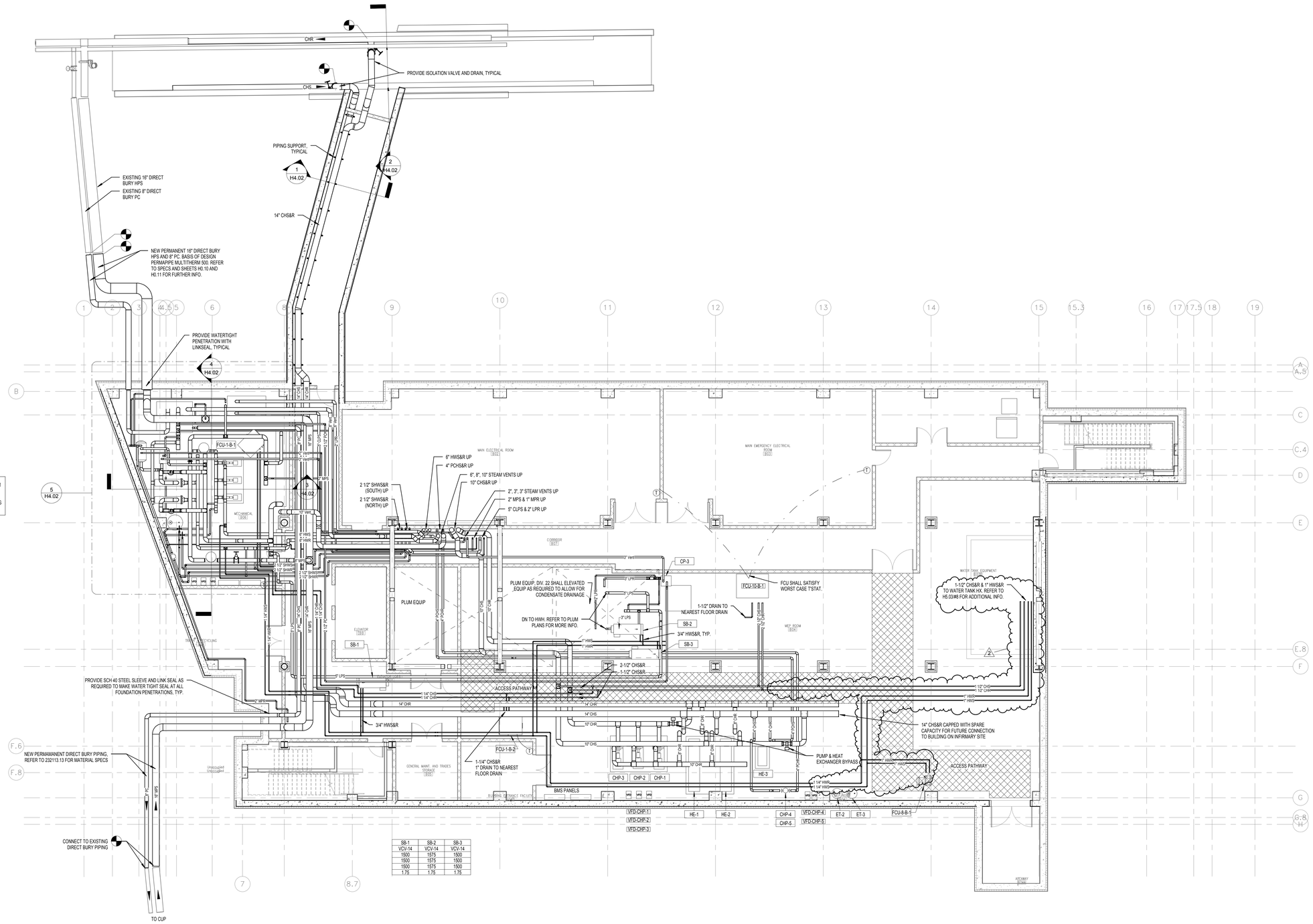


PROJECT:
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:
PENTHOUSE DUCTWORK PLAN

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: 1/8" = 1'-0"

H1.06



SB-1	SB-2	SB-3
VCV-14	VCV-14	VCV-14
1500	1575	1500
1500	1575	1500
1500	1575	1500
1.75	1.75	1.75

01 BASEMENT PIPING PLAN
1/8" = 1'-0"

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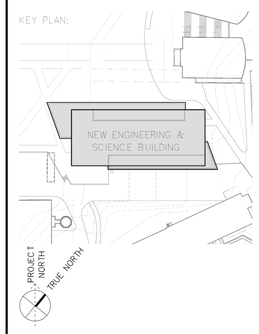


PROJECT:

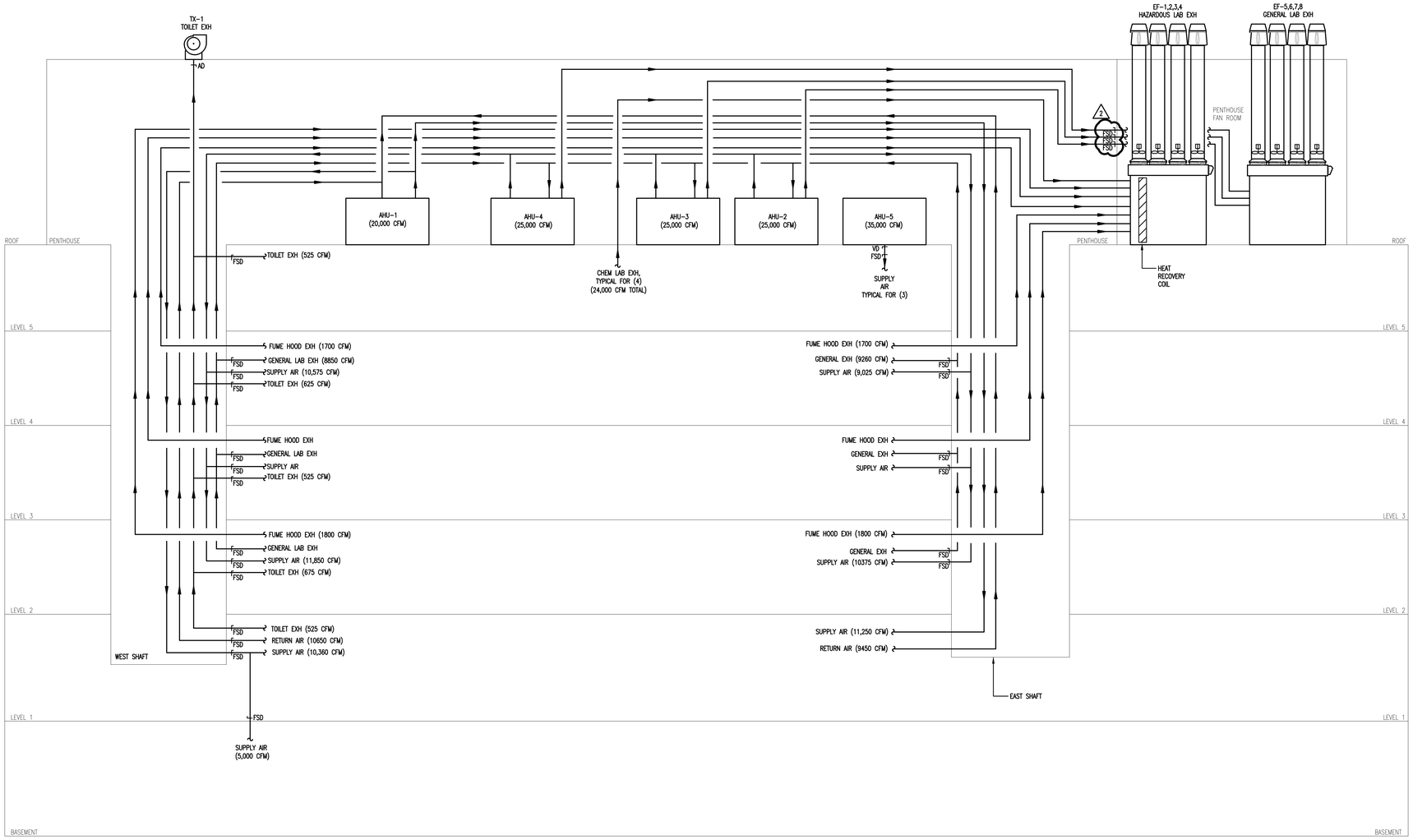
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

