

# **NMNH Supplemental Design Standards**

## ***100% final submission – October 21, 2016***

### **Introduction**

The NMNH Supplemental Design Standards apply to all design, construction, maintenance and repair projects at the National Museum of Natural History (NMNH). This document is to be used as a supplement to the Smithsonian Institution Facilities Design Standards. Refer to the SI OFEO “Codes, Standards and Guidelines” document for all other applicable requirements at NMNH.

#### **Smithsonian Institution-approved Sole Source manufacturers**

- Siemens Building Technologies – Integrated Automation (HVAC and Fire Alarm Controls)
- LSI Lighting Track and Fixtures – Track Lighting
- Electronic Theater Control, Inc – Central Dimming Controls
- Yazkawa Controllers – VFD Electronic Motor Controllers
- Square D/Schneider Electric – Electrical Components
- Spacesaver – Mobile Storage Carriages and Shelving
- Spacesaver/Viking Metal Cabinet Company – Collection Storage Equipment

Specific manufacturers are referenced as a Basis of Design (BOD) in *blue text* throughout these standards. The BOD manufacturers are to be included in the design documents. Several BOD manufacturers have a Sole Source justification at NMNH as listed above. Where a sole company has been sourced as the Basis of Design, a substitution requires demonstration that performance is identical, and requires approval from SI.

Contact NMNH staff for approval of deviations from these standards or if information herein contradicts material found in other SI standards or codes.

## Division 01 - General Conditions

### Design Requirements:

#### East Parking Lot Loading Capacity

A/E should take weight and size of trucks into consideration when outlining staging plans and delivery of oversized/heavy items.

- Maximum Axle Load: 32,000 lbs. (16 tons), single or tandem **and** Maximum Gross Vehicle Load: 72,000 lbs. (36 tons)
- Load limitation line starts from the SE corner of the East Wing Building and extends across to the NW corner of the Cooling Tower Building.
- Tractor trailers are not allowed in the Load Limited areas.



*Load limitation area of the East Parking Lot demarcated with black line.*

### Freight Elevators Sizes and Capacities

The A/E should take elevator dimensions, weight of items and path to elevators into consideration when designing any HVAC units, structural elements or any other oversized/heavy items.

- Elevator No 13 (East Wing Basement Freight) and No. 12 (West Wing Basement Freight)  
7'-6" W X 12'-8" D X 7'-6" H (Maximum Length of 14'-8", diagonal)  
15,000 lbs. (7.5 tons)

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## **Division 02 – Existing Conditions**

### **Design Requirements:**

- The notes below should be on demolition drawings for each trade and not just the general architectural demolition drawings. This will minimize contention during contract administration.
  - Demolish all utilities back to source/riser. Cap all open connections.
  - Remove all abandoned utility services and devices. Fill and fire stop all holes.
- Stone Salvage:
  - Salvage and turn over all stone tiles and bases longer than 12”.
  - Relocate salvaged stones to owner specified location.
  - Clean and polish existing stone during post construction clean up.

## **Division 03 – Concrete**

### **Design Requirements:**

- Provide ACI testing flatness/levelness of a computer room for new concrete floors.
- For any area that will contain Mobile Storage Carriages and Shelving (105613), the general contractors shall coordinate installation of the concrete flooring in conjunction with staff from Spacesaver.

## **Division 04 – Masonry**

### **Design Requirements:**

- Stone used at exterior of NMNH:
  - Pink or warm grey granite; Milford, MA; at Basement level, perimeter security
  - White granite; Bethel, VT; First and Second stories and main cornice
  - White granite; Mount Airy, NC; Attic story

## **Division 05 – Metals**

### **Specifications:**

#### **057300 Decorative Metal Railings**

- The railings at the exhibit hall windows shall be Brass/Alloy #404 Light Bronze Patina. Clean gloss lacquer topcoat.

## **Division 06 – Wood, Plastics, and Composites**

### **Specifications:**

#### **066116 Solid Surfacing**

- Lavatories in restrooms shall have solid surface counter with integrated bowl.

## **Division 07 – Thermal and Moisture Protection**

- Not Used

## **Division 08 – Openings**

### **Design Requirements:**

#### **Doors**

- All corridor doors should have 3”X33” vision panels on handle side.
- All laboratory doors should have 3”X33” vision panels on the handle side.
- Restroom doors should have storeroom lockset.
- Doors with electrified hardware shall have electrified hinges to avoid exposed wiring.
- Provide appropriate blocking at walls with door stops.
- Provide 6” high stainless steel kick plate at high-traffic doors.
- Door gaskets shall be installed at entries to collection areas, offices and labs, especially at doors near elevators, loading docks, and any designated food areas, to control pest problems and infiltration of dust into these sensitive areas. Discuss details with OPDC during design phase.

#### **Exterior Windows**

The A/E should refer to drawings and specification by AECOM (SI project # 0500107) when demolition and new construction of exterior windows is in scope of renovation.

### **Specifications:**

#### **081113 Hollow Metal Doors and Frames**

- Door Frames shall be *completely* welded steel frame, no knocked down frames

#### **081416 Flush Wood Doors**

- Office Doors shall be Solid core, Red Oak, Plain Sliced Match Box to match custom Marshfield Finish 211954C.

#### **083100 Access Doors and Frames**

- Utility Tunnel Access doors shall be fire-rated and manufactured by Bilco, with key access to match existing access door locks.

*The Bilco Company – PO Box 1203, New Haven, CT 06505; (203) 934-6363 (BOD)*

#### **087100 Door Hardware**

- Mortised Lockset: Yale, 8800 Series with AU x CN Trim with Augusta lever operator, brushed nickel finish.

