UNIVERSITY of MARYLAND
BALTIMORE

**ADMINISTRATION & FINANCE**

**DESIGN AND CONSTRUCTION**

# SPECIFICATIONS FOR THE INSTITUTE OF HUMAN VIROLOGY ELEVATOR MODERNIZATION AT THE UNIVERSITY OF MARYLAND

**UNIVERSITY PROJECT # 23-385**

**VOLUME 1: PROJECT SPECFICATIONS**

**March 7, 2025**

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**Owner**
University of Maryland, Baltimore
Design and Construction
620 W. Lexington Street, 6th Floor
Baltimore, Maryland 21201

**Board of Public Works**
Wes Moore, Governor
Brooke Lierman, Comptroller
Dereck E. Davis, Treasurer

**Maryland General Assembly**
Bill Ferguson, Senate President
Adrienne A. Jones, House Speak

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**Consultant**
VDA
8641 Loch Raven Blvd., Suite 3A
Baltimore, MD 21286

**UMB MASTER SPECIFICATIONS TABLE OF CONTENTS**

# SECTION 010100 – SUMMARY OF WORK

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The Project consists of the modernization of two (2) traction passenger elevators and one (1) traction service at the Institute of Human Virology.

1. Project Location: 725 West Lombard Street, Baltimore, MD 21201
2. Owner: University of Maryland, Baltimore.

B. Contract Documents dated September 9, 2024 were prepared for the Project by VDA Inc., 8641 Loch Raven Blvd., Suite 3A, Baltimore, MD 21286.

C. The Work consists of the modernization/replacement of the Maryland Bar Center one (1) hydraulic passenger elevator, including but not limited to cab interiors and elevator machine room, hoistways, elevator lobbies, pit, related building work: electrical, mechanical and life safety upgrades (reference Division 14, 142123, 142143 Section 1.5, Division 07, Division 21, Division 22, Division 22, Division 26,Division 28).

### 1.3 WORK UNDER OTHER CONTRACTS

A. Separate Contract: The University has awarded a separate contract for performance of certain construction operations at the site. Those operations will be conducted simultaneously with work under this Contract. That Contract includes the following:

1. Contract: Install elevator machine room HVAC.

B. Cooperate fully with separate contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

### 1.4 WORK SEQUENCE

A. The work will be conducted in four (4) phases. Modernization work on Elevators No.1 - No.3 shall be performed consecutively. Only one (1) traction elevator can be taken out of service at any one time.

1. Phase 1: Modernize Elevator No.1.
2. Phase 2: Modernize Elevator No.2.
3. Phase 3: Modernize Elevator No.3.

4. Phase 4: Replace Sidewalk Lift.

1.5 CONTRACTOR USE OF PREMISES

A. General: During the construction period the Contractor shall have full use of the premises for construction operations, including use of the site. The Contractor's use of the premises is limited only by the University's right to perform work or to retain other contractors on portions of the Project.

B. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.

1. University Occupancy: Allow for University occupancy and use by the public.
2. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the University, the University's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Use of the Existing Building: Maintain the existing building in a weathertight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

1.6 OCCUPANCY REQUIREMENTS

A. Full University Occupancy: The University will occupy the site and existing building during the entire construction period. Cooperate with the University during construction operations to minimize conflicts and facilitate University usage. Perform the Work so as not to interfere with the University's operations.

1.7 PROTECTION OF EXISTING CONSTRUCTION AND FURNISHINGS

A. The Contractor shall take all necessary precautions to protect the University’s property and furnishings. The Contractor shall promptly remedy damage and loss to the University’s property caused in whole or in part by the Contractor, a Subcontractor, a Sub-Subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible.

**PART 2 – PRODUCTS** (Not Applicable)

**PART 3 – EXECUTION**

END OF SECTION 010100

# SECTION 010200 – ALLOWANCES

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.

1. Selected materials and equipment are specified in the Contract Documents by allowances. In some cases, these allowances include installation. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.
2. Whenever costs are more or less than allowances, the contract sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect the difference between actual costs and the allowance.

B. Types of allowances include the following:

1. Lump-sum allowances.
   a. This is a fixed amount allowance for a given item.

### 1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise the University of the date when the final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work. Include these milestone dates in the Contractor's Construction Schedule.

B. At the University's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by the University from the designated supplier.

### 1.4 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

B. Submit invoices and delivery slips to show the actual costs and quantities of materials delivered to the site for use in fulfillment of each allowance.

**PART 2 – PRODUCTS** (Not Applicable)

**PART 3 – EXECUTION**

3.1 EXAMINATION

A. Examine products covered by an allowance promptly upon delivery for damage or defects. Report any damages or defects to the University and make arrangements for replacement of defective or damaged materials.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Allowances

1. Carry the following allowances for Elevators No.1 – No.3:

   a. Passenger Elevator Cab Interior Allowances: $45,000.00 (Per Elevator)
   b. Service Elevator Cab Interior Allowances: $25,000.00 (Per Elevator)

2. The above allowances are exclusive of any handling charge, applicable sales and/or use taxes. Wiring, installation and coordination of allowance items shall be included in the base contract.

END OF SECTION 010200

# SECTION 010270 – APPLICATIONS FOR PAYMENT

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.

B. This Section specifies administrative and procedural requirements governing each prime contractor's Applications for Payment.

1. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, Submittal Schedule, and List of Subcontracts.

### 1.3 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:

a. Contractor's Construction Schedule.
b. Application for Payment forms, including Continuation Sheets.
c. List of subcontractors.
d. Schedule of allowances.
e. Schedule of alternates.
f. List of products.
g. List of principal suppliers and fabricators.
h. Schedule of submittals.

2. Submit the Schedule of Values to the University at the earliest possible date but no later than seven (7) days before the date scheduled for submittal of the initial Applications for Payment.

3. Subschedules: Where Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish the format for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values:

   a. Project name and location.
   b. University's Project number.
   c. Contractor's name and address.
   d. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

   a. Related Specification Section or Division.
   b. Description of Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value.
   h. Percentage of Contract Sum to nearest one-hundredth percent, adjusted to total 100%.

3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Break principal subcontract amounts down into several line items.
4. Round amounts to nearest whole dollar; the total shall equal the Contract Sum.
5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed.

   a. Differentiate between items stored on-site and items stored off-site. Include requirements for insurance and bonded warehousing, if required.

6. Provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Unit-Cost Allowances: Show the line-item value of unit-cost allowances, as a product of the unit cost, multiplied by the measured quantity. Estimate quantities from the best indication in the Contract Documents.
8. Margins of Cost: Show line items for indirect costs and margins on actual costs only when such items are listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete. Include the

total cost and proportionate share of general overhead and profit margin for each item.

a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at the Contractor's option.

9. Schedule Updating: Update and resubmit the Schedule of Values prior to the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications for payment as paid for by the University.

1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

B. Refer to the University of Maryland Baltimore Standard General Condition of Construction for requirements and procedures governing applications for payment.

C. Initial Application for Payment: Administrative actions and submittals, that must precede or coincide with submittal of the first Application for Payment, include the following:

1. List of subcontractors.
2. List of principal suppliers and fabricators.
3. Schedule of Values.
4. Contractor's Construction Schedule.
5. Schedule of unit prices.
6. Submittal Schedule.
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.
9. Copies of authorizations and licenses from governing authorities for performance of the Work.
10. Initial progress report.
11. Report of preconstruction meeting.
12. Certificates of insurance and insurance policies.
13. Performance and payment bonds.
14. Data needed to acquire the University's insurance.
15. Initial settlement survey and damage report, if required.

D. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment.

1. This application shall reflect Certificates of Partial Substantial Completion issued previously for University occupancy of designated portions of the Work.
2. Administrative actions and submittals that shall precede or coincide with this application include:
    a. Warranties (guarantees) and maintenance agreements.
    b. Test/adjust/balance reports.
    c. Operation and Maintenance Manuals.
    d. Meter readings if appropriate.
    e. Startup performance reports.
    f. Commissioning Reports.
    g. Final cleaning.
    h. Application for reduction of retainage and consent of surety.
    i. Advice on shifting insurance coverages.
    j. Final progress photographs.
    k. List of incomplete Work, recognized as exceptions to University's Certificate of Substantial Completion.
    l. Final acceptance paperwork for each single elevator or group of elevators.

E. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include the following:

1. Completion of Project closeout requirements.
2. Completion of items specified for completion after Substantial Completion.
3. Resolve all previously unsettled claims.
4. Resolve all previously incomplete Work.
5. Transmittal of required Project construction records to the University.
6. Proof that taxes, fees, and similar obligations were paid.
7. Removal of temporary facilities and services.
8. Removal of surplus materials, rubbish, and similar elements.
9. Change of door locks to University's access.

**PART 2 – PRODUCTS** (Not Applicable)

**PART 3 – EXECUTION** (Not Applicable)

END OF SECTION 010270

# SECTION 010350 – MODIFICATION PROCEDURES

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing contract modifications.

### 1.3 MINOR CHANGES IN THE WORK

A. The University will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or Contract Time.

### 1.4 CHANGE ORDER PROPOSAL REQUESTS

A. University Initiated Change Order Proposal Requests: The University will issue a detailed description of proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal requests issued by the University are for information only. Do not consider them as an instruction either to stop work in progress or to execute the proposed change.
2. Within a mutually agreed upon time period, submit an estimate of cost necessary to execute the change to the University for review.

    a. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities. Include required labor hours and unit costs, with totals for each labor category. Include all credits for deleted work.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts, for new work and deleted work.
    c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.

B. Contractor-Initiated Proposals: When latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the University.

1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
2. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities. Include required labor hours and unit costs, with totals for each labor category. Include all credits for deleted work.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts, for new work and deleted work.
4. Comply with requirements in Section "Product Substitutions" if the proposed change requires substitution of one product or system for a product or system specified.

C. Proposal Request Form: Use forms provided by the Owner for Change Order Proposals or Contractor's standard form if found to be acceptable by the Owner.

1.5 ALLOWANCES

A. Allowance Adjustment: For allowance-cost adjustment, base each Change Order Proposal on the difference between the actual purchase amount and the allowance.

1. Include installation costs in the purchase amount only where indicated as part of the allowance.
2. Prepare explanations and documentation to substantiate the margins claimed.
3. The University reserves the right to establish the actual quantity of work-in-place

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or the Contractor's handling, labor, installation, overhead, and profit. Submit claims within twenty-one (21) days of receipt of the Change Order authorizing work to proceed. The University will reject claims submitted later than twenty-one (21) days.

1. Do not include the Contractor's or sub-contractors indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in Contract Documents.
2. No change to the Contractor's indirect expense is permitted for selection of higher or lower-priced materials or systems of the same scope and nature as originally indicated.

1.6 CHANGE ORDER PROCEDURES

**A.** Upon the University's approval of a Proposal Request, the University will issue a Change Order Requisition for signatures of the Contractor followed by a Notice to Proceed.

**PART 2 – PRODUCTS** (Not Applicable)

**PART 3 – EXECUTION**

END OF SECTION 010350

# SECTION 010400 – COORDINATION

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes administrative and supervisory requirements necessary for coordinating construction operations including, but not necessarily limited to, the following:

1. General project coordination procedures.
2. Conservation.
3. Coordination Drawings.
4. Administrative and supervisory personnel.
5. Cleaning and protection.

### 1.3 COORDINATION

A. Coordinate construction operations included in various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in the sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to assure required minimum accessibility for maintenance, service, and repair.
3. Make provisions to accommodate items scheduled for later installation.

B. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

1. Prepare similar memoranda for the University and sub-contractors where coordination of their work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly

progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of CPM schedules.
2. Installation and removal of temporary facilities.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Work coordination meetings.
6. Project closeout activities.

D. Conservation: Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work.

1.4 SUBMITTALS

A. Staff Names: Within fifteen (15) days of commencement of construction operations, submit a list of the Contractor's principal staff assignments, including the superintendent and other personnel in attendance at the Project Site. Identify individuals and their duties and responsibilities. List their addresses and telephone numbers.

1. Post copies of the list in the Project meeting room, the temporary field office, and at each temporary telephone.

**PART 2 – PRODUCTS** (Not Applicable)

**PART 3 – EXECUTION**

3.1 GENERAL COORDINATION PROVISIONS

A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

B. Coordinate temporary enclosures with required inspections and tests to minimize the necessity of uncovering completed construction for that purpose.

3.2 CLEANING AND PROTECTION

A. Clean and protect construction in progress and adjoining materials in place, during handling and installation. Apply protective covering where required to assure protection from damage or deterioration until Substantial Completion.

B. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to assure operability without damaging effects.

C. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Thermal shock.
5. Excessively high or low humidity.
6. Air contamination or pollution.
7. Water or ice.
8. Solvents.
9. Chemicals.
10. Light.
11. Radiation.
12. Puncture.
13. Abrasion.
14. Heavy traffic.
15. Soiling, staining, and corrosion.
16. Bacteria.
17. Rodent and insect infestation.
18. Combustion.
19. Electrical current.
20. High-speed operation.
21. Improper lubrication.
22. Unusual wear or other misuse.
23. Contact between incompatible materials.
24. Destructive testing.
25. Misalignment.
26. Excessive weathering.
27. Unprotected storage.
28. Improper shipping or handling.
29. Theft.
30. Vandalism.

END OF SECTION 010400

# SECTION 010450 – CUTTING AND PATCHING

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes the requirements for cutting and patching.

### 1.3 SUBMITTALS

A. Cutting and Patching Proposal: When unforeseen conditions require cutting and patching of the existing structure and/or related components the CM shall submit a cutting and patching proposal to the university, for review and approval before proceeding with any work. Include the following information, as applicable, in the proposal:

1. Describe the extent of cutting and patching required and indicate why it cannot be avoided. Include changes to the building's appearance and other significant visual elements if applicable.
2. Describe the products to be used.
3. Identify the impact to the project’s schedule and budget.
4. Indicate the dates when cutting and patching will be performed.
5. Where cutting and patching involves adding reinforcement to structural elements, the modifications to the structure shall be designed by a registered structural engineer. If the design team does not include a structural engineer the CM shall secure the services of an engineer to perform the required design. The CM shall submit the design drawings, details and engineering calculations showing integration of reinforcement with the original structure to the University.
6. Approval by the University to proceed with cutting and patching does not waive the University's right to later require complete removal and replacement of unsatisfactory work.

### 1.4 QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.

1. Obtain hot work permit from the University for cutting, burning, welding, etc. (See attached).

2. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:

a. Structural concrete.
b. Structural steel.
c. Lintels.
d. Miscellaneous structural metals.
e. Equipment supports.
f. Piping, ductwork, vessels, and equipment.
g. Structural systems of special construction in Division 13 Sections.

B. Operational Limitations: Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.

1. Obtain approval of the cutting and patching proposal from the University before cutting and patching the following operating elements or safety related systems:

a. Primary operational systems and equipment.
b. Air or smoke barriers.
c. Water, moisture, or vapor barriers.
d. Membranes and flashings.
e. Fire protection systems.
f. Noise and vibration control elements and systems.
g. Control systems.
h. Communication systems.
i. Conveying systems.
j. Electrical wiring systems.
k. Operating systems of special construction.
l. Fire rated assemblies.

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the University's opinion, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner when directed by the University.

1. If possible, retain the original Installer or fabricator to cut and patch the exposed Work listed below. If it is impossible to engage the original Installer or fabricator, engage another recognized experienced and specialized firm.

a. Processed concrete finishes.
b. Ornamental metal.
c. Matched-veneer woodwork.

d. Preformed metal panels.
e. Firestopping.
f. Window wall system.
g. Stucco and ornamental plaster.
h. Acoustical ceilings.
i. Terrazzo.
j. Fluid-applied flooring.
k. Wall covering.
l. HVAC enclosures, cabinets, or covers.