BASEMENT PIPING PLAN

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: 1/8" = 1'-0"

H2.00



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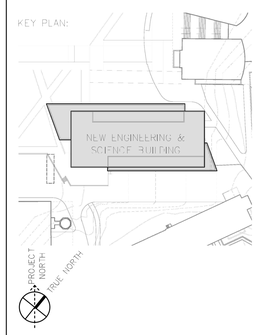


PROJECT:

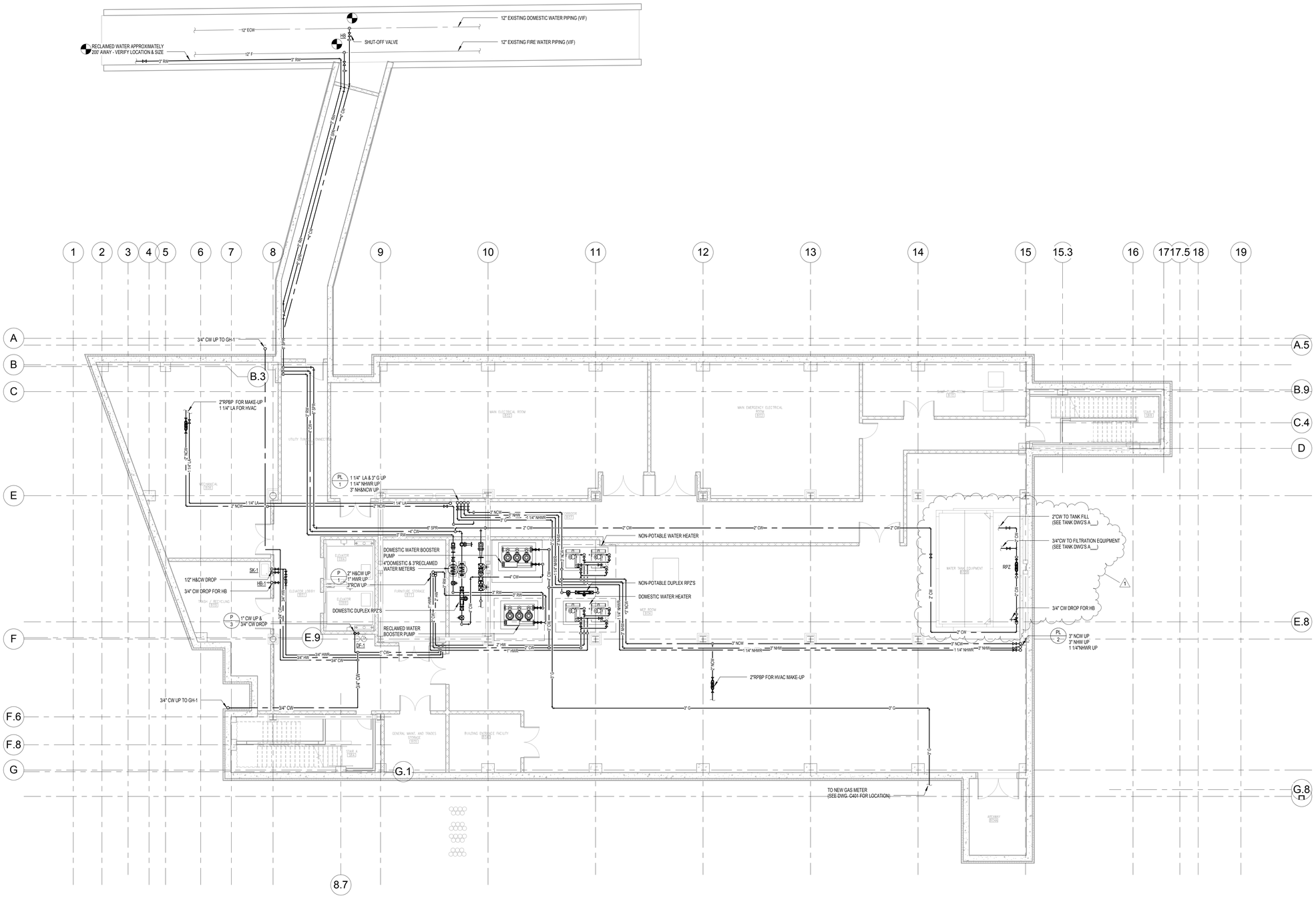
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

HVAC
AIRFLOW DIAGRAM

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: N.T.S.

H3.00



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ISSUE/REVISION:

NO.	DATE	COMMENTS
1	04/20/2015	ADDENDUM 3

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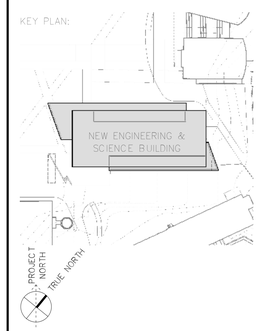
KEY PLAN:



PROJECT:

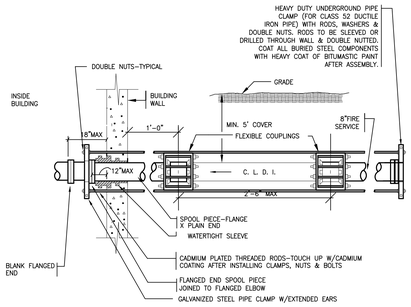
NEW ENGINEERING AND SCIENCE BUILDING

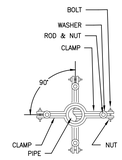
DRAWING TITLE:

PLUMBING SUPPLY BASEMENT FLOOR PLAN

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: 1/8" = 1'-0"

P1.00





END VIEW OF PIPE WITH 2 CLAMPS

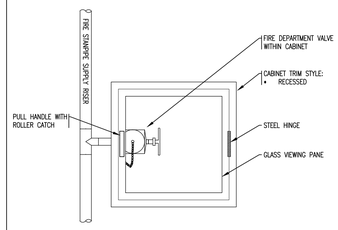
MINIMUM SIZES FOR CLAMPS, RODS, BOLTS & WASHERS

PIPE DIA	CLAMPS	RODS	BOLTS	WASHERS
4"&6"	1/2"x2"	(2)5/8"	5/8"	5/8"x3"ø
8"	5/8"x2"	(2)3/4"	5/8"	5/8"x3"ø
10"	(2)5/8"x2"	(4)5/8"	3/4"	5/8"x3"ø
12"	(2)5/8"x3"	(4)3/4"*	7/8"	3/4"x3 1/2"ø

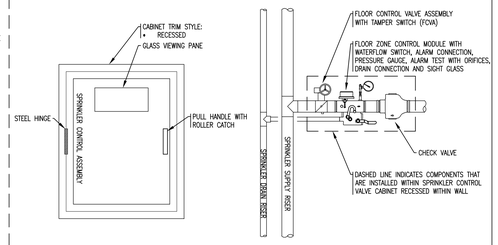
* 2 RODS PER CLAMP

NOTE(S):
1. PROVIDE NIPPLE EXTENSIONS AS REQUIRED BY CONSTRUCTION OF EXTERIOR WALL.
2. REFER TO DESIGN DOCUMENTS FOR SPECIFIC QUANTITY OF CLAPPER INLETS AND SIZES.