*ASSA ABLOY – 110 Sargent Drive, New Haven, CT 06505; (800) 377-3948*

- Lock Cylinder: Refer to OPS Security Standards

- Exit Hardware: Von Duprin, 98/99 Series, with no vertical rods exposed

*Allegion – 11819 N. Pennsylvania Street, Carmel, IN 46032; (317) 810-3700*

- Door Closer: LCN, 4000 Series

*Allegion – 11819 N. Pennsylvania Street, Carmel, IN 46032; (317) 810-3700*

## 08800 Glazing

- Exterior windows: *Main Building steel windows, 1<sup>st</sup> and 2<sup>nd</sup> Floors*
  1. Security Glazing: Laminated translucent, passive solar low-E glass
    - a. Basis of Design Product: Prelco, Inc.
      - i. Overall Unit Thickness: ½ inch.
      - ii. Laminated Unit: Class 1 clear laminated glass with two plies of heat strengthened float glass. Provide safety glazing labeling on the indoor ply.
        1. Thickness of Outdoor Glass Ply: 6 mm.
        2. Thickness of Indoor Glass Ply: 5 mm.
        3. Interlayer Thickness and Color: 0.060 inch, clear PVB.
      - iii. Low-E Coating: Second surface.
      - iv. Acid Etch: Fourth surface.
      - v. Visible Light Transmittance: 60.5%.
      - vi. Winter Nighttime U-Factor: 0.96
      - vii. Summer Daytime U-Factor: 0.87
      - viii. Solar Heat Gain Coefficient: 0.57
      - ix. Ultraviolet Transmittance: 0.0%
    - b. Other acceptable manufacturers: Subject to compliance with all requirements.
- Laylight:
  1. Laminated Translucent Glass
    - a. Basis of Design Product: Standard Bent Glass Corporation
      - i. Overall Unit Thickness: 7/16 inch
      - ii. Laminated Unit: Class 1 clear laminated glass with two plies of float glass, heat strengthened or fully tempered as required to meet or exceed performance requirements included herein. Provide safety glazing labeling on the indoor ply. Glass is to match installed in the laylight in Ocean Hall.
        1. Thickness of Outdoor Glass Ply: 3/16 inch.
        2. Thickness of Indoor Glass Ply: 3/16 inch.
        3. Interlayer Thickness and Color: 0.060 inch, clear, PVB
      - iii. Surface Texture: Thin rubbing on first surface (facing skylight).
      - iv. Acid Etch: Fourth surface.
      - v. Visible Light Transmittance: 68%.
      - vi. U-Factor: 1.00
      - vii. Solar Heat Gain Coefficient: 0.63
    - b. Other acceptable manufacturers: Subject to compliance with all requirements
- Skylight:
  1. Glass Type: GLASS BASED LIGHT DIFFUSING INSULATED GLAZING UNIT

- a. Basis of Design Product: Advanced Glazings Ltd., Solera Plus Lumira Custom.
    - i. Overall Unit Thickness: 1-7/16 inches – to match existing lites
    - ii. Thickness of Each Glass Lite:
      - 1. Outdoor Lite: 6 mm.
      - 2. Indoor Lite: 10.060 mm.
    - iii. Outdoor Lite: Class 1 clear, tempered glass.
    - iv. Interspace Content: Lumira aerogel R7.
    - v. Indoor Lite: Laminated glass with two plies of heat strengthened glass.
      - 1. Outdoor Ply: Class 1, clear, 5 mm thick, heat strengthened.
      - 2. Interlayer(s) Thickness and Color: 0.060, clear, PVB.
      - 3. Indoor Ply: Class 1, clear, 5 mm thick, heat strengthened.
    - vi. Silk-Screened Coatings: 80% white opaque ceramic frit on second surface.
      - 1. Pattern: 1/8 inch diameter, .375 inch spacing.
    - vii. Glass Light Diffusing Veils:
      - 1. (2) AGL 545 on second surface.
      - 2. (2) AGL 545 on third surface.
    - viii. Visible Light Transmittance: 2%
    - ix. U-Value: 0.14
    - x. Solar Heat Gain Coefficient: 0.02
    - xi. UV Transmittance: 0.001%
    - xii. Light Diffusion Power: 0.95
    - xiii. Maximum Weight: Not to exceed 10 psf, weight of the existing glazing.
  - b. Other acceptable manufacturers: Subject to strict compliance with all requirements.
- Window tint: Lumar N 1065 window film, installed at exterior windows.
    - Confirm which exterior window locations are to receive tint with NMNH staff.

*Eastman Chemical Company - 575 Maryville Centre Drive, St. Louis, Missouri 63141; 800-255-8627*

## **Division 09 – Finishes**

### **Design Requirements:**

#### **Floor finishes**

- No broadloom carpet shall be used unless specifically directed by the Museum.
- When adding terrazzo flooring, make sure an equal depth of the old terrazzo is demolished so the adjacent floors are level.
- Alcohol storage rooms and laboratories with certain chemicals shall have Epoxy Flooring.
- All concrete floors not covered with a flooring material shall have a clear 2 part epoxy coating unless noted.
  - Typical spaces include corridors, electrical and mechanical rooms.

- Dry-collection storage areas shall have this flooring in a neutral gray color. No other flooring material should be used in areas that store dry collections.
- All restroom floors shall be set within a waterproof membrane, with the floor tiles sloped toward the floor drain.

### **Specifications:**

#### **095123 Acoustical Tile Ceilings**

- Acoustical Ceiling Tiles shall be 2'X4' tegular ceiling tiles with the appearance of 2'X2' tiles.

#### **095436 Suspended Grid Systems**

- Suspended Grid System shall be the correct type to accept tegular ceiling tiles.

#### **096516 Resilient Sheet Flooring/Tiles**

- East and West Wing Corridors and Offices: Johnsonite Azrock Collection, Cortina Grand Solid Vinyl sheet flooring.  
*Johnsonite - 30000 Aurora Road, Solon, Ohio 44139; 800.899.8916*
- All floor tiles shall be static-dissipative type tiles, especially in IT and security closets.

#### **096813 Tile Carpeting**

- 24" X 24" carpet tiles is the preferred type of carpet throughout the museum, all other sized must be approved by the Museum.