D. Cutting and Patching Responsibilities:

1. Cutting: cutting shall be the work of the trade requiring the cutting for access, or for permitting the alteration to be performed or an approved subcontractor designated by the trade or the CM.

   a. Cutting required for inspections shall be the work of the CM/GC.
   b. Cutting required to obtain test samples of suspected hazardous materials shall be the work of a contractor licensed for the removal of hazardous materials.

2. Patching: Patching shall be the work of the appropriate trade.

   a. Maintain the rating of fire rated barriers, using approved sealant products.

3. Fire Rated Barriers: Where existing fire rated barriers, located in the project area, have unsealed openings for mechanical and electrical work, these openings shall be sealed using the approved sealant products to maintain the fire rating of the barrier.

1.5 WARRANTY

A. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

**PART 2 – PRODUCTS**

2.1 MATERIALS, GENERAL

A. Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible if identical materials are unavailable or cannot be used. For building exterior or visible interior elements, the Architect and the UMB representative must approve substitutions. Use materials whose installed performance will equal or surpass that of existing materials. Refer to applicable spec sections for materials.

2.2 ROOFING SYSTEMS

A. Where existing roofing systems require alterations due to unforeseen conditions, all required alterations shall be provided by a roofing contractor approved by the manufacturer of the existing roofing system.

**PART 3 – EXECUTION**

3.1 CONSTRUCTION WORK – EXCESSIVE NOISE

A. All construction work that creates excessive noise will not be permitted during normal business hours, 8:00am to 5:00pm (M-F) or 8:00am to 8:00pm (weekends). Work such as core drilling floors, cutting masonry construction or other materials, or inserting hangers in floor slabs shall be scheduled between 5:00am and 8:00am (M-F) or 10:00pm to 8:00am (weekends). Coordinate actual time frames with UMB – Project Manager.

3.2 INSPECTION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.

1. Before proceeding, meet at the Project Site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.3 PREPARATION

A. Temporary Support: Provide temporary support of work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Avoid cutting existing pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them or to take them out of service.

3.4 PERFORMANCE

A. General: Employ skilled workmen or experienced subcontractors to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining construction. Where possible, review proposed procedures with the original Installer; comply with the original Installer's recommendations.

1. In general, when cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.
4. Comply with requirements of applicable Division 2 Sections where cutting and patching requires excavating and backfilling.
5. Where services are required to be removed, relocated, or abandoned, by-pass utility services, such as pipe or conduit, before cutting. Ensure all services have been de-energized or drained before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Where removing walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch after the area has received

primer and second coat. Prepare entire surface to receive final coat as necessary for proper adhesion.

4. Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.5 PAINTING

A. Extent of Painting:

1. Paint over the entire surface plane, unless otherwise noted.
2. Over patched surfaces paint to the nearest cut off line for the entire surface, such as the intersection with adjacent wall, ceiling, beam, bulkhead, or to the nearest opening frame where a total cut off does not occur within ten (10) feet of the patch, unless otherwise noted.

B. Appearance and Finish:

1. Appearance: Ensure painted surfaces do not present a spotty, touched-up appearance.
2. Finish: Provide a smooth continuous surface in texture, coverage and color.

3.6 CLEANING

A. Areas and spaces where cutting and patching are performed shall be cleaned. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

END OF SECTION 010450

# SECTION 010950 – REFERENCE STANDARDS AND DEFINITIONS

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 DEFINITIONS

A. General: Basic contract definitions are included in the Conditions of the Contract.

B. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, or other paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the reader locate the reference. Location is not limited.

C. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the University, requested by the University, and similar phrases.

D. "Approved": The term "approved," when used in conjunction with the University's action on the Contractor's submittals, applications, and requests, is limited to the University's duties and responsibilities as stated in the Conditions of the Contract.

E. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": The term "furnish" means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": The term "install" describes operations at the Project Site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.

I. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. The term "experienced," when used with the term "installer," means having a minimum of five (5) previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of authorities having jurisdiction.
2. Trades: Using terms such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
3. Assigning Specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no option. However, the ultimate responsibility for fulfilling contract requirements remains with the Contractor.

    a. This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade-union jurisdictional settlements and similar conventions.

J. “Project Site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction, with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

K. “Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Format: These Specifications are organized into Divisions and Sections based on CSI's 16-Division format and UMB’s Master format numbering system.

B. Specification Content: This Specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

1. Abbreviated Language: Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Streamlined Language: The Specifications generally use the imperative mood and streamlined language. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.

    a. The words "shall be" are implied where a colon (:) is used within a sentence or phrase.

## 1.4 INDUSTRY STANDARDS

A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.

C. Conflicting Requirements: Where compliance with two (2) or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer to the University before proceeding for a decision on requirements that are different but apparently equal, and where it is uncertain which requirement is the most stringent.

    1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum acceptable. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the University for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

    1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source.

E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authorities having jurisdiction, or other

entity applicable to the context of the text provision. Refer to Gale Research Co.'s "Encyclopedia of Associations," available in most libraries.

1.5 SUBMITTALS

A. Permits, Licenses, and Certificates: For the University's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

**PART 1 – PRODUCTS** (Not Applicable)

**PART 2 – EXECUTION** (Not Applicable)

END OF SECTION 010950

# SECTION 012000 – PROJECT MEETINGS

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:

1. Preconstruction conferences.
2. Progress meetings.
3. Coordination meetings.

### 1.3 PRECONSTRUCTION CONFERENCE

A. The University shall schedule a preconstruction conference before starting construction, at a time convenient to the Contractor and the University, but no later than fifteen (15) days after execution of the Agreement. The conference will be held at a site identified by the University.

1. The University will conduct the meeting. Minutes will be recorded and distributed to participants in accordance with contract requirements.

B. Attendees: Authorized representatives of the University, University, and their consultants; the Contractor and its superintendent; major subcontractors; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

C. Agenda: Discuss items of significance that could affect progress, including, but not limited to, the following:

1. Tentative construction schedule.
2. Critical work sequencing.
3. Designation of responsible personnel.
4. Procedures for processing field decisions and Change Orders.
5. Procedures for processing Applications for Payment.
6. Procedures for processing Requests for Information (RFI's).
7. Procedures for processing University's Supplemental Instructions and Contract Clarification.
8. Distribution of Contract Documents.

9. Submittal of Shop Drawings, Product Data, and Samples.
10. Preparation of record documents.
11. Use of the premises.
12. Parking availability.
13. Office, work, and storage areas.
14. Equipment deliveries and priorities.
15. Safety procedures.
16. First aid.
17. Security.
18. Housekeeping.
19. Working hours.
20. Utility outages.
21. Testing.

1.4 PROGRESS MEETINGS

A. The University shall schedule and administer monthly progress meetings throughout the progress of work. The progress meetings will be held at a site identified by the University.

1. The University will conduct the meeting, record minutes, and distribute copies to participants.

B. Attendees: In addition to representatives of the University and the University, each subcontractor, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project.

1. Contractor's CPM Construction Schedule: Review progress since the last meeting. Determine status of each activity in relation to the Contractor's Construction Schedule, whether on time, ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to insure that current and subsequent activities will be completed within the Contract Time. Determine status of tasks on critical path. Identify additional tasks becoming critical due to delays.
2. Review the present and future needs of each entity present, including, but not limited to, the following:

a. Interface requirements.
b. Time.
c. Sequences.

d. Status of submittals.
e. Deliveries.
f. Off-site fabrication problems.
g. Access.
h. Site utilization.
i. Temporary facilities and services.
j. Hours of work.
k. Hazards and risks.
l. Housekeeping.
m. Quality and work standards.
n. Change Orders.
o. Documentation of information for payment requests.
p. Review submittal log.
q. Review RFI log.
r. Review Change Order log.
s. Review upcoming outages, testing and inspections.
t. Conduct RFI & Submittal on board review meetings as necessary.

1.5 COORDINATION MEETINGS

A. Conduct project coordination meetings at regular intervals convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings.

B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.

C. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

D. Review the progress of other construction activities and preparations for the particular activity under consideration at each preinstallation conference, including requirements for the following:

1. Contract Documents.
2. Options.
3. Related Change Orders.
4. Purchases.
5. Deliveries.
6. Shop Drawings, Product Data, and quality-control samples.
7. Review of mockups.
8. Possible conflicts.
9. Compatibility problems.
10. Time schedules.
11. Weather limitations.

12. Manufacturer's recommendations.
13. Warranty requirements.
14. Compatibility of materials.
15. Acceptability of substrates.
16. Temporary facilities.
17. Space and access limitations.
18. Governing regulations.
19. Safety.
20. Inspecting and testing requirements.
21. Required performance results.
22. Recording requirements.Protection.

**PART 2 – PRODUCTS** (Not Applicable)

**PART 3 – EXECUTION** (Not Applicable)

END OF SECTION 012000

# SECTION 013000 – SUBMITTAL PROCEDURES

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submittals by the Contractor as required by the contract documents.

### 1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals." Informational Submittals will be acknowledged.

C. Closeout Submittals: Written and graphic information regarding the operations and maintenance of a product or system, and that do not require Architect's responsive action. Closeout submittals are those submittals indicated in individual Specification Sections as "closeout submittals." Closeout Submittal will be acknowledged.

D. Shop Drawings, Product Data and Samples: Instruments prepared and submitted by Contractor, for Contractor’s benefit, to communicate to Architect the Contractor’s understanding of the design intent, for review and comment by Architect on the conformance of the submitted information to the general intent of the design. Shop drawings, product data and samples are not Contract documents. Drawings, diagrams, schedules and illustrations, with related notes, are specially prepared for the Work of the Contract, to illustrate a portion of the Work.

E. Product Data: Standard published information (“catalog cut sheets”) and specially prepared data for the Work of the Contract, including standard illustrations, schedules, brochures, diagrams, performance charts, instructions and other information to illustrate a portion of the work.

F. Samples: Physical examples that demonstrate the materials, finishes, features, workmanship or and other characteristics of a portion of the Work. Accepted samples shall service as quality basis for evaluation the Work.

G. Other Submittals: Technical data, test reports, calculations, surveys, certifications, special warranties and guarantees, operation and maintenance data, extra stock and other submitted information and products shall also not be considered Contract Documents but shall be information from Contractor to Architect to illustrate a portion of the Work for confirmation of understanding the design intent.

H. e-Builder: The University employs the e-Builder Construction Project Management System. The software enables members to manage work via a web based graphical interface. Owner will establish project specific page on e-Builder with project specific members. The site login address is https://app.e-builder.net/.

I. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

J. XLS: A file format created by Microsoft for use with Microsoft Excel which is a spreadsheet program that presents table of values arranged in rows and columns.

1.4 SUBMITTAL SCHEDULE

A. Submittal Schedule: Contractor shall prepare and submit a Submittal Schedule which lists submittal items per the product specifications for review and approval by the Architect. Contractor shall allow seven (7) days for Architect and University review. The Submittal Schedule shall identify all specified submittals to be made and shall serve as a checklist for submittals. Arrange the submittals in numerical order by specification section. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Use the Preliminary Project Submittal Register (when provided by the Architect) as a basis for submittals required to be submitted, including requirements for concurrent submittals, and complex submittals which may require additional review time by the Architect at Initial Review.
2. Coordinate Submittal Schedule with list of subcontracts, the Schedule of Values, and Contractor's construction schedule.
3. Format: Submit the Submittal Schedule as a Microsoft Excel file. Use the University-provided excel template which can be found in the eBuilder submittal folder.
4. The first submittal shall be the Submittal Schedule.

5. Review of any submittal without submission and approval of submittal schedule does not relieve Contractor of responsibility to provide Submittal Schedule for approval.
6. Contractor shall review Submittal Register and supplement as required to provide complete Submittal Schedule for review and approval.
7. Contractor shall revise Submittal Schedule as required to include addition or deletion of submittals during project duration.

1.5 SUBMITTAL FORMATS

A. Action Submittals: Assemble all Action Submittals for each specification section into a single Submittal Package for submission into e-builder unless otherwise specified or agreed to during the Submittal Schedule review. Failure of Contractor to assemble all Action Submittals in single package may result in Architect withholding action on submittal(s) until associated submittal(s) required by applicable specification section are received.

1. Product Data can be submitted as a separate Submittal Item before or concurrent with Shop Drawings and before or concurrent with Samples unless otherwise noted in individual specification sections. Product data, shop drawings, color charts and/or samples can be submitted as a single submittal where appropriate.
2. Each Action Submittal shall clearly indicate the products that will be provided by the contractor, including indicating selected options when specified. Where published data sheets are provided which indicate the availability of multiple products or multiple options/selections for products, clearly mark the submittal using arrows, clouds, boxes, or highlighting to indicate intended options and selections for each product.
3. Action submittals shall not include manufacturer's warranty and/or operation and maintenance instructions. This information shall be included in the project's operation and maintenance manual submittal.

B. Informational and Closeout Submittals: Submit Informational and Closeout Submittals in separate Submittal Package as applicable rather than in single Action Submittal package described above.

C. Processing Submittals: Submittals shall be processed electronically using e-Builder. Transmit all submittals from Contractor to Architect via e-Builder, unless otherwise directed. Submittals received from sources other than the Contractor will be returned without action. Include all information specified below for identification of submittals.

1.6 SUBMITTAL IDENTIFICATION FORM

A. Submit each Submittal Item with a Submittal Identification Form, in a format developed with the Architect and acceptable to the University, including the following information for each submittal:

1. Project name and University project number.
2. Submission date.
3. Name and address of Architect.
4. Name and address of Contractor.
5. Name of firm or entity that prepared submittal.
6. Names of subcontractor, manufacturer, and supplier as applicable.
7. Category (action or informational).
8. Include the following information identical to that listed in the approved Submittal Schedule.

    a. Specification section.
    b. Unique submittal title, including revision identifier.

        1) As an option, when a submittal item includes multiple types of submittals (Product Data, Shop Drawings, Qualifications, etc.) include an abbreviation of each that identifies the types.

    c. Type of submittal (product data, test report, etc.).

        1) Only one type of submittal may be selected in the drop down category, for multiple types of items in one submittal choose the category that is the most explanatory.

9. Place for Contractor submittal approval certification, including name, date and signature.
10. Identifiable location for Architect's Action stamp and/or comments.
11. Identifiable location for University's Review stamp and/or comments.
12. Other necessary identification.
13. Submittals not including a Submittal Identification Form will be returned as "Not Reviewed".

B. Identify each element in a Submittal Item by a unique identifier such as: reference to the Specifications article and paragraph, bullet, Drawing sheet number, detail, schedule, room number, assembly or equipment number, and or any other pertinent information that can be used to clearly correlate submittal with Contract Drawings.

C. On the Submittal Identification Form, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information submitted complies with requirement of the Contract Documents.

D. Input each Submittal Item using the eBuilder Submittal Module with identical information as found on the approved Submittal Schedule.

E. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. For full version specifications Name PDF file with the UMB specification section number and title. For condensed specifications Name PDF file with the UMB project number, division number, article number and title. Submittal file names shall be identical to that found in the approved Submittal Schedule. Provide revision number where applicable. See examples below:

1. File Name Examples: 23-385 087100 Door Hardware

    a. Full Version Specification: 23-385 087100 Door Hardware
    b. Full Version Specification: 23-385 230523 Valves for HVAC Piping Systems
    c. Condensed Specification: 23-385 22 - 2.6 Plumbing Valves
    d. Condensed Specification: 23-385 23 - 2.2 HVAC Valves R1

2. Contractor's file names shall not be altered by the A/E and UMB except adding the A/E and UMB Initials (XXX) at each review step. See examples below:

    a. Full Version Specification: 087100 Door Hardware XXX.pdf
    b. Full Version Specification: 087100 Door Hardware XXX.pdf
    c. Condensed Specification: 22 - 2.6 Plumbing Valves XXX.pdf
    d. Condensed Specification: 23 - 2.2 HVAC Valves XXX.pdf

F. Options: When the specification does not identify a manufacturer's specific feature, such as color, provide options available for selection by the Architect.