FP 001 FIRE PROTECTION SERVICE THROUGH FOUNDATION WALL
SCALE: NONE



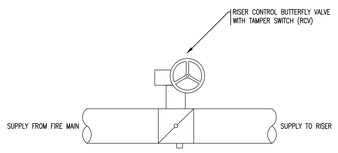
FIRE STANDPIPE ONLY



SPRINKLER SUPPLY AND DRAIN

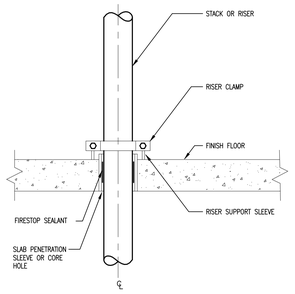
NOTE(S):
1. PROVIDE FIRE RATED CABINET(S) WHERE REQUIRED.
2. REFER TO ARCHITECTURAL ELEVATIONS AND PLANS FOR CABINET LOCATIONS AND HEIGHTS.
3. PROVIDE SYSTEM INFORMATION AND HYDRAULIC DATA SIGN ON EVERY FLOOR AT SPRINKLER ONLY RISER.

FP 002 FIRE PROTECTION RISERS, CONTROL VALVE ASSEMBLY, AND CABINETS
SCALE: NONE



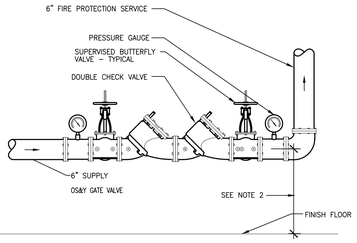
NOTE(S):
1. PROVIDE AT THE BASE OF EVERY FIRE PROTECTION RISER IN ACCESSIBLE LOCATION.

FP 003 RISER CONTROL VALVE (RCV)
SCALE: NONE



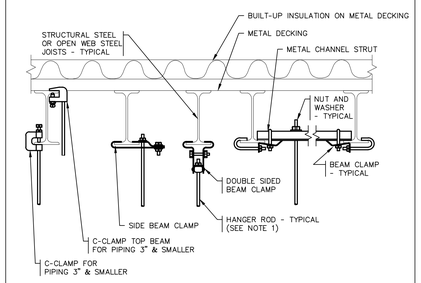
NOTE(S):
1. FIRESTOP SEALANTS AND PIPING PENETRATIONS THROUGH FIRE RATED ASSEMBLIES SHALL COMPLY WITH THE UL FIRE RESISTANCE DIRECTORY.

FP 004 SLAB PENETRATION AND RISER SUPPORT SLEEVE
SCALE: NONE



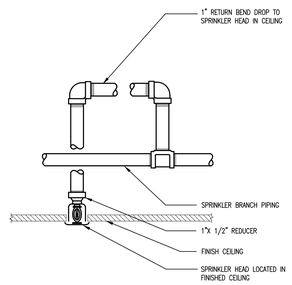
NOTE(S):
1. SUPPORT PIPING AND FITTINGS AS REQUIRED TO CONFORM TO MANUFACTURERS REQUIREMENTS.
2. INSTALL DCVA 3" TO 4" AFF WITH CLEAR SPACE OF 3" IN FRONT, 1" AT EACH END AND 1" FROM WALL (MINIMUM).

FP 005 DOUBLE CHECK VALVE ASSEMBLY
SCALE: NONE



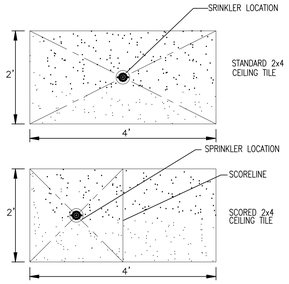
NOTE(S):
1. –

FP 006 CENTER OF TILE SPRINKLER LOCATIONS
SCALE: NONE



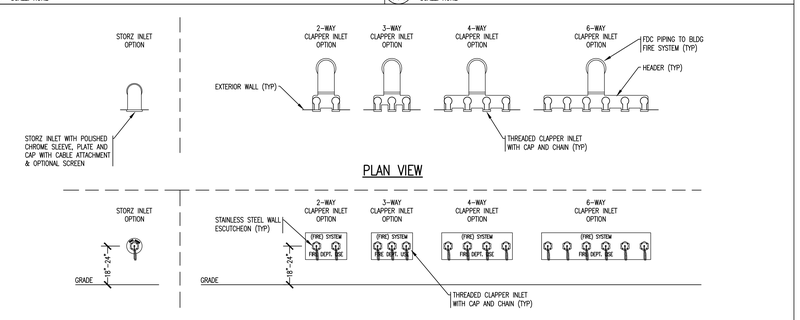
NOTE(S):
1. PROVIDE AT THE BASE OF EVERY FIRE PROTECTION RISER IN ACCESSIBLE LOCATION.

FP 007 SPRINKLER RETURN BEND DROP
SCALE: NONE



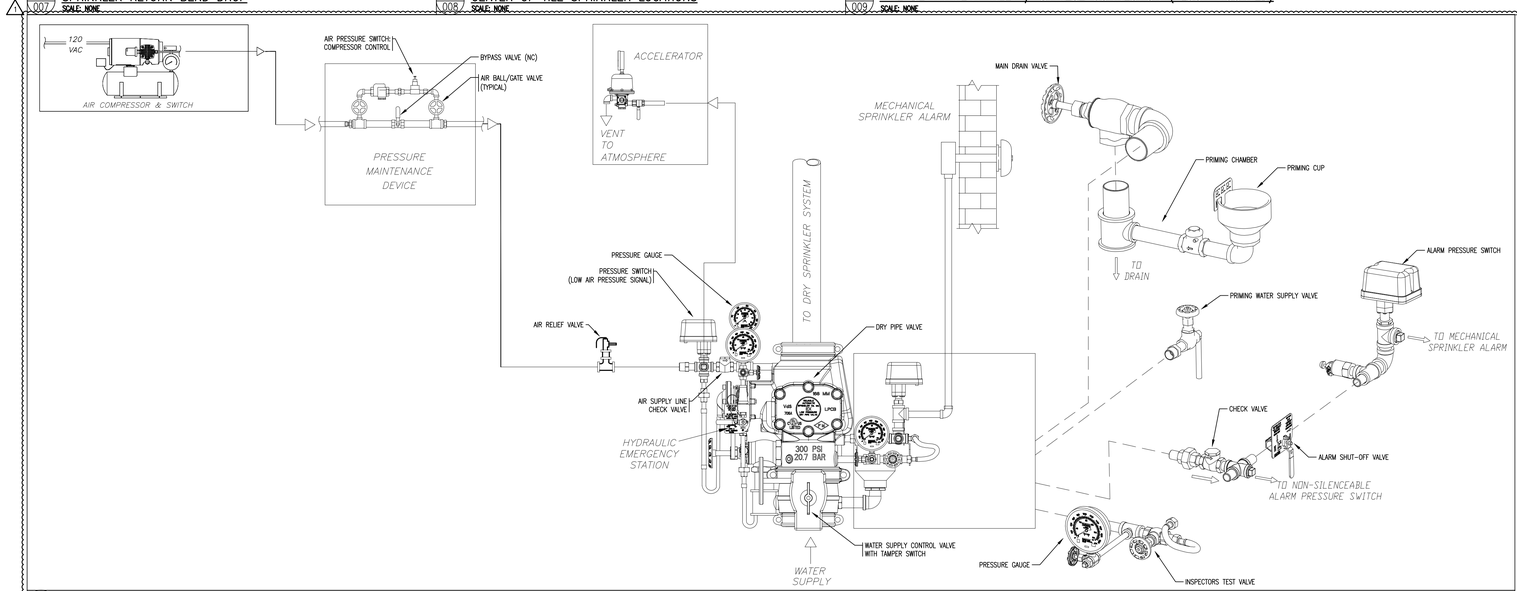
NOTE(S):
1. –

FP 008 CENTER OF TILE SPRINKLER LOCATIONS
SCALE: NONE



NOTE(S):
1. PROVIDE NIPPLE EXTENSIONS AS REQUIRED BY CONSTRUCTION OF EXTERIOR WALL.
2. REFER TO DESIGN DOCUMENTS FOR SPECIFIC QUANTITY OF CLAPPER INLETS AND SIZES.