#### **099113 Painting**

##### **Standard Exterior Paint Colors**

- Main Building wood windows, Ground and 3<sup>rd</sup> Floor: Benjamin Moore, Moore Craft Exterior 1474 B-2 (Cape May Cobblestone)  
*Benjamin Moore & Co. – 101 Paragon Drive, Montvale, NJ 07645; 855-724-6802*
- East & West Wings Aluminum Windows, Floors Ground, 1<sup>st</sup> and 6<sup>th</sup>: Linetec, KYNAR 500 Enamel Finish, Fluropon (Valspar), Smithsonian Beige - LT440389  
*Linetec – 7500 Stewart Avenue, Wausau, Wisconsin 54401; 715-843-4100*  
*Valspar – PO Box 1461, Minneapolis, MN 55440-1461; 612-851-7000*
- East & West Wing painted window trims, Ground, 1<sup>st</sup> and 6<sup>th</sup> floors: Benjamin Moore, Moore Craft Exterior 1474 B-2 (Cape May Cobblestone); glossy.
- East & West Wings Aluminum Windows, 2<sup>nd</sup> to 5<sup>th</sup> floors: Linetec, Duranar (PPG Paints) 3-coat system, Metallic Silver - BK20408X6  
*PPG Canada Inc./Coating & Resins Group – 880 Avonhead Road, Mississauga, Ontario L5J2Z5*
- East & West Wing painted window trims, 2<sup>nd</sup> to 5<sup>th</sup> floors: Duron Duraclad Industrial coating #32-00140 ready mix aluminum.  
*The Sherwin-Williams Company – 101 West Prospect Ave, Cleveland, OH 44115; 800-474-3794*
- Main Building Steel Windows, 1<sup>st</sup> & 2<sup>nd</sup> Floor, including courtyard side:
  - Exterior Primer Coat: Tnemec Series 1 Omnithane – Color 1216 Grayish-Green
  - Exterior Intermediate Coat: Tnemec Series 1075-Color Endura Sheild – Color Light gray 32GR



- Exterior Finish Coat: Tnemec Series 1078 Fluoronar Metallic: Color, 03MTSilver  
*Tnemec Company – 6800 Corporate Drive, Kansas City, MO 64120; 800-863-6321*

### Standard Interior Paint Colors

- All paint shall be Benjamin Moore Aura Interior Paint, unless directed otherwise.  
*Benjamin Moore & Co. – 101 Paragon Drive, Montvale, NJ 07645; 855-724-6802*
- Zero-VOC paint shall not be installed on canvas-material covers/jackets.
- In exhibits and collection storage areas, the coatings must be allowed to dry for 4 weeks in order to cure fully and to avoid potential off-gassing damage to museum objects
  - In exhibits and collection storage areas, the following types of paint shall be prohibited:
    - alkyds
    - single-component epoxies
    - polyvinyl chlorides
    - corrosion-resistant paint
    - chlorinated rubber paints
    - latex varnishes
    - oil-based or oil-modified coatings
- Main Building monumental stairs (Rotunda stairs & Constitution Avenue stair), Ornamental metal railings, spandrel trims and window railings – Benjamin Moore BM 1232 (Fresh Brew)
- Main Building Rotunda walls & railings – Benjamin Moore BM-978 (Raccoon Hollow)
- Main Building Constitution Avenue lobby decorative plaster beams: Benjamin Moore HC-54 (Jumel Peachtone)
- Main Building Constitution Avenue lobby plaster ceiling: Benjamin Moore BM 2154-70 (Vanilla Ice Cream).
- Main Building Constitution Avenue lobby plaster walls: Benjamin Moore BM 1079 (Bayshore Beige).
- All exposed ceilings (except exhibit and public areas): Benjamin Moore BM 912 (Linen White).
- All ceiling and walls in utility closets and mechanical rooms: Benjamin Moore BM 912 (Linen White).
- All exposed ceilings in exhibit halls: Benjamin Moore Flat Black
- Standard paint finishes, unless directed otherwise by the Museum :
  - Ceiling: Flat
  - Wall: Eggshell
  - Trim: Semi-Gloss

## **Division 10 – Specialties**

### **Design Requirements:**

#### Restrooms

- Public Restrooms shall have one lavatory and liquid soap dispenser mounted at children's height.
- Men's and Women's Public Restrooms shall have baby changing stations.
  - Baby changing stations shall be located in such a way that they do not impeded access in or out of accessible stalls.

- Electrical Hand Dryers are to be installed in restrooms in lieu of paper towel dispensers in all restrooms. Consult Museum for number hand dryers in each restroom.
  - Provide a splash-back panel attached to wall below hand dryer.
    - 18 gauge, brushed stainless steel
    - 28" wide, height will be from bottom of hand dryer to top of base molding
- All lavatories piping shall be covered with PVC insulating jackets.