1.7 SUBMITTAL PROCEDURES

A. Prepare and submit types of submittals with submittal items as required by individual Specification Sections. Examples of types of submittals include product data, shop drawings, color charts and/or samples. Each submittal shall be one e-Builder item, unless submittal types are grouped together for review. Multiple files can be uploaded to eBuilder under a single submittal item when the submittal types are packaged together.

B. Submittal Item: Each submittal Item shall be provided with a Submittal Identification Form addressed from the Contractor to the Architect.

C. Use the eBuilder Submittal Module to create each Submittal Item. Persons entering submittals shall be trained by UMB on the eBuilder Submittal Module prior to entering the Submittal Schedule and any other submittals. Upload the pdf of the submittal directly to the e-Builder Submittal Module.

D. Submittal File Name, Contents and Bookmarks:

1. File Name: UMB Specification # - Title (R1, R2 etc.):

a. Example - Full Specification:
   1) 220523 – Valves for Plumbing Piping System

b. Example - Condensed Specification:
   1) 2.6 – Plumbing Valves

2. Submittal Contents and Bookmarks:

   a. Contents: Include submittal data corresponding to each article in the specification section in the submittal file name.

   b. Bookmarks: Include bookmarks for files larger than 15 pages for each product in the submittal file. Label each product bookmark with the UMB Article # and Title. See examples below and sample bookmarks in Part 3:

      1) Example: 2.2 Shut Off Valves
      2) Example: 2.4 Check Valves
      3) Example: 2.5 Special Valves
      4) Hyperlinks to documents on the web are not allowed and are not acceptable as a substitution for product data. A submittal must be complete without any external links.

   c. Submitted file shall be a searchable PDF electronic file.

   d. When a Submittal includes multiple submittals from a single spec section, it shall be described properly in the submittal file name. Use the following abbreviations, PD – Product Data, SD – Shop Drawings, QUAL – Qualification Data, etc. see examples below:

      1) Example:123600 Wood Laboratory Furniture PD, SD, QUAL
      2) Example:123661 Simulated Stone Countertops PD, QUAL

E. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate submittal items.

4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Certain submittals need to be reviewed concurrently, including but not limited to, the following:

        1) 142123 Traction Passenger Elevators
        2) 142143 Traction Service Elevators

    b. Submittals that require selection of colors will be reviewed. Color selection may not be provided until all submittals requiring color selection have been received and reviewed, and color selections have been approved by the Architect.

    c. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

F. Submittal Comments: Submittal comments entered on the submittal by the Supplier, CM / Contractor, Consultant (A/E), and UMB Personnel shall follow the assigned color codes, based on using Bluebeam Colors, as follows:

1. Supplier, CM / Contractor: Use color Dark Green
2. Consultant (A/E): Use color Red
3. UMB: Use color Light Cyan Blue

G. Processing Time: Allow time for submittal review, including time for resubmittals, as follows: Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the work to permit processing, including resubmittals.

1. Initial Review: Allow 15 working days for initial review of each submittal (which includes University's review) unless otherwise noted on the approved Submittal Schedule. Allow additional time if coordination with concurrent submittals is required. The Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Initial Review of Concurrent Submittals: Allow additional time if coordination with concurrent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
3. Initial Review of Complex Submittals: At the time of review and approval of the Submittal Schedule, the Architect will advise Contractor of certain submittals that are substantially complicated or require multiple reviewers and need an extended initial review time, including but not limited to, the following:

    a. 142100 Elevators (45 days) includes Elevator Inspector review.

b. 210000 Fire Protection Submittal (45 days) includes Fire Marshal review.
c. 220000 Mechanical Submittals (21 days)
d. 260000 Electrical Submittals (45 days)

H. Resubmittals: Make resubmittals in same form as initial submittal.

1. Note date and content of previous submittal only (do not include entire rejected submittal).
2. Note date and content of revision in Submittal Identification Form and clearly indicate extent of revision. Provide responses to Architect's review comments as appropriate to address concerns raised. Annotate the product data sheets, shop drawings, calculations, etc. to clearly indicate compliance with the original specification requirements and to demonstrate compliance with review comments.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

I. Delegated Design Services Certification: In addition to other required submittals, submit digitally-signed PDF electronic file paper copies of certificate, signed and sealed by the responsible design professional.

J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities.

K. Use for Construction: Establish and maintain access to eBuilder so that all submittals are available for use on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.8 CONTRACTOR'S REVIEW OF SUBMITTALS

A. Contractor's Review of Submittals: Prior to submission to Architect for review, Contractor shall collect complete submittal documentation from the Sub/Manufacturer, create the Submittal Package, and assign Submittal Items to it. Each Submittal Item shall be reviewed by the Contractor.
1. Upon receipt of a submittal from the vendor the contractor shall be responsible for reviewing and verifying the submittal is complete and complies with all the requirements of the construction documents before forwarding the submittal to the CM/GC. If the submittal does not comply, the contractor shall identify the deficiencies and promptly return the submittal to the vendor for correction. If the incomplete or incorrect submittal is forwarded on by the CM/GC to the A/E and/or UMB, the CM/GC or contractor shall be responsible for any cost issues resulting from re-processing the submittals.

B. The Contractor shall create one Submittal Identification Form for each Submittal Item. The Contractor shall certify that submittals have been reviewed and approved. Note

corrections and field dimensions. Mark each Submittal Item with a uniform approval stamp including the name of the reviewer and the date of the Contractor's approval and sign each Submittal Item. Submittals without stamp and signature will not be reviewed and will be returned. Electronic signatures are acceptable. Contractor's submittal approval shall certify the following actions by Contractor:

1. Field measurements have been determined and verified.
2. Conformance with requirements of Contract Drawings and Specification is confirmed.
3. Catalog numbers and similar data are correct and indicated with arrow or highlighting; items not used, but on same page shall be crossed out.
4. Work being performed by various subcontractors and trades is coordinated.
5. Field construction criteria have been verified, including confirmation that information submitted has been coordinated with the work being performed by others for the University and actual site conditions.
6. All deviations from requirements of Drawings and Specifications have been identified and noted.
7. Submittals not certified by being stamped and signed by Contractor electronically on the Submittal Identification Form will be returned without action, as will submittals which, in the Architect's opinion, have not been adequately reviewed and coordinated by Contractor.

C. Changes in Work: Changes in the Work shall not be authorized by submittal review actions. No review action, implicit or explicit, shall be interpreted to authorize changes in the Work. Changes shall only be authorized by separate written direction from the University, in accordance with the Contract General Conditions. However, to minimize the ordering of incorrect equipment/parts, notes may indicate forthcoming changes via CDC.

1.9 REVIEW OF SUBMITTALS BY ARCHITECT AND UNIVERSITY

A. Review of Submittals by Architect and University: Submittals shall be a communication aid between Contractor and Architect by which interpretation of Contract Documents requirements may be confirmed in advance of construction.

1. Reviews by University, Architect and Architect's consultants shall be only for general conformance with the design concept of the Project and general compliance with the information given in the Drawings and Specifications.
2. The Architect's review shall not be construed as an "approval," or to relieve the Contractor(s) and material suppliers of responsibility for errors or omissions in the submitted documents.
3. Acceptance of a specific item does not include acceptance of the assembly of which the item is a component.
4. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each submittal, mark

to indicate action taken, and return promptly via the web-based software (e-Builder) system.

B. Architect's Review Action: Architect will mark each submittal with a uniform, self-explanatory action. Architect's action may be a stamp on the Contractor's Submittal Identification Form or a separate review sheet on Architect's standard form.