FP 009 FIRE DEPARTMENT INLET / SIAMESE CONNECTION (FLUSH MOUNTED)
SCALE: NONE



FP 010 DRY ALARM CHECK VALVE
SCALE: NONE

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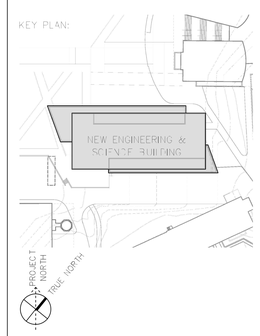
KEY PLAN:

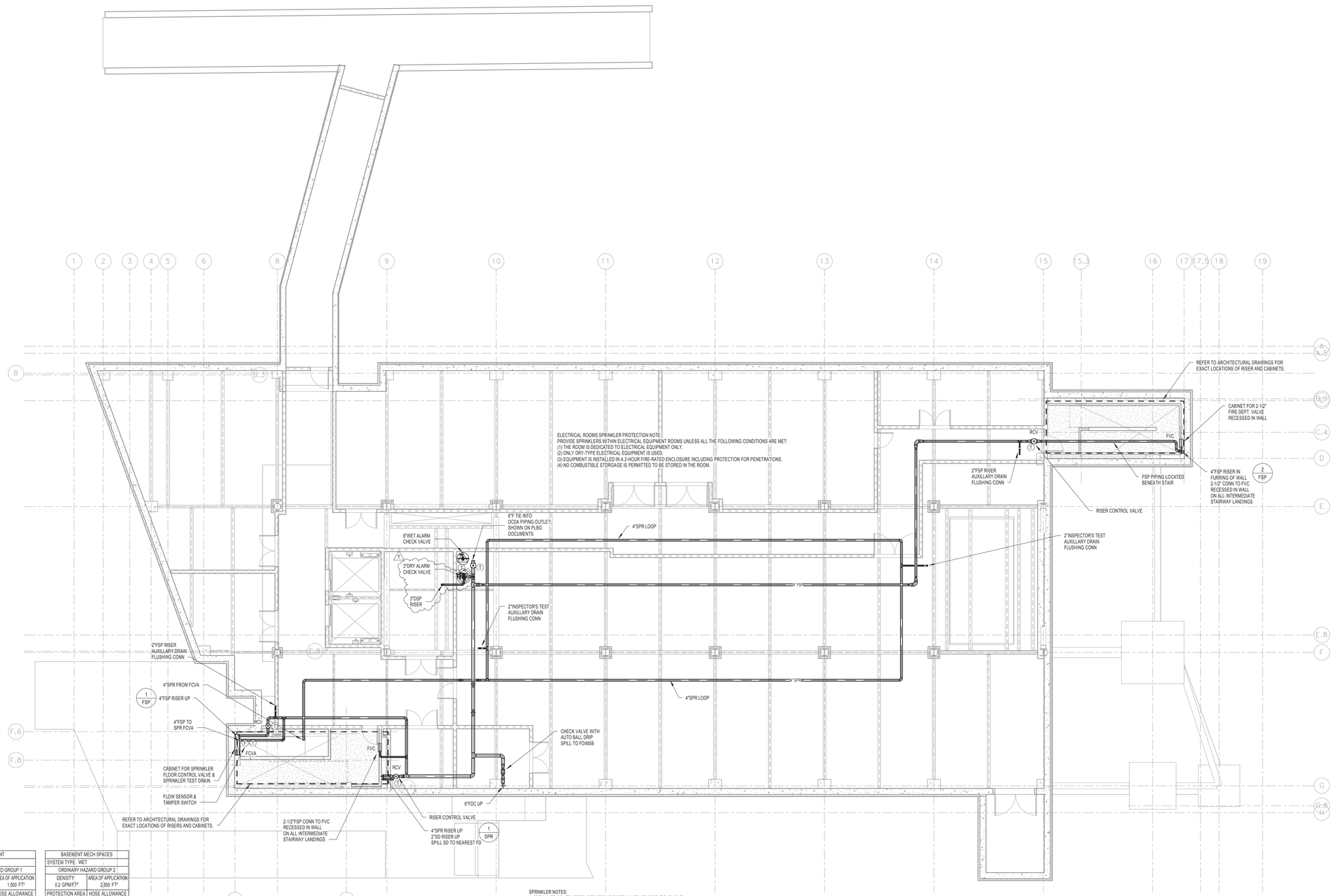


PROJECT:
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:
FIRE PROTECTION DETAILS

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: NTS

FP0.02



BASEMENT	
SYSTEM TYPE: WET	
ORDINARY HAZARD GROUP 1	
DENSITY: 0.15 GPM/FT²	AREA OF APPLICATION 1,500 FT²
PROTECTION AREA 130 FT² SPRINKLER	HOSE ALLOWANCE 250 GPM
REMARKS:	

BASEMENT MECH SPACES	
SYSTEM TYPE: WET	
ORDINARY HAZARD GROUP 2	
DENSITY: 0.2 GPM/FT²	AREA OF APPLICATION 2,500 FT²
PROTECTION AREA 130 FT² SPRINKLER	HOSE ALLOWANCE 250 GPM
REMARKS: SPRINKLER K-FACTOR SHALL BE A MINIMUM OF 8.0.	

SPRINKLER NOTES:
1. SPRINKLER CONTRACTOR IS TO PROVIDE SPRINKLER HEADS THROUGHOUT INCLUDING ABOVE & BELOW PANEL CEILING CONSTRUCTION, ELECTRICAL AND TELEPHONE ROOMS, MER & ATTIC SPACES, ETC.
2. REFER TO LATEST ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF SPRINKLER HEADS.
3. REFER TO RISER DIAGRAM FOR ADDITIONAL INFORMATION & PIPE SIZES.

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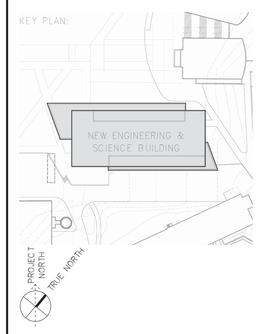


PROJECT:

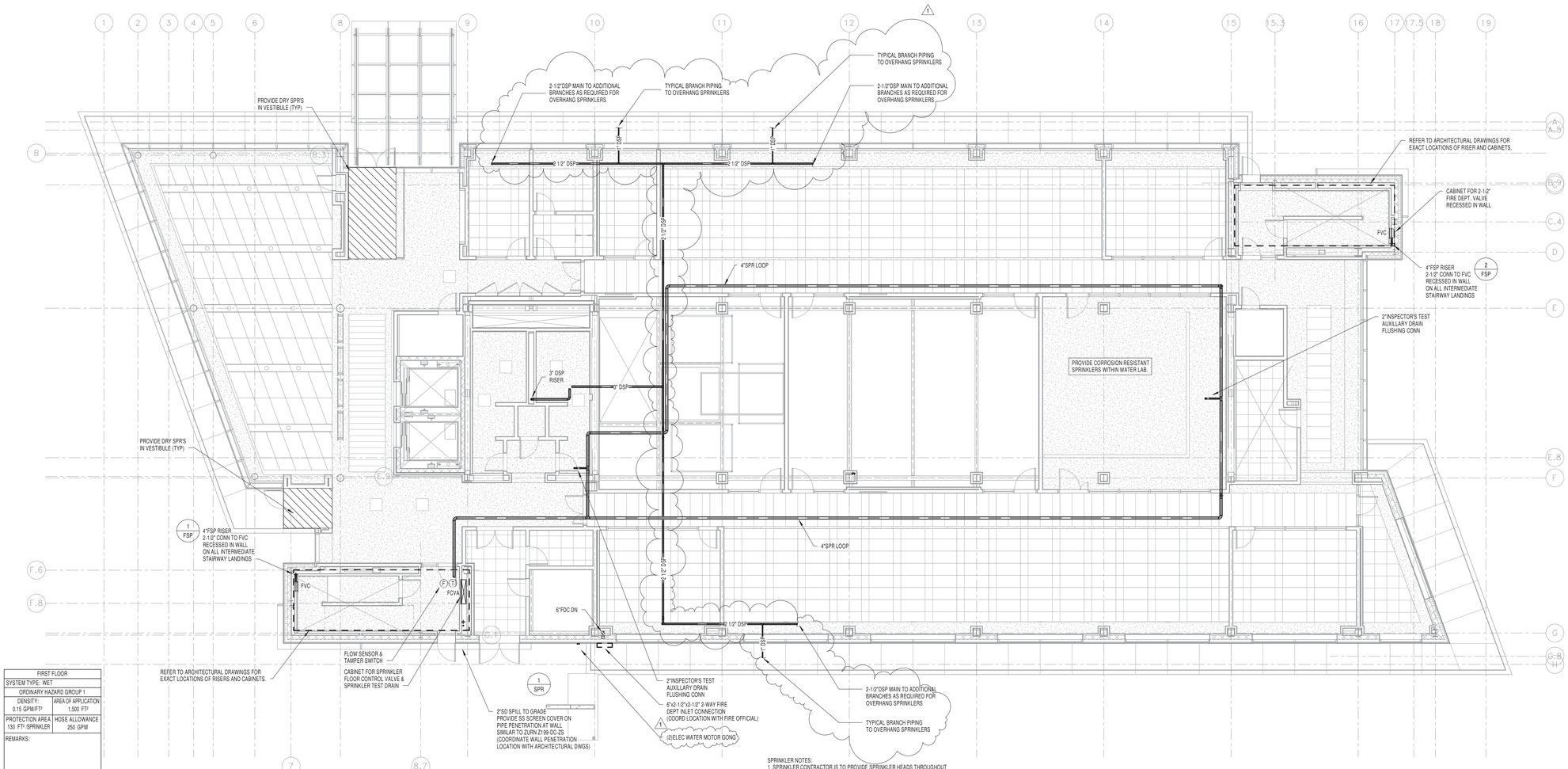
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

FIRE PROTECTION BASEMENT PLAN

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: 1/8" = 1'-0"

FP1.00



FIRST FLOOR	
SYSTEM TYPE: WET	
ORDINARY HAZARD GROUP 1	
DENSITY: 0.15 GPM/FT²	AREA OF APPLICATION 1,500 FT²
PROTECTION AREA 130 FT² /SPRINKLER	HOSE ALLOWANCE 250 GPM
REMARKS:	

SPRINKLER NOTES:
1. SPRINKLER CONTRACTOR IS TO PROVIDE SPRINKLER HEADS THROUGHOUT INCLUDING ABOVE & BELOW PANEL CEILING CONSTRUCTION, ELECTRICAL AND TELEPHONE ROOMS, MER & ATTIC SPACES, ETC.
2. REFER TO LATEST ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF SPRINKLER HEADS.
3. REFER TO RISER DIAGRAM FOR ADDITIONAL INFORMATION & PIPE SIZES.

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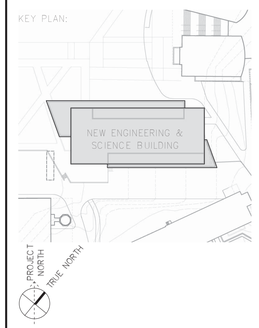
KEY PLAN:



PROJECT:

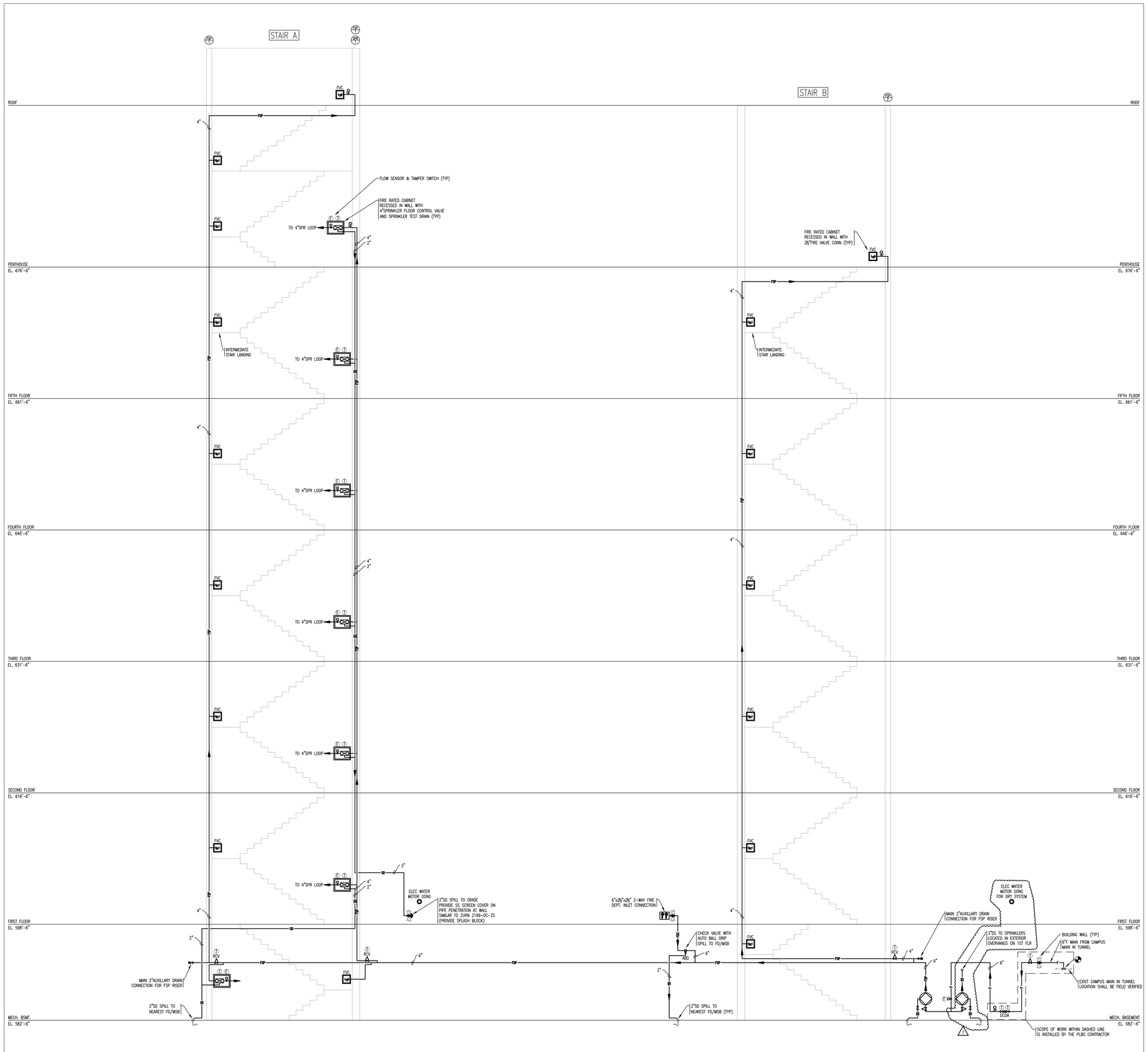
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