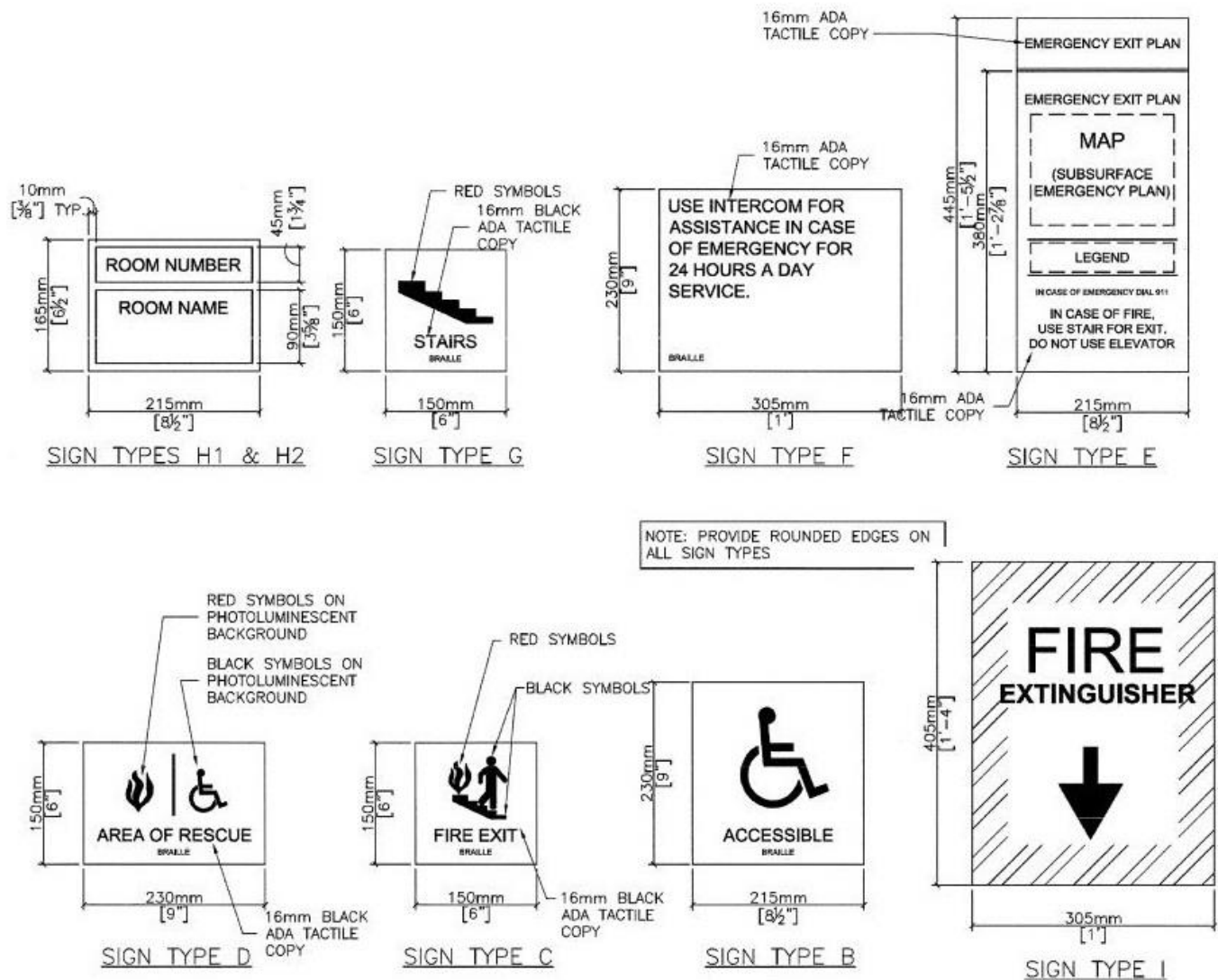
#### Picture Rails

- Picture rails shall be provided in the corridors of East and West Wings.

## Specifications:

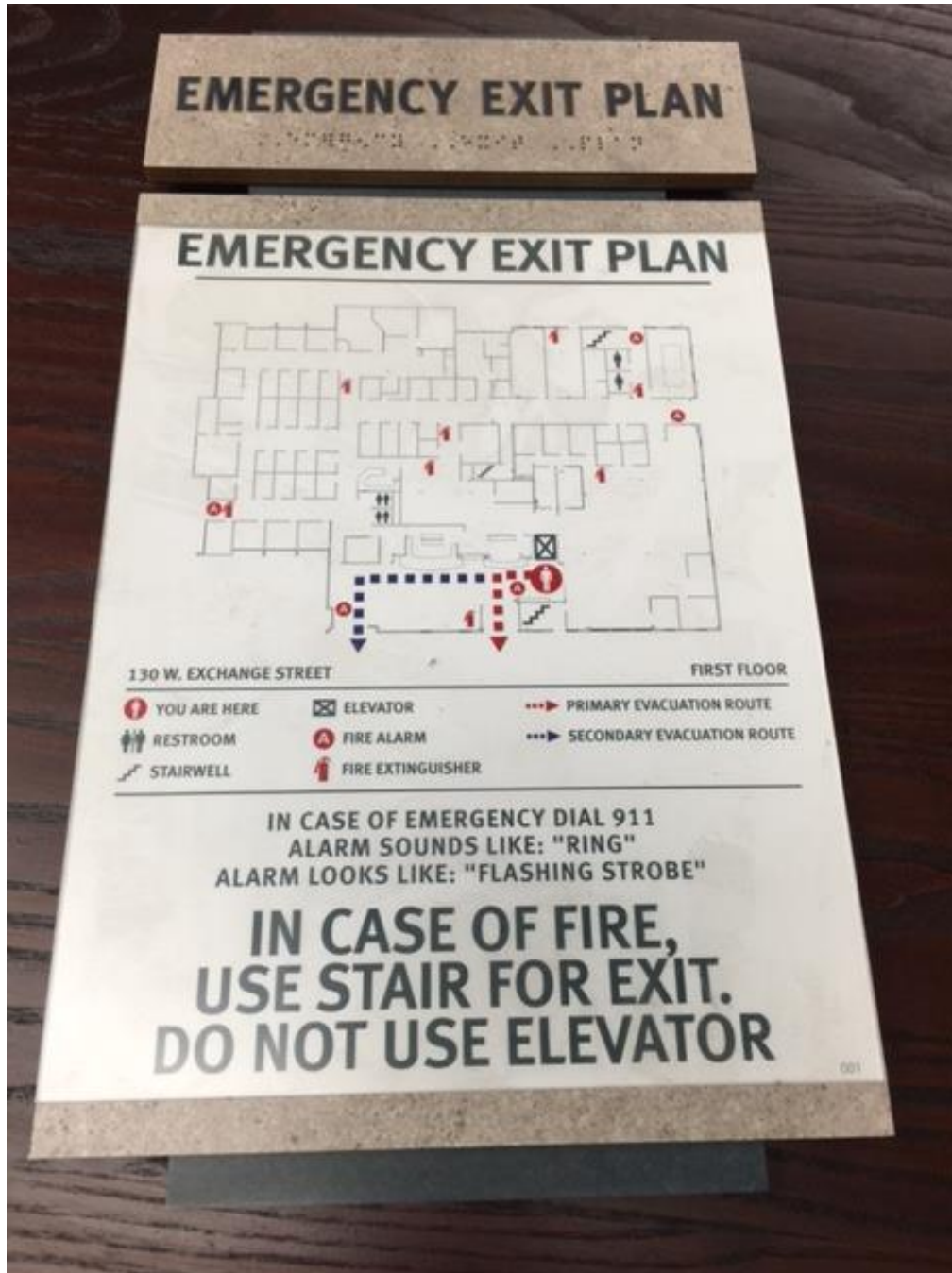
### 101423 Panel Signage

- Miscellaneous Building Signage: NMNH has very specific signage – see below for examples from the SE Quad Ground floor project. Contractor to provide samples for each specific sign.
- Sign type H is a 2-part sign holder that only contains the room #, unless the room is for general usage such as electrical, mechanical, breakroom, IT, corridor, etc.
  - Signature Signs, 211 Berkeley Street, High Point, NC 27260; 336.431.2072



### Examples of NMNH-specific signage

- Emergency Egress Route Signage (Sign type E): Express Signs; 423.246.3100 – Paula Atkinson ([paula@express-signs.com](mailto:paula@express-signs.com)) (see image of sign below)



*Image of "Emergency Exit Plan" Sign Type E*

#### 102114 Solid Plastic Toilet Compartments

- Ceiling-mounted, graffiti-proof Toilet Compartments with Phenolic Core and steel bracing/anchoring above the ceiling shall be the basis of design for all restrooms.