1. Submittal will be appropriately marked as follows to indicate the action taken:

   a. Action 1 APP (no exceptions taken) Means fabrication, manufacture, or construction may proceed providing submittal complies with Contract Documents.

   b. Action 2a AAN (note markings; no resubmission required): Means fabrication, manufacture, or construction may proceed providing submittal complies with Architect's notations and Contract Documents. (Note: If Contractor cannot comply with notations, make revisions and resubmit.)

   c. Action 2b RFR (note markings/resubmit for record): Means fabrication, manufacture, or construction may proceed; however, submittal did not fully demonstrate full extent of all conditions, details and coordination with other surrounding work and therefore requires additional information and rework as noted. Resubmit shop drawings for final Action 1 or 2. Should Contractor proceed with fabrication, manufacturing or construction, it shall do so at its own risk.

   d. Action 3 A&R (amend and resubmit): This is the equivalent to R&R (revise and resubmit). Means submittal does not comply with design intent of Contract Documents. Do not use submittals stamped Action 4. Make revisions and resubmit.

   e. Action 4 REJ (rejected, submit specified item or resubmit with related assembly items): Means submittal varies from specified item or system specified in Contract Documents and is not acceptable for use on the project. Do not use submittals stamped Action 5. Make revisions and resubmit.

   f. Action 6 NAR (no action required): Means documents have not been reviewed by Architect and submittal is returned to Contractor for several possible reasons: submittal not requested, submittal not complete, Submittal Transmittal form is not included, submittal not coordinated, or submittal bears no resemblance to design intent.

2. Do not permit submittals marked "Rejected or Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.

3. Any work performed prior to receiving a fully approved submittal shall be done at the Contractor's risk and shall be subject to being replaced if Contract requirements are not met.

C. University Review: The University will review the submittal, stamp, and upload the stamped submittal to e-Builder.

D. Final Review Action: The Architect will provide final Action for the submittal and return stamped submittal to the Contractor.

E. Contractor Action: The Contractor will be notified through eBuilder that the submittal is ready for his action. The Contractor shall incorporate all review comments and resubmit if so indicated by the eBuilder and Architect's actions and markings.

F. Contract Requirements:

1. Review actions by Architect and Architect's consultants or the University shall not relieve the Contractor from compliance with requirements of the Contract Drawings and Specifications.
2. Acceptance of submittals with deviations shall not relieve Contractor from responsibility for additional costs of changes required to accommodate such deviations.
3. Deviations included in submittals without prior acceptance will be considered an exception from review of submittals whether noted or not on returned copy.
4. No review action, implicit or explicit, shall be interpreted to authorize changes in the Work. Changes shall only be authorized by separate written Change Order or Field Instruction, in accordance with the Contract General Conditions.
5. When professional certification of performance criteria of materials, systems or equipment is required by Contract Documents, the Architect shall be entitled to rely upon accuracy and completeness of such calculations and certifications.

G. Resubmittals: Subject to same terms and conditions as original submittal.

1. The University will not accept excessive resubmittals.
2. Should excessive resubmittals be required, Contractor may be subject to reimburse the University for Architect's accounts for time spent in processing additional resubmittals at their contractual hourly rate.

## 1.10 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment included in the specification section.

1. If information must be specially prepared for submittal because standard published data are unsuitable for use, generate specific shop drawings for the submittal, and title the submittal as product data.
2. Mark each submittal to show which products and options are applicable. Clearly indicate all aspects of the proposed items, including material selections and all options specified. Failure to indicate such details could result in the submittal being returned as incomplete.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency, including credentials.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams that show factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

B. Shop Drawings: Prepare and submit Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements as shown in the Contract Documents. Include the following information, as applicable:

    a. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.

2. e-Builder: Submit one PDF copy of each submittal, with any scaled drawings capable of being printed as a full-size drawing.

C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Sample Identification: Permanently attach label on unexposed side of Samples that includes the following:

    a. Project name and submittal number.
    b. Generic description of Sample.
    c. Product name and name of manufacturer.
    d. Sample source.
    e. Number and title of applicable Specification Section.
    f. Specification paragraph number and generic name of each item.

3. Transmittal: Provide Submittal Identification Form and include complete submittal information indicated. Include photographic image(s) illustrating Sample characteristics, and Sample Identification information for record.
4. e-Builder: Prepare transmittal in PDF form, and upload to e-Builder. Enter required data in e-Builder to fully identify submittal.
5. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

6. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit two full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return one set with options selected.

7. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or

fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit two sets of Samples. Architect will retain one Sample set; remainder will be returned. Retain one returned Sample set as a project record Sample.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

D. Product Schedule (when required or applicable): As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.

E. Qualification Data: Prepare and submit written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

G. Certificates:

1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.

2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

    a. Name of evaluation organization.
    b. Date of evaluation.
    c. Time period when report is in effect.
    d. Product and manufacturers' names.
    e. Description of product.

f. Test procedures and results.
g. Limitations of use.

7. Corrective Action Report: Testing agency shall submit written documentation of any defects found and any corrective action taken, or proposed solutions.

1.11 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

**PART 2 – PRODUCTS (Not Used)**

**PART 3 – EXECUTION**

Submittal Bookmark Example: The following bookmark example is based on using an outline type arrangement with each line linked to the appropriate submittal page:

UMB Submittal Stamp
CM/Contractor Transmittal
CM/Contractor Replies (Resubmittal Only)
Consultant's Comments
Manufacturer's Transmittal
Manufacturer's Replies (Resubmittal Only)
Product Data
  Product A (Example for A: 2.2 Shut Off Valves)
  Product B (Example for B: 2.4 Check Valves)
  Product C (Example for C: 2.5 Special Valves)
Fabrication Drawings

Drawing 1
Drawing 2
Drawing 3
Maintenance Data (Leave blank for submittal)
Manufacturer's Maintenance Data [Include data in approved submittal for project manual]

END OF SECTION 013000

# SECTION 013110 – SCHEDULES AND REPORTS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes administrative and procedural requirements for schedules, reports, and critical path method scheduling required for proper performance of the Work, including:

1. Submittal schedule.
2. Schedule of inspections and tests.
3. Special reports.

### 1.3 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of schedules and reports with performance of other construction activities.

### 1.4 DEFINITIONS

A. Critical Path Method (CPM): A method of planning and scheduling a construction project where activities are arranged based on activity relationships and network calculations determine when activities can be performed and the critical path of the Project.

B. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall project duration.

C. Network Diagram: A graphic diagram of a network schedule, showing the activities and activity relationships.

D. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path.
2. Predecessor activity is an activity that must be completed before a given activity can be started.

E. Event: An event is the starting or ending point of an activity.

F. Milestone: A key or critical point in time for reference or measurement.

G. Float is the measure of leeway in activity performance. Accumulative float time belongs to the University.

1. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
2. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned project completion date.

1.5 RELIMINARY NETWORK DIAGRAM

A. Preliminary Network Diagram: Submit a preliminary network diagram within fourteen (14) days of the Notice to Proceed. The preliminary network diagram shall outline activities for the first sixty (60) days of construction. Include a skeleton diagram for the remainder of the Work with the preliminary diagram.

1. Include each significant construction activity. Coordinate each activity in the network with other activities. Schedule each construction activity in proper sequence.
2. Indicate completion of the Work on the date established for Substantial Completion, unless the University agrees otherwise.

B. Cash Requirement Prediction: With submittal of the preliminary network diagram, include a preliminary cash requirement prediction based on indicated activities.

C. Distribution: Distribute the preliminary network diagram to parties involved in construction activities that are scheduled early, including the University and the University.

1.6 CPM SCHEDULE

A. Prepare the Contractor's Construction Schedule using the network analysis diagram system known as the critical path method (CPM). Follow procedures outlined in AGC's "Construction Planning & Scheduling."

1. Proceed with preparation of the network diagram immediately following Notice to Proceed.
2. Follow the steps necessary to complete development of the network diagram in sufficient time to submit the CPM Schedule so it can be accepted for use no later than sixty (60) days after commencement of the Work.
3. Conduct educational workshops to train and inform key project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.

4. Establish procedures for monitoring and updating the CPM Schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates. Use "one working day" as the unit of time.