FIRE PROTECTION FIRST FLOOR

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: 1/8" = 1'-0"

FP1.01



1 FIRE PROTECTION RISER DIAGRAM

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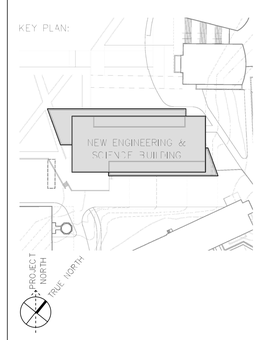
KEY PLAN:



PROJECT:

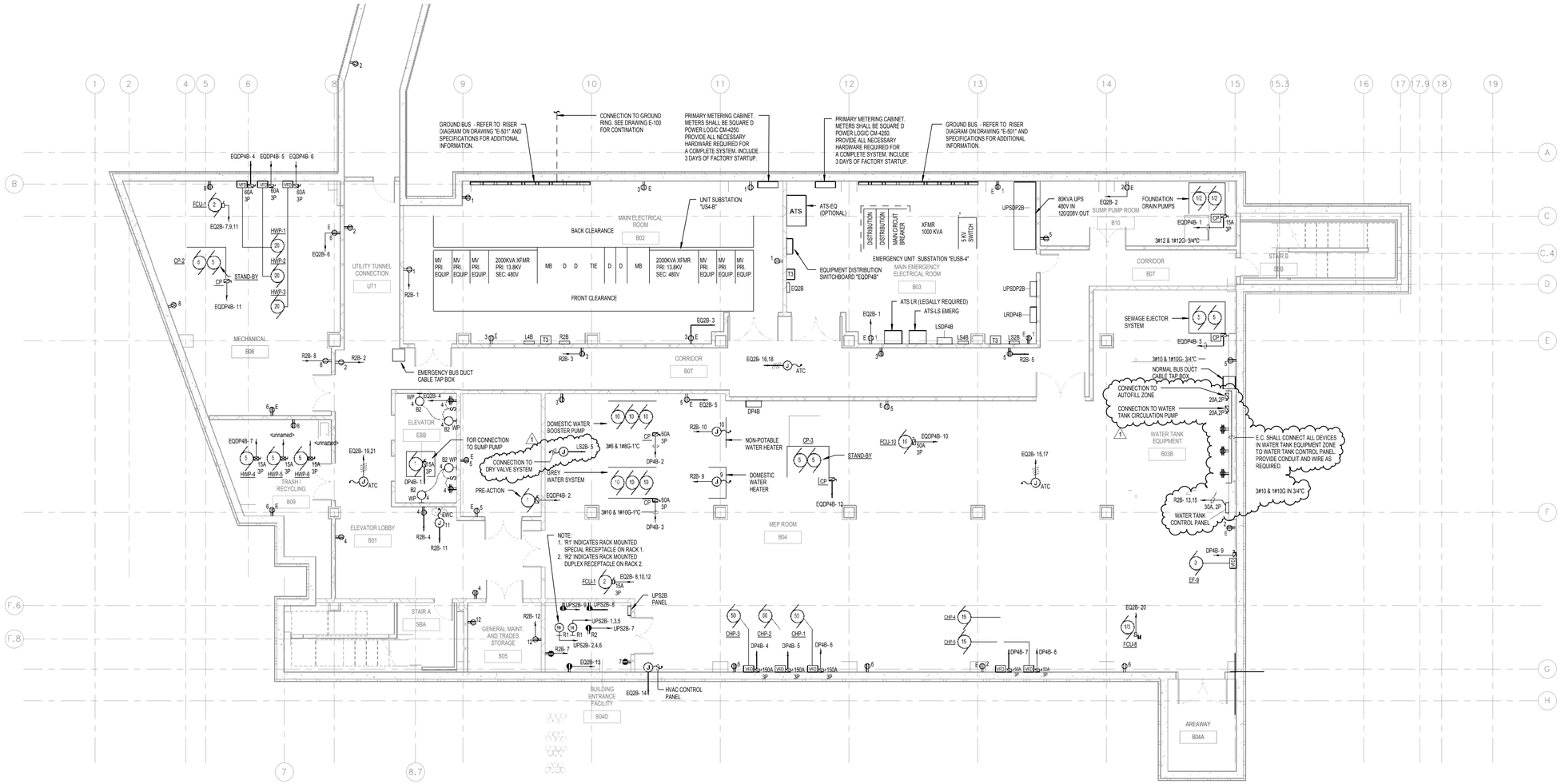
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

FIRE PROTECTION RISER DIAGRAM

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: NONE

FP3.00



01 Basement – FLOOR PLAN – POWER
1/8" = 1'-0"

GENERAL POWER NOTES:

1. REFER TO DRAWING E-001 FOR IDENTIFICATION OF ALL ELECTRICAL DEVICES.
2. REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT LOCATION AND MOUNTING HEIGHTS FOR ALL DEVICES.
3. REFER TO SPECIAL PURPOSE RECEPTACLE SCHEDULE ON DWG. E-001 FOR DEVICE AND BRANCH CIRCUIT INFORMATION.
4. REFER TO MOTOR WIRING SCHEDULE ON DRAWING E-001 FOR CONDUIT AND WIRE SIZE REQUIREMENTS TO EACH MOTOR (TYPICAL).
5. REFER TO MECHANICAL DRAWINGS (HVAC, PLUMBING AND F/P) FOR EXACT LOCATION OF EQUIPMENT PRIOR TO SERVICE ROUGH-IN.
6. OUTLETS LOCATED WITHIN 6'-0" OF SINK SHALL BE GFI TYPE.
7. THE ELECTRICAL CONTRACTOR SHALL FIELD COORDINATE EXACT LOCATION OF FLUSH MOUNTED LAB PANELS WITH OTHER TRADES (i.e. HVAC, SPRINKLERS, LAB GAS PIPING) TO AVOID CONFLICTS WITH PANELBOARD INSTALLATION.
8. COORDINATE EXACT LOCATION OF ALL FLOOR MOUNTED DEVICES WITH ARCHITECT PRIOR TO INSTALLATION.

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NO.	DATE	COMMENTS
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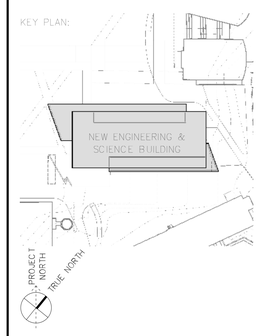
KEY PLAN:



PROJECT:

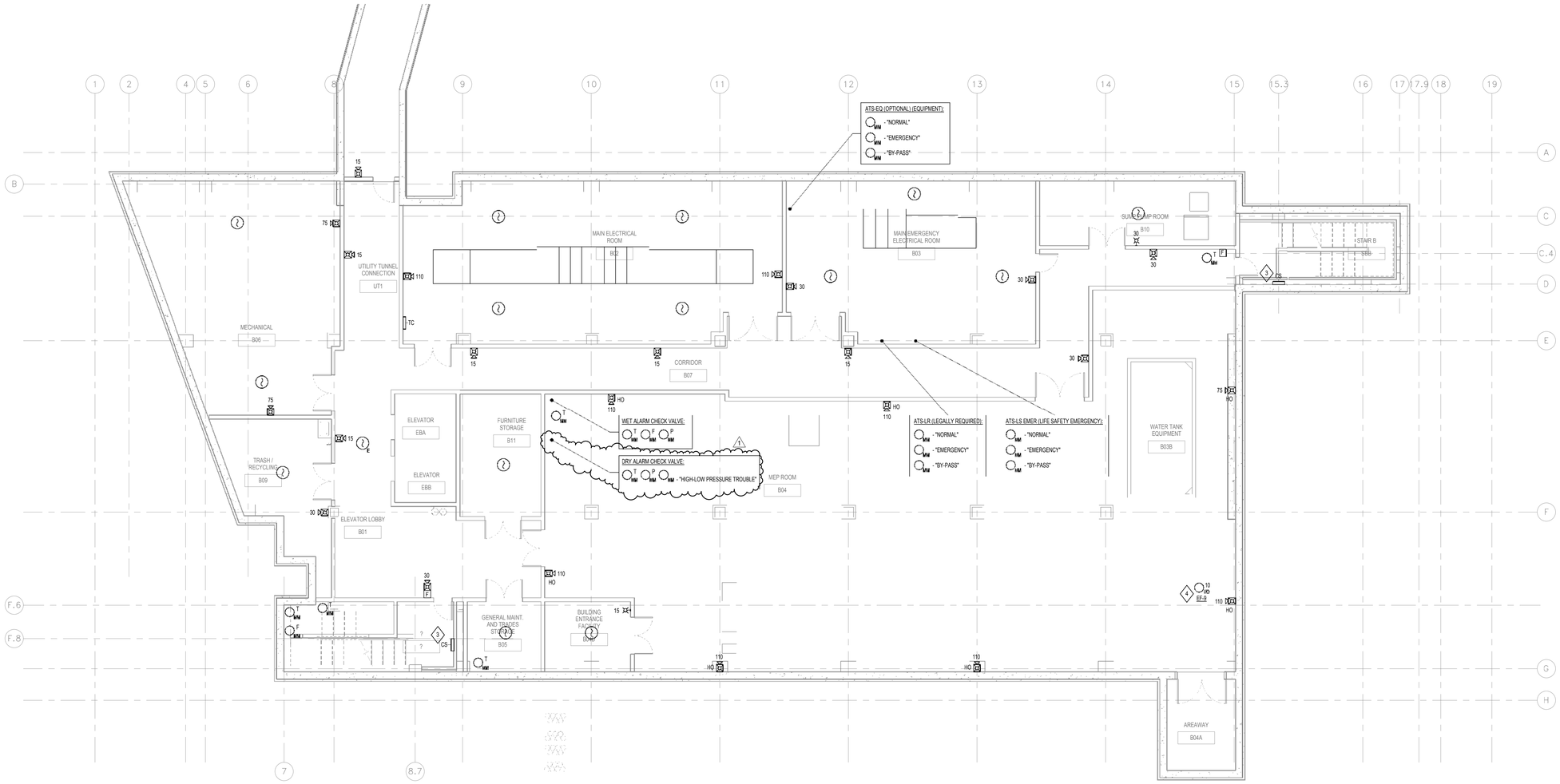
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

ELECTRICAL BASEMENT – POWER PLAN

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: As indicated

E–300



GENERAL NOTES:

1. CONSULT THE PROJECT SPECIFICATIONS AND PROJECT NARRATIVE FOR ADDITIONAL INFORMATION REGARDING SYSTEM DESIGN, INTENDED PERFORMANCE, PRODUCTS AND INSTALLATION.
2. DISCREPANCIES BETWEEN THE DRAWINGS AND SPECIFICATIONS SHALL BE BROUGHT TO THE ATTENTION OF BR+A CONSULTING ENGINEERS, LLC.
3. CONSULT MANUFACTURER'S APPROVED SHOP DRAWINGS AND INSTALLATION MANUALS FOR ADDITIONAL INFORMATION.
4. ALL INSTALLATION WORK SHALL CONFORM WITH THE REQUIREMENTS OF NFPA 72 NATIONAL FIRE ALARM AND SIGNALING CODE (2002 EDITION) AND NFPA 70 THE NATIONAL ELECTRICAL CODE (2014 EDITION). THE CONTRACTOR SHALL KEEP A COPY OF EACH ON THE JOB SITE.
5. WHERE EQUIPMENT MUST BE INSTALLED ON SUSPENDED CEILINGS OR BETWEEN BUILDING STRUCTURAL COMPONENTS, ADEQUATE FIXTURE BARS OR OTHER SUPPORT SHALL BE PROVIDED.
6. CONTROL UNITS SHALL BE INSTALLED SO THAT WORKING CLEARANCES ARE MAINTAINED AROUND THE UNITS IN ACCORDANCE WITH NFPA 70 NATIONAL ELECTRICAL CODE (2014).
7. ALL WIRING WITHIN CONTROL EQUIPMENT SHALL BE INSTALLED SO THAT WIRING AND EQUIPMENT ARE ACCESSIBLE. WIRING SHALL BE INSTALLED SO THAT EQUIPMENT CAN BE SERVICED OR REMOVED WITHOUT DISCONNECTING OR MOVING UNRELATED CIRCUITS. ALL WIRING WITHIN CONTROL UNITS, JUNCTION BOXES, AND TERMINAL CABINETS SHALL BE NEATLY TRIMMED, DRESSED, LABELED, AND INSTALLED IN GUTTERS OR CHANNELS. WIRING IN CONTROL UNITS AND TERMINAL CABINETS SHALL BE INSTALLED PARALLEL TO OR AT RIGHT ANGLES TO THE SIDES AND BACK OF THE ENCLOSURE.
8. REFER TO LEGEND FA-001, DETAIL SHEET FA-600, AND RISER DIAGRAM FA-500 FOR ADDITIONAL REQUIREMENTS.
9. REFER TO MECHANICAL/HVAC DRAWINGS TO COORDINATE QUANTITIES AND LOCATIONS OF ALL EQUIPMENT AND DEVICES TO BE INTEGRATED WITH THE FIRE ALARM SYSTEM.
10. REFER TO FIRE PROTECTION DRAWINGS FOR EXACT QUANTITIES AND LOCATIONS OF RELATED SYSTEMS AND DEVICES.
11. ALL CIRCUITS SHALL BE DERIVED FROM LOCAL FIRE ALARM CONTROL PANEL AND WIRED TO TERMINAL CABINETS ON EACH FLOOR AS SHOWN ON THE RISER DIAGRAM.
12. REFER TO FIRE ALARM SPECIFICATION 283110 FOR WIRING REQUIREMENTS.
13. CIRCUITS SHALL BE INDIVIDUALLY ISOLATED SO THAT A WIRING FAULT WILL NOT AFFECT THE OPERATION OF CIRCUITS SERVING ANY OTHER FLOOR OR EVACUATION ZONE.
14. ALL WIRING SHALL BE IN CONDUIT (3/4" MINIMUM) - EXCEPT AS NOTED.
15. COORDINATE EQUIPMENT INSTALLATION WITH ARCHITECTURAL DOCUMENTS INCLUDING ELEVATIONS, REFLECTED CEILING PLANS AND DETAILS.
16. CONTRACTOR SHALL PROVIDE 120VAC EMERGENCY ELECTRICAL POWER TO ALL FIRE ALARM CONTROL PANELS AND RELATED DEVICES.
17. EXCEPT WHERE DESIGNATED AS WEATHERPROOF "WP" DEVICES, ALL DEVICES AND EQUIPMENT SHALL BE LOCATED IN A CONDITIONED SPACE.

KEY NOTES:

1. DUCT SMOKE DETECTOR INTERFACE - SEE DETAIL #3, KEYNOTE #1 ON SHEET FA-600 FOR ADDITIONAL INFORMATION
2. AHU DUCT SMOKE DETECTOR INTERFACE - SEE DETAIL #4, KEYNOTE #2 ON SHEET FA-600 FOR ADDITIONAL INFORMATION.
3. TWO-WAY (EMERGENCY) COMMUNICATIONS SYSTEM - SEE DETAIL #8 ON SHEET FA-600 FOR ADDITIONAL INFORMATION.
4. FAN CONTROL-MANUAL OVERRIDE INTERFACE - SEE DETAIL #7 ON SHEET FA-600 FOR ADDITIONAL INFORMATION.
5. EMERGENCY ELEVATOR INTERFACE - SEE DETAIL #5 ON SHEET FA-600 FOR ADDITIONAL INFORMATION.