#### 102600 Metal Corner Guards

- Corner Guard: All corner guards shall be of brushed stainless steel, no. 4 finish. 3.5" on each side with top edge at 4'-0" above finished floor. Guards at loading dock areas to be full height.

#### 102800 Toilet Accessories

- Toilet Paper Dispenser: Bay West/Wausau Paper 80300 Silhouette Revolution triple roll dispenser, ABS plastic, black. (Museum supplied)
- Liquid Soap Dispenser: Maintenance South Ino –Pak / 800 / 1100 foam dispenser. (Museum supplied)
- Toilet Seat Cover Dispenser: Hospital Specialty Co Superior Supply, model HG-2. (Museum supplied)
- Sanitary Napkins Disposal: Bobrick Washroom Equipment, Inc. B-254 Stainless Steel No. 4 Finish (Museum supplied)
- Waste Receptacle: Bobrick Washroom Equipment, Inc. B-277 Stainless Steel Finish (Museum supplied)
- Mirror Unit: Bobrick Washroom Equipment, Inc. B-290 Frame Stainless Steel Angle ; 1.3mm thick
- Hat and Coat hook: Bobrick Washroom Equipment, Inc. B-6827 Satin Stainless Steel Finish; 2.8mm thick (mounted at the middle height of stall doors, to avoid theft from outside of stall)
- Shelf: Bobrick Washroom Equipment, Inc. B-295 Satin Stainless Steel Finish; 1.2mm thick
- Grab Bar: Bobrick Washroom Equipment, Inc. B-6106 Stainless Steel No. 4 Finish on ends with slip resistance texture in grip area.
- Baby Changing Station: Bobrick Washroom Equipment, Inc. / Koala Kare Products KB101  
[\*Bobrick Washroom Equipment, Inc - 6901 Tujunga Avenue, North Hollywood, California 91605; \(818\) 982-9600\*](#)

#### 104400 Fire Extinguishers, Cabinets, and Accessories

- Exhibit Hall (at specific locations) Fire Extinguisher Cabinets: Larsen's Manufacturing, Fully Recessed. Medallion Series, BZ-2409-R2 and FS-BZ-2409-R2; Box: White; Door/Trim: Solid Bronze; Finish: Statuary; no lettering on the glass.  
[\*Larsen's Manufacturing Co. – 7421 Commerce Lane N.E., Minneapolis, MN 55432; 800-527-7367\*](#)
- Exhibit Hall (at specific locations) Fire Extinguisher Cabinets/Fire Department Valve: Larsen's Manufacturing, Fully Recessed. Medallion Series, BZ-T-VC4016-R and FS-BZ-T-VC4016-R; Box: White; Door/Trim: Solid Bronze; Finish: Statuary; no lettering on the glass.
- Fire Extinguisher Cabinets for Staff Area: Larsen's Manufacturing, Recessed. Box: White; Door/Trim: White; Full Glass; no lettering on the glass.
- Fire Extinguisher Cabinets/Fire Department Valve: Larsen's Manufacturing, Recessed. Box: White; Door/Trim: White; Full Glass; no lettering on the glass.
- Hat style fire extinguisher identification will be provided by the Museum and installed by the contractor.

#### 105613 Mobile Storage Carriages and Shelving

- All mobile storage carriages and shelving shall be mechanically-operated, movable carriage and shelving systems by Spacesaver.

*Spacesaver Corporation - 1450 Janesville Avenue, Fort Atkinson, WI 53538; 800.255.8170*

- End panels are required at both ends of the shelving units.

## **Division 11 – Equipment**

### **Design Requirements:**

- Free-standing collections storage shelving shall be designed to withstand lateral movements (i.e. bracing to walls, earthquake-proof cross bracing, horizontal bars at exposed edges of shelves to keep jars from falling off) and shall be customized for the specimens they will store (i.e. perforated shelves).

### **Specifications:**

#### **119000 Collection Storage Equipment**

- Collection storage equipment shall be installed on sanitary bases provided by Spacesaver/Viking Metal Cabinet or on mobile storage carriage systems manufactured by Spacesaver.
- Collection storage cabinets shall be manufactured by Spacesaver/Viking Metal Cabinet.
  - Standard cabinets are models 215, 220, and 238. (238 is a full-unit cabinet, which can make excellent use of space, especially in compact/mobile storage; other cabinets made by this vendor are suitable, depending upon anticipated use)

*Spacesaver Corporation/Viking Metal Cabinet Company - 1450 Janesville Avenue, Fort Atkinson, WI 53538; 800.255.8170*

## **Division 12 – Furnishings**

### **Specifications:**

#### **122000 Window Treatments**

- Basis of design for all standard window shades is Mecho Shade Corporation
  - Color and operation to be specified by the designer.
- East and West Wing Mini Blinds: Manufactured by Levolor; 1" Custom Mark 1 Metal Blinds
  - Contractor will need to submit a color chart for the Museum to pick the proper gray color because name of the colors has changed.

*Mechosystems, 42-03 35th Street, Long Island City, NY 11101; (718) 729-2020*  
*Levolor Contract – 3 Glenlake Parkway, Atlanta, GA 30328; 800-826-8021*  
*Leonard's Draperies, 10441 Rhode Island Avenue, Beltsville, Maryland 20705; 301-441-2600*

#### **123553 Laboratory Casework**

- Basis of Design – Kewaunee Scientific Corporation  
*Kewaunee Scientific Corporation, 2700 Front Street, Statesville, North Carolina 28677*

#### **115313 Fume Hoods**

- Basis of Design – Kewaunee Scientific Corporation  
*Kewaunee Scientific Corporation, 2700 Front Street, Statesville, North Carolina 28677*

## **Division 13 – Special Construction**

## Structural

- In Main Building areas with either existing steel-reinforced brick vaults or clay (terra cotta) masonry ceilings, all overhead utilities (i.e. Mechanical, Electrical, Plumbing, Fire Protection) must be supported by a separate structure, welded to the underside of existing I-Beam/Wide Flanges. No items shall be directly attached to the existing brick vaults or clay masonry ceiling. The new structure shall utilize a clip system to hang utilities. This system must be engineered and stamped by a professional engineer.
  - An engineered unistrut clip system may be used in lieu of a welded clip system if approved during the proposal process of the project.