B. CPM Schedule Preparation: Prepare a list of all activities involved in the Project. Include a list of activities required to complete the Work. No single activity shall exceed fifteen (15) work days. Provide the best data available for generation of the network diagram and the CPM Schedule.

1. Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities.
2. Indicate estimated times for the following activities to be performed:
   a. Preparation and processing of submittals.
   b. Purchase of materials.
   c. Delivery.
   d. Fabrication.
   e. Installation.
3. Treat each story or separate area as a separate numbered activity for principal elements of the Work.
4. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.

C. Processing: Enter prepared data on the processing system. Process data to produce output data or a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM Schedule within the limitations of Contract Time.

D. Format: Display the full network on a single sheet of stable transparency, or other reproducible media, of sufficient width to show data clearly for the entire construction period.

1. Mark the critical path. Locate the critical path near the center of the network; locate paths with the most float near the edges.
2. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

E. Initial Issue: Prepare the initial issue of the CPM Schedule network diagram from a listing of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports to show the following:

1. The Contractor or subcontractor and Work or activity.
2. Description of the activity.
3. Principal events of that activity.

4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in working days (maximum limit is fifteen (15) work days for construction activity).
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the Schedule of Values).

F. Value Summaries: Prepare two (2) cumulative value listings, sorted by finish dates.

1. In first listing, tabulate the following:

   a. Activity number.
   b. Early finish date.
   c. Dollar value.
   d. Cumulative dollar value.

2. In second listing, tabulate the following:

   a. Activity number.
   b. Late finish date.
   c. Dollar value.
   d. Cumulative value.

3. In subsequent issues of both listings, substitute actual finish dates for activities completed as of listing date.
4. Prepare listing for ease of comparison with payment requests; coordinate timing with progress meetings.

   a. In both value summary listings, tabulate "actual percent complete," and "cumulative value completed" with total at bottom.
   b. Submit value summary printouts following each regularly scheduled progress meeting.

## 1.7 CPM SUBMITTALS

A. Submittal and Distribution: Submit three (3) copies of the initial issue of the tabulations and network to the University for acceptance. When authorized, distribute copies to the separate contractors, subcontractors and suppliers or fabricators, and others identified by the Contractor with a need-to-know schedule responsibility.

1. Post copies in the Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed

their assigned portion of the Work and are no longer involved in performance of construction activities.

3. Submit copies of each computer-produced report to the University.

B. Schedule Updating: Revise the schedule immediately after each meeting or other activity, where revisions have been recognized or made. Issue the updated schedule at each project meeting and submit with application for payment. Requests for payment will not be made without an updated CPM schedule.

1.8 SUBMITTAL SCHEDULE

A. After development and acceptance of the Contractor's CPM Schedule, prepare a complete schedule of submittals. Submit the schedule within ten (10) days of the date required for submittal of the Contractor's CPM Schedule.

1. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values and the list of products as well as the Contractor's Construction Schedule.

B. Prepare the schedule in chronological order. Provide the following information:

1. Scheduled date for the first submittal.
2. Related Section number.
3. Submittal category.
4. Name of the subcontractor.
5. Description of the part of the Work covered.
6. Latest scheduled date for the University’s review/approval.

C. Distribution: Upon final approval of the University, print and distribute copies to the University, subcontractors, and other parties required to comply with submittal dates indicated.

1. Post copies in the Project meeting room and temporary field office.
2. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned part of the Work and are no longer involved in construction activities.

D. Schedule Updating: Revise the schedule after each meeting or other activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.9 SCHEDULE OF INSPECTIONS AND TESTS

A. Prepare a schedule of inspections, tests, and similar services required by the Contract Documents. Submit the schedule within thirty (30) days of the date established for commencement of the Work.

B. Form: The schedule shall be in tabular form and shall include, but not be limited to, the following:

1. Specification Section number.
2. Description of the test.
3. Identification of applicable standards.
4. Identification of test methods.
5. Number of tests required.
6. Time schedule or time span for tests.
7. Entity responsible for performing tests.
8. Requirements for taking samples.
9. Unique characteristics of each service.

C. Distribution: Distribute the schedule to the University, and each party involved in performance of portions of the Work where inspections and tests are required.

D. Schedule Updating: Revise the schedule after each meeting or other activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.10 REPORTS

1.11 SPECIAL REPORTS

A. General: Submit special reports directly to the University within one day of an occurrence. Submit a copy to other parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at the site, prepare and submit a special report. List the chain of events, persons participating, and responses by the Contractor's personnel, an evaluation of the results or effects and similar pertinent information. Advise the University in advance when such events are anticipated or predictable.

**PART 2 – PRODUCTS** (Not Applicable)

**PART 3 – EXECUTION** (Not Applicable)

END OF SECTION 013110

# SECTION 013800 – CONSTRUCTION PHOTOGRAPHS

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes administrative and procedural requirements for construction photographs for the following types of projects:

1. Campus renovation projects.

### 1.3 CM REQUIREMENTS

A. The CM shall make arrangements to have a series of before and after construction photographs taken of the construction site utilizing their personnel with a digital camera.

B. The CM shall maintain an up-to-date electronic file of the photographs in numerical order per month in an XL spread sheet format as follows:

1. The XL spread sheet shall include a header with the UM Project Name and Project Number. Under the header include columns for “Photo #”, “Date” “Location on Project Site”, “View of the Photo” “Description” and “Photograph”. For Example:

a. Photo #1
b. 6-5-12
c. Roof Level
d. Looking East
e. Roof Flashing at Stair Tower
f. Photograph

### 1.4 SUBMITTALS

A. Submit construction photographs, electronically, in “pdf” file format to the University Project Manager (PM) monthly with the application for payment.

1. Organize the electronic “pdf” files as indicated in paragraph 1.3 above.
2. Pre-construction photographs shall be submitted with the first application for payment.
3. Post-construction photographs shall be submitted with the last application for payment

1.5 PHOTOGRAPHIC REQUIREMENTS

A. The CM shall take a series of construction photographs to document conditions at the project site and during various stages of construction as follows:

1. Pre-Construction Photographs: Prior to the start of construction take photographs of the project site and adjacent areas as follows:

a. Campus Renovation Projects: Take photographs in sufficient number to show existing conditions adjacent to the work areas, to indicate pre construction damage to existing walls, partitions, insulation, previous work that was not completed, and/or missing materials before starting work.

2. Post Construction Photographs:

a. After the project has completed if the A/E, the CM, and/or other contractors would like to have a series of post construction photographs taken of the project site they must submit a written request to the University PM. The PM will contact the contact the appropriate University representatives to gain approval and the set up a time for the photographs to be taken. Post construction photographs will not be allowed without the approval of the end usurer or their representative.

3. Record Photograph Files:

a. At the end of the project submit a complete set of record photographs, organized in XL spread sheets on a CD-R in a full size jewel case to the University. Label the CD-R and the jewel case with the UMB Project Title, UMB Project Number, contents on the CD, and the submission date

**PART 2 – PRODUCTS** (Not Applicable)

**PART 3 – EXECUTION** (Not Applicable)

END OF SECTION 013800

# SECTION 014000 – QUALITY CONTROL

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality-control services.

B. Quality-control services include inspections, tests, and related actions, including reports, performed by Contractor, by independent agencies, and by governing authorities. They do not include contract enforcement activities performed by the University.

C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.

### 1.3 RESPONSIBILITIES

A. Contractor Responsibilities: Unless otherwise indicated as the responsibility of another identified entity, Contractor shall provide inspections, tests, and other quality-control services specified elsewhere in the Contract Documents and required by authorities having jurisdiction. Costs for these services are included in the Contract Sum.

1. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Contractor's responsibility, the Contractor may perform testing by its own workforce. The Contractor shall employ and pay a qualified independent testing agency to perform quality-control services for the following list of testing requirements: Costs for these services are included in the Contract Sum.

2. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the University's responsibility, the University will employ and pay a qualified independent testing agency to perform those services.