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ISSUE/REVISION:

NO.	DATE	COMMENTS
1	2015-04-20	BID ADDENDUM 03

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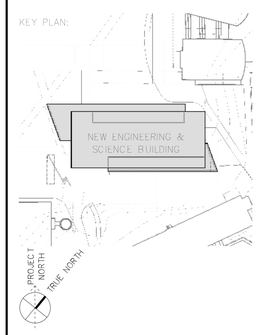
ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR BEFORE PROCEEDING WITH THE WORK.

KEY PLAN:



PROJECT:

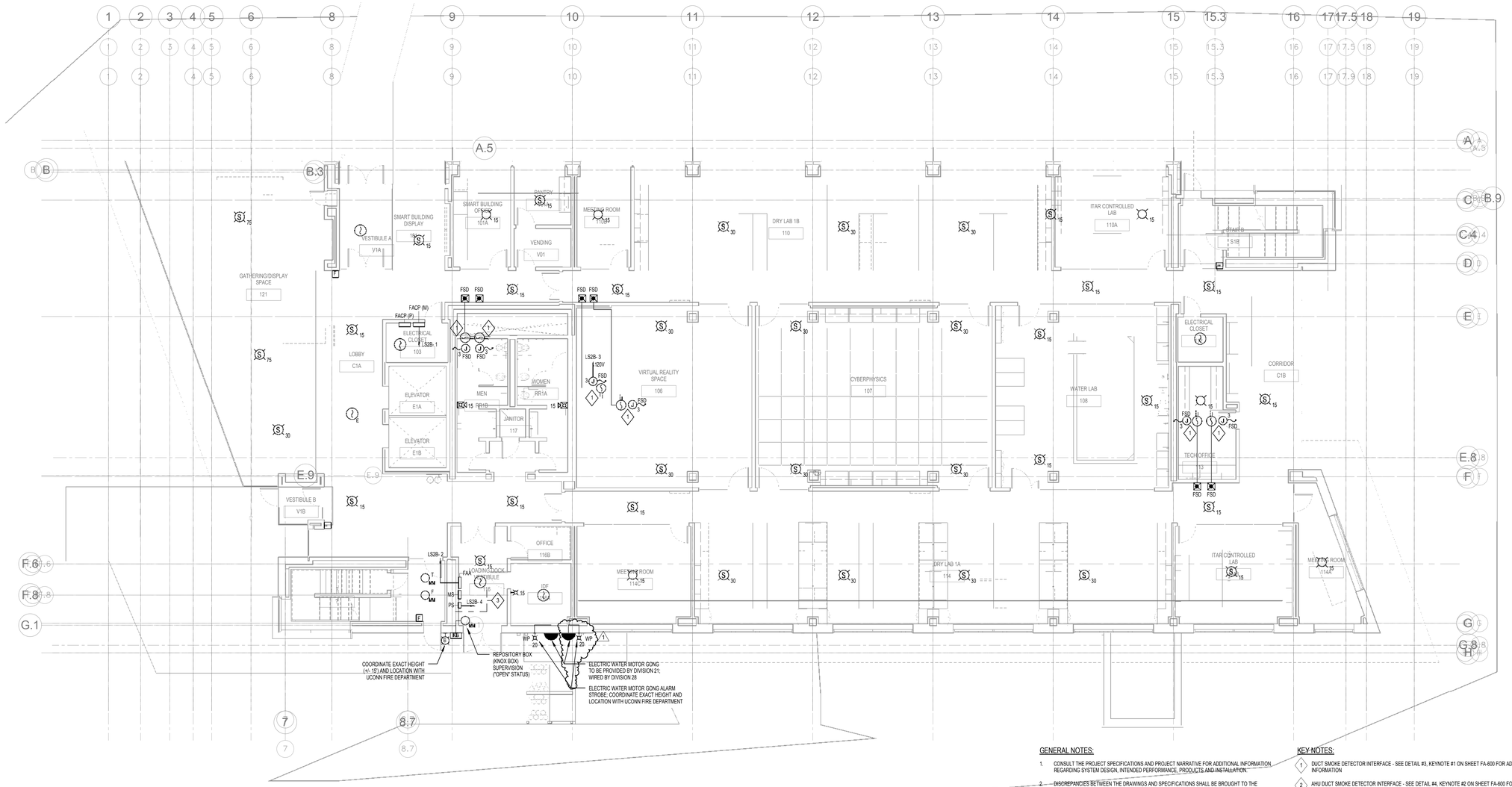
NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

FIRE ALARM BASEMENT PLAN

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: 1/8" = 1'-0"

FA-400



GENERAL NOTES:

1. CONSULT THE PROJECT SPECIFICATIONS AND PROJECT NARRATIVE FOR ADDITIONAL INFORMATION REGARDING SYSTEM DESIGN, INTENDED PERFORMANCE, PRODUCTS AND INSTALLATION.
2. DISCREPANCIES BETWEEN THE DRAWINGS AND SPECIFICATIONS SHALL BE BROUGHT TO THE ATTENTION OF BR+A CONSULTING ENGINEERS, LLC.
3. CONSULT MANUFACTURER'S APPROVED SHOP DRAWINGS AND INSTALLATION MANUALS FOR ADDITIONAL INFORMATION.
4. ALL INSTALLATION WORK SHALL CONFORM WITH THE REQUIREMENTS OF NFPA 72 NATIONAL FIRE ALARM AND SIGNALING CODE (2002 EDITION) AND NFPA 70 THE NATIONAL ELECTRICAL CODE (2014 EDITION). THE CONTRACTOR SHALL KEEP A COPY OF EACH ON THE JOB SITE.
5. WHERE EQUIPMENT MUST BE INSTALLED ON SUSPENDED CEILINGS OR BETWEEN BUILDING STRUCTURAL COMPONENTS, ADEQUATE FIXTURE BARS OR OTHER SUPPORT SHALL BE PROVIDED.
6. CONTROL UNITS SHALL BE INSTALLED SO THAT WORKING CLEARANCES ARE MAINTAINED AROUND THE UNITS IN ACCORDANCE WITH NFPA 70 NATIONAL ELECTRICAL CODE (2014).
7. ALL WIRING WITHIN CONTROL EQUIPMENT SHALL BE INSTALLED SO THAT WIRING AND EQUIPMENT ARE ACCESSIBLE. WIRING SHALL BE INSTALLED SO THAT EQUIPMENT CAN BE SERVICED OR REMOVED WITHOUT DISCONNECTING OR MOVING UNRELATED CIRCUITS. ALL WIRING WITHIN CONTROL UNITS, JUNCTION BOXES, AND TERMINAL CABINETS SHALL BE NEATLY TRIMMED, DRESSED, LABELED, AND INSTALLED IN GUTTERS OR CHANNELS. WIRING IN CONTROL UNITS AND TERMINAL CABINETS SHALL BE INSTALLED PARALLEL TO OR AT RIGHT ANGLES TO THE SIDES AND BACK OF THE ENCLOSURE.
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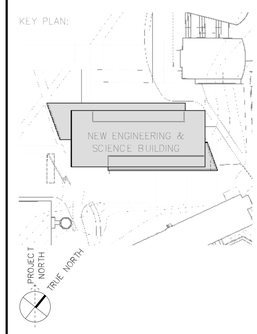

PROJECT:

NEW ENGINEERING AND SCIENCE BUILDING

DRAWING TITLE:

FIRE ALARM FLOOR 1 PLAN

PROJECT NO: 092203	DATE: 20 FEBRUARY 2015
PHASE: BID DOCUMENTS	SCALE: 1/8" = 1'-0"

FA-401