## **Division 14 – Conveying Equipment**

- Not used

## **Division 21 – Fire Suppression**

### **Design Requirements:**

#### Fire Protection

- All Fire alarm devices and panels shall be manufactured by Siemens or compatible to interface with the current Siemens Fire System installed in this museum.  
*Siemens Corporation - 300 New Jersey Avenue, Suite 1000, Washington, D.C. 20001; 800-743-6367*
- All fire strobes shall be ceiling-mounted in rooms.
  - Fire strobe locations in corridors without finished ceilings must be discussed during the design process with the Museum and OSHM with the preferred location being over the light switch to ensure compliance with NFPA 72 and meet the requirements of the Museum.
  - Fire strobes should not be ceiling-mounted in the two-story halls (Halls 2, 10 and 16) since they exceed the height-from-floor limit. Instead, mount the units on the vertical face of columns or piers that surround the high space.
  - Wall mounted device can be allowed if A/E can demonstrate to the Museum reasons why ceiling mounted device will not work. When wall mounting device is used, preferred location is over the light switch in the room. Such location must still meet the requirements of NFPA 72.
- All Fire Alarm devices shall be white for both ceilings and walls.
- On Exhibit Areas, all fire alarm devices shall have no longer than 2'-0" of flexible conduit to the device to allow adjustment of device locations for specific exhibits.
- No flexible pipe connections to sprinklers are allowed, all sprinkler heads must be hard piped unless specifically designed for unusual spaces, i.e. Exhibit cases in which case the flexible assembly cannot be of a type that uses "O" rings as part of the assembly. Museum and SI Fire Protection Engineer will need to approve all flexible locations.
- Sprinkler heads in collection areas (exhibit and storage) should be mounted upwards to help avoid accidental discharge.
- All fire/smoke dampers require end switches for positive proof of open/closure and wired back programmed to the BAS system.

- Controls and batteries for all fire shutters and doors shall be installed in an accessible manner such that the controls can be tested and maintained without the requirements of specialty lifts/equipment.
- Sprinkler heads, and fire protection devices shall be at center of ceiling tile. Alternative layouts must be approved by the Museum.
- All fire sprinkler zone isolation valves over 8'-0" above finished floor require a chain operator to open/secure valve unless otherwise specified. Fire sprinkler valves behind closed in areas require labeled access door or ceiling grid labeled with remote indicator.

## **Division 22 – Plumbing**

### **Design Requirements:**

#### **Accommodating low-flow fixtures in historic buildings**

All existing waste piping should have adequate slopes to accommodate the installation of low-flow water fixtures (i.e. water closets, urinals). The A/E shall survey the existing plumbing infrastructure and propose new measures, if needed, to confirm that solids can be adequately flushed through the system with low-flow fixtures.

### **Specifications:**

#### **221000 Plumbing Systems**

- All floor and trench drains shall be installed with automatic trap primers.
- All Domestic cold and hot water line shall be insulated with minimum 1 1/2" fiberglass jacketed insulation. Exposed lines in corridors, rooms and mechanical rooms require painted canvas wrap covering the insulated jacket.
- Provide manual isolation valves on all automatic air vents.
- All domestic hot and cold water risers shall have isolation valves at the main connections and at each floor level take-off.
- All isolation valves required for any type of water or air service shall have valve tags with numbers and abbreviation for service served. Valve chart to be either turned over to facility staff or hung in the mechanical room of the location of the valves. Valve chart shall include: number of tag; service for valve; and location of valve.
- All No-Hub connections requires (4) bands on each connection.
- Provide 1/4" water line and recess box for refrigerator ice maker. All water lines shall have an accessible water cutoff valve installed.

#### **224216 Commercial Lavatories and Sinks**

- Commercial lavatory and sink fixtures, except sinks located in kitchens, break rooms, and SEEC changing area, shall have hands-free activation devices that are hard-wired.

#### **224716 Pressure Water Coolers**

- All water coolers shall be fully recessed, high/low dual station; ADA Compliant. Brushed stainless steel finish.
  - In staff areas, refrigerated water coolers shall be outfitted with glass fillers with water sentry or equivalent. Water filter kits to include isolation valves for replacement.



- In public areas, refrigerated water coolers shall be outfitted with bottle fillers with water sentry filters or equivalent. Filters to include isolation valves for replacement.

*Elkay Manufacturing Company - 2222 Camden Court, Oak Brook, IL 60523; 800-726-0553*

## **Division 23 – Heating, Ventilating and Air Condition**

### **Design Requirements:**

#### **HVAC**

- HVAC Terminal Units, whenever possible, shall be located in the corridor and not in offices, laboratories, and collection spaces, nor above fixed exhibits and racks in A/V closets. Placement shall take into considerations maintenance access and repair clearances. A clearance of 3' must be maintained in front of the opening to the control panel in addition to 4" around the coil and accessories. Free access must be maintained under VAV box for removal/servicing.
  - Placement of units above the entry door to offices, laboratories or collection spaces can be considered if A/E can demonstrate to the Museum that there is a lack of space in the corridor to accommodate.
- All gauges, thermostats and other monitoring devices shall have either imperial reading or dual imperial/metric reading. Metric only devices are not allowed. All pressure gauges installed on pumps require snubbers and isolation valves.
- Siemens temperature sensors are used throughout the building in lieu of thermostats. These sensors should not allow local/individual adjustments and shall be controlled by the BAS.
 

*Siemens Corporation - 300 New Jersey Avenue, Suite 1000, Washington, D.C. 20001; 800-743-6367*

  - Temperature sensors for spaces should be located above the light switch for the space to minimize impact on usability of wall at a height of 48" – 54". Mount in accordance with ADA requirements. A/E needs to ensure proper temperature reading with regard to location of return air grille.
  - Temperature/Relative Humidity sensors and controls in areas that serve collection (exhibition or storage) areas should be in the space, rather than in the ductwork where they are not readily accessible for calibration checks and do not necessarily reflect the conditions around the collections.
  - Unit color is white.
- Drain pans shall be installed under VAV boxes w/ hydronic coils that are located in collections areas, labs, conference room, IT spaces, specialty rooms and offices.
  - The drain pans shall have alarms tied back to the BAS system.
- Ductwork and piping should be installed as close to the structure above as possible.
- Any exposed duct works shall be insulated, canvas wrapped and painted to match exposed ceiling color.
- No interior duct liners are allowed except in transfer ducts.
- All volume/balancing dampers in duct work require accessibility locally at the damper or remotely by a separate means.
  - Access panels in ductwork for fire or smoke dampers shall be 24" by 24" minimum and be large enough to make adjustments to the device/damper inside of the panel or to reset fusible links in the case of fire dampers. All covers should be hinged with external cam type locks.

- Piping that is 2" or less shall have snap on plastic labeling. Labeling on piping greater than 2" shall use plastic ties.
- 3-Way valves are not allowed in the Museum unless designed to maintain minimum flow on a hydronic system.
- Isolation valves shall be installed at all connection points between new and existing piping points of connections unless directed otherwise.
- All hydronic system risers shall have isolation valves at point of connection to the main and at each floor level. Any isolation valve for fluid systems above 8'-0" above finished floor shall be chain operated.
- All pressure bearing piping (except for fire suppression piping) must be braised, threaded, soldered, or welded. No "Pres-Fit" fittings are allowed.
- All mechanical/HVAC equipment mounted on flooring must be on a concrete housekeeping pad at least 4" in height in order to install P-trap and gravity drains. A&E shall verify the height of the pad required by equipment for proper drainage of the equipment.

#### **Specifications:**

##### **230523 General Duty Valves for HVAC Piping**

- NIBCO valves are not allowed at NHB.
- All mechanical equipment installed on the floor require vibration isolation and at a minimum a 4" housekeeping pad.
- All steam valves above 2" in size require a removable strapped insulated jacket for service. Valves less than 2" are required to be standard PVC jacketed insulated based upon pressure of the service.
- All isolation valves serving mechanical fluid systems above 2" in size that are above 8'-0" above finished floor shall be installed with a chain operator.

## **Division 25 – Integrated Automation**

#### **Design Requirements:**

- All BAS panels shall be fed electrically by an emergency power source.
- All control wiring associated with the BAS system and its field devices or panels shall be in conduit. This also includes communications cabling.
- All BAS controls, sensors, panels, etc. used throughout the museum for monitoring or controlling mechanical equipment, electrical systems or HVAC systems shall be Siemens compatible.  
[\*Siemens Corporation - 300 New Jersey Avenue, Suite 1000, Washington, D.C. 20001; 800-743-6367\*](#)
- Humidity sensors where required in the museum shall be Vaisala Inc. or an equivalent approved quality type sensor.  
[\*Vaisala, Inc. - 194 South Taylor Avenue, Louisville, CO, 80027; 877.824.7252\*](#)
- Do not use proprietary software or hardware that is not compatible with Siemens Building Automation System (BAS) in any controls for HVAC and Refrigeration equipment.
- All sensors wiring penetration through walls must be sealed to the sensor connection point to prevent air infiltration.

## **Division 26 – Electrical**

### **Design Requirements:**

#### **Electrical**

- All Panel boards, disconnects, transformers and bus duct shall be Square D.  
*Schneider Electric - 800 Federal Street, Andover, MA 01810; 877.342.5173*
- All electrical and control wiring shall be in conduits. Minimum conduit size is ¾". No flexible conduits shall be used.
- All electrical circuits must be labeled with inconspicuous labeling, based upon the area installed with the panel and circuit # feeding the receptacle.
- Provide dedicated circuit for each appliance in the break rooms.
- No MC cable greater than 6'-0" long is allowed.
- Separate electrical meter for all Smithsonian Enterprises spaces.
- All wall plates shall be stainless steel.
- Receptacle color should be discussed with the Museum during design meetings.
- Lighting and receptacles branch circuits, where home run contains three or more single phase circuits, shall have dedicated neutrals for each phase conductors.
- All junction boxes and receptacles must be labeled with panel fed from and circuit number. All conduits must be labeled with the service of the conductors.
- In exhibit areas, housekeeping receptacles shall not be fed from exhibit circuits. Housekeeping receptacles shall be commercial-grade simplex receptacles (1 outlet); Exhibit receptacles shall be commercial-grade duplex receptacles (2 outlets).
- All electrical equipment mounted on the floor requires a minimum of a 4" concrete housekeeping pad for the equipment to sit on.
- All ATS's shall be Zenith and have Load shedding Capabilities to allow interface with the buildings Square D load shed system and SCADA systems.  
*GE Industrial Solutions - 800-431-7867*
- All electrical transformers need to be set on a concrete pad. They are not to be hung from any type of trapeze in an electrical closet unless prior museum design approval.

### **Specifications:**

#### **260553 Raceway and Boxes for Electrical Systems**

- Avoid using a raceway system if feasible. If needed, use Wiremold steel powder-coated 4000 and 6000 series as Basis of Design.  
*Legrand - 60 Woodlawn Street, West Hartford, CT 06110; 877.BY.LEGRAND*

#### **260923 Lighting Control Devices**

- All lighting control in exhibits spaces shall be from Electronic Theater Control, Inc. (ETC).  
*Electronic Theater Control, Inc. - 3031 Pleasant View Rd, PO Box 620979, Middleton, WI 53562-0979; 608.831.4116*

#### **262416 Panel boards**

- Electric panel boards shall be Square D with hinged cover and hinged door within the cover.  
*Schneider Electric - 800 Federal Street, Andover, MA 01810; 877.342.5173*

### 262923 Variable Frequency Controllers

- Variable Frequency Drive – All drives should be from Yaskawa America, Inc.  
*Yaskawa America, Inc. – 2121 Norman Drive South, Waukegan, IL 60085; 800-927-5292*

### 265100 Interior Lighting

- Wherever possible, LED bulbs/fixture shall be used for all applications.
  - Incandescent lightbulbs are not allowed, unless approved for a special application.
- New fixtures for general lighting shall be 277V.
  - Most of the existing Main Building lighting is 208V. A/E should consider upgrading the services to 277V after discussion with the Museum and SF Project Manager.
- Exit Lights: Evenlite Inc., Sentry CCDS recessed LED Exit Signs;  
*Evenlite Inc. – 3161 State Road, Bensalem, PA 19020; 800.872.0879*
  - All black housing; Green Lettering; AC Operation
  - 2 Exit Signs (high and low) shall be provided at each location: both signs shall be fully recessed in the wall with recessed conduits.
- ARA signs shall be a custom-graphic version of the exit light with black housing, white face, blue lettering:
  - Evenlite Inc., Model # DCG-AC-1-BW-RE-BL-W “AREA OF RESCUE”
- Lighting Track: LSI, 2 circuit track mounted on unistrut. All tracks to end no more than 2’-0” from walls.  
*LSI Industries Inc. - 10000 Alliance Road, Cincinnati, OH 45242; 513-793-3200*
  - Power feed to LSI 2-circuit lighting track must be tested prior to electrical close-out by installing a lamped fixture on each circuit on each length of track from feed end to opposite end.
- Fluorescent fixtures:
  - Fluorescent Lamp: T-8 and T-5 lamps.
    - All fixtures shall be 4’-0” length. 2’-0” fixtures are not allowed.
  - Fluorescent Light Lenses: Parabolic Lenses.
  - Lighting Ballasts: Instant Start/Energy Saver ballasts.
    - Do not use fluorescent fixture with emergency ballast unless approved by the museum. Separate regular fluorescent and emergency lights.
- Emergency Lighting: Connect all emergency lights to emergency circuit. Do not use battery operated units unless approved by the museum.

### 265613 Lighting Poles

- Light poles in Parking area: refer to Interagency Initiative for National Mall Road Improvement plan

## **Division 27 – Communications**

### Data

- Provide ¾” conduit from each data location to cable tray or data closet (whichever is closer); no daisy chaining is allowed.
- Cable tray to have solid bottom, only data is to be installed in the cable tray (no security or other cabling will be installed in the cable tray) finish
  - Cable tray to be field painted, same color as ceiling.
- Data conduits must have grounding bushing and be grounded to the cable tray system.

- Cable trays shall be grounded to building grounding system.
- CWAS cable: The contractor is responsible for coordinating the moving and reconnecting of the CWAS cable. Contact Arron Matassa 225-644-1166, [Arronm@Gcrec.org](mailto:Arronm@Gcrec.org)

## **Division 28 – Electronic Safety and Security**

### **Security**

- Refer to SI Security Design Criteria, latest revision.
- Refer to OPS Preferred Equipment List, latest revision.
- Card Readers for Access Control shall be black.
- No card reader on IT closets and Electrical closets
- Mount card readers in such a manner and location to avoid door swing and contact with door hardware to avoid physical damage to reader.
- All security wiring must be in conduits. Cable tray cannot be used for security wiring.
- Lord and Company Technologies coaxial cable for security radios must be maintained during construction. It is the contractor's responsibility to contact Lord and Company Technologies to move and or re-connect this cable. Contact: Bill Gulbranson; 703-361-6009 ([Lordcotech.com](http://Lordcotech.com))

## **Division 31 – Earthwork**

Not Used

## **Division 32 – Exterior Improvements**

### **Specifications:**

#### **328400 Planting Irrigation**

- Basis of Design: Rainbird MAXICOM2  
*Rain Bird Corporation – 970 West Sierra Madre Ave., Azusa, CA 91702; (626) 812-3400*
- Coordinate all work for additions, repairs or modifications of existing irrigation systems with Smithsonian Gardens' staff prior to starting renovation or expansion work.
- Obtain Smithsonian Gardens' approval on installed main and lateral lines prior to backfilling.
- Guarantee: Guarantee all work for two years from date of acceptance.
- As-Built Drawing(s): Provide an "As-Built" drawing(s) of the installed irrigation system that shows point of connection(s), mainline pipes, mainline fittings, isolation valves, zone valves, quick couplers, wire splices, and controller. As-builts shall be supplied as both AutoCAD 2016 files and on reproducible media.
- Operations and Maintenance Manuals: Provide Operations and Maintenance Manuals, including operating and maintenance instructions on all major equipment.
- Project Conditions: Verify pressure at the irrigation point of connection to confirm minimum operating pressure of 80 psi and minimum water supply of 65 gpm.
- Flow Sensors: NPT, as manufactured by Rain Bird

- Spray Heads: 1800 Series Pressure Regulated Spray Heads, SAM-PRS, as manufactured by Rain Bird
- Nozzles: Matched Precipitation Rate Nozzles, as manufactured by Rain Bird
- Rotors: 5000 Series Rotors, 5004-PL-PC-SAM-R, as manufactured by Rain Bird
- Valves: PEB Series Valves, 100-PEB (1") and 150-PED (1 ½"), as manufactured by Rain Bird
- Mainline Piping (3" and larger upstream of individual zone valves): Polyvinyl Chloride (PVC) pipe, class 200 gasketed O-ring joint, as manufactured by World of Plastics, Johns Mansville, or approved equal.
- Mainline Piping (¾" to 2 ½"): PVC, SDR21, class 200, all fittings shall be pressure-rated. No sewer or drain fittings shall be used.
- Mainline Piping (½"): class 315 or Schedule 40 solvent weld PVC, all fittings shall be pressure rated. No sewer or drain fittings shall be used.
- Lateral Line Piping: PVC, SDR21, class 200, all fittings shall be pressure rated. No sewer or drain fittings shall be used.
- Pressurized Mainline Piping to be installed through sleeve beneath road crossings: PVC Aquamine piping with pressure rating of 200psi and must meet ASTM D2241. Certa-Lok joints shall meet ASTM D3139 requirements for flexible elastomeric seals.
- Pipe Fittings (for pipes 3" and larger): Class 250, ASTM-A-536 ductile iron, cast iron, deep joint socket fittings. Fittings shall be suitable for pressures up to 350 PE, as manufactured by Harco Union Foundry. No solvent weld fittings on the main line 3" and larger will be accepted. Fittings for gasketed pipe shall be thrust blocked per details, and of the size recommended by the manufacturer of the fitting.
- Pipe Sleeving: PVC, 1120, Schedule 40, two full sizes larger in inside diameter than the pipe it is to hold (and conforming to ASTM D2665 and D1785), and extending a minimum of 36" beyond the pavement edges
- Testing: Subject the system to a leakage test, zone wiring test, and a test for nozzle displacement/pattern/coverage.

### **Division 33 – Utilities**

Not Used

### **Division 34 – Transportation**

Not Used

### **Division 35 – Waterway and Marine**

Not Used