B. Retesting: The Contractor is responsible for retesting where results of inspections, tests, or other quality-control services prove unsatisfactory and indicate noncompliance with Contract Document requirements, regardless of whether the original test was Contractor's responsibility.

1. The cost of retesting construction, revised or replaced by the Contractor, is the Contractor's responsibility where required tests performed on original construction indicated noncompliance with Contract Document requirements.

C. Associated Services: Cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:

1. Provide access to the Work.
2. Furnish incidental labor and facilities necessary to facilitate inspections and tests.
3. Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
4. Provide facilities for storage and curing of test samples.
5. Deliver samples to testing laboratories.
6. Provide the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
7. Provide security and protection of samples and test equipment at the Project Site.

D. Duties of the Testing Agency: The independent agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual Sections shall cooperate with the University and the Contractor in performance of the agency's duties. The testing agency shall provide qualified personnel to perform required inspections and tests.

1. The agency shall notify the University and the Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. The agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.
3. The agency shall not perform any duties of the Contractor.

E. Coordination: Coordinate the sequence of activities to accommodate required services with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

1. The Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.

## 1.4 SUBMITTALS

A. Unless the Contractor is responsible for this service, the independent testing agency shall submit a certified written report, in duplicate, of each inspection, test, or similar service to the University. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection, test, or similar service through the Contractor.

1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
2. Report Data: Written reports of each inspection, test, or similar service include, but are not limited to, the following:

    a. Date of issue of report.
    b. Project title and number.
    c. Name, address, and telephone number of testing agency.
    d. Dates and locations of samples and tests or inspections.
    e. Names of individuals making the inspection or test.
    f. Designation of the Work and test method.
    g. Identification of product and Specification Section.
    h. Complete inspection or test data.
    i. Test results and an interpretation of test results.
    j. Ambient conditions at the time of sample taking and testing.
    k. Comments or professional opinion on whether inspected or tested Work complies with Contract Document requirements.
    l. Name and signature of laboratory inspector.
    m. Recommendations on retesting.

1.5 QUALITY ASSURANCE

A. Qualifications for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, that are prequalified as complying with the American Council of Independent Laboratories' "Recommended Requirements for Independent Laboratory Qualification" and that specialize in the types of inspections and tests to be performed.

    1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the state where the Project is located.

**PART 2 – PRODUCTS**
**PART 3 – EXECUTION**

3.1 REPAIR AND PROTECTION

A. General: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes. Comply with Contract Document requirements for Division 01 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities and protect repaired construction.

C. Repair and protection is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

END OF SECTION 014000

# SECTION 016000 – MATERIALS AND EQUIPMENT, DELIVERY, STORAGE, AND HANDLING

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.

### 1.3 DEFINITIONS

A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.

1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

    a. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature that is current as of the date of the Contract Documents.
    b. "Foreign Products," as distinguished from "domestic products," are items substantially manufactured (50% or more of value) outside the United States and its possessions. Products produced or supplied by entities substantially owned (more than 50%) by persons who are not citizens of, nor living within, the United States and its possessions are also considered to be foreign products.

2. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

### 1.4 SUBMITTALS:

A. All submittals shall comply with the requirements in the “SUBMITTALS” section.

## 1.5 QUALITY ASSURANCE

A. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.

1. When specified products are available only from sources that do not, or cannot, produce a quantity adequate to complete project requirements in a timely manner, consult with the University to determine the most important product qualities before proceeding. Qualities may include attributes, such as visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources producing products that possess these qualities, to the fullest extent possible.

B. Compatibility of Options: When the Contractor is given the option of selecting between two (2) or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

C. Foreign Product Limitations: Except under one or more of the following conditions, provide domestic products, not foreign products, for inclusion in the Work:

1. No available domestic product complies with the Contract Documents.
2. Domestic products that comply with the Contract Documents are available only at prices or terms substantially higher than foreign products that comply with the Contract Documents.

D. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
   a. Name of product and manufacturer.
   b. Model and serial number.
   c. Capacity.
   d. Speed.
   e. Ratings.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
6. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
7. Store products subject to damage by the elements above ground, under cover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

**PART 2 – PRODUCTS**

2.1 PRODUCT SELECTION

A. General Product Requirements: Provide products that comply with Contract Documents that are undamaged and new at time of installation.

1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and intended use and effect.
2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Where products are accompanied by the term as selected, University will make selection.
4. Where products are accompanied by the term match sample, sample to be matched is University's.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

A. General Compliance Requirements: Compliance requirements for individual products, as indicated in Contract Documents, are multiple in nature and may include generic

descriptions, performance requirements, compliance with reference standards, conformance with graphic details and other similar forms and methods of indicating requirements, all of which must be complied with.

B. Procedures for Selecting Products: Contractor's options for selecting products are limited by Contract Document requirements, and are not controlled by industry traditions or procedures experienced by Contractor on previous construction projects.

C. Products specified by Reference Standards, Codes and Regulations: Select from among products which can be shown to comply to referenced documents.

D. Products specified by Naming Products and Manufacturers: Select from among products listed.

E. Products specified by naming one (1) Manufacturer's Product as the Basis-of-Design with Reference to Other Manufacturers: Select either the specified Basis-of-Design product or an approved comparable product by one of the other named manufacturers.

1. Comply with provisions in Comparable Products Article to obtain approval for use of a comparable product by one of the named manufacturers.

F. Products specified by naming one (1) Manufacturer's Product and Indicating Option of Selecting Comparable Products by stating or Approved Equivalent or similar language: Select either the specified product or an approved comparable product.

1. Comply with provisions in Comparable Products Article to obtain approval for use of an unnamed comparable product by another manufacturer.

G. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches University's sample. University's decision will be final on whether proposed product matches satisfactorily.

H. Visual Selection Specification: Where Specifications include the phrase as selected from manufacturer's standard colors, patterns, textures or similar phrase, select a product that complies with other specified requirements. University will select color, pattern, and texture.

1. Standard Range: Where Specifications include the phrase standard range of colors, patterns, textures or similar phrase, University will select color, pattern, or texture from manufacturer's product line that does not include premium items.
2. Full Range: Where Specifications include the phrase full range of colors, patterns, textures or similar phrase, University will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Where Basis-of-Design products are specified by name, submit the following, in addition to other required submittals, to obtain approval of a comparable product by one (1) of the named manufacturers:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with the Basis-of-Design product in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, serviceability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of Universities, if requested.
5. Samples, if requested.

**PART 3 - EXECUTION**

3.1 INSTALLATION OF PRODUCTS

A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.

1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

B. Install products in accordance with the execution’s sections of the Project Manual.

END OF SECTION 016000

# SECTION 016310 – SUBSTITUTIONS

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes administrative and procedural requirements for handling requests for substitutions made after award of the Contract.

B. Contractor's submittal and University's acceptance of Shop Drawings, Product Data, or Samples not complying with Contract Documents do not constitute an acceptable or valid request for substitution, nor do they constitute approval. Substitutions not properly authorized may be considered defective.

### 1.3 DEFINITIONS

A. Definitions in this Article do not change or modify the meaning of other terms used in the Contract Documents.

B. Substitutions: Changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor after award of the Contract are considered to be requests for substitutions. The following are not considered to be requests for substitutions:

1. Substitutions requested during the bidding period, and accepted by Addendum prior to award of the Contract, are included in the Contract Documents and are not subject to requirements specified in this Section for substitutions.
2. Revisions to the Contract Documents requested by the University or University.
3. Specified options of products and construction methods included in the Contract Documents.
4. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

### 1.4 SUBMITTALS

A. Substitution Request Submittal: The University will consider requests for substitution if received within sixty (60) days after issuance of Notice to Proceed. Requests received more than sixty (60) days after issuance of Notice to Proceed may be considered or rejected at the discretion of the University.

1. Submit three (3) copies of each request for substitution for consideration. Submit requests in the form and according to procedures required for change-order proposals.
2. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers.
3. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
    a. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the University and separate contractors that will be necessary to accommodate the proposed substitution.
    b. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.
    c. Product Data, including Drawings and descriptions of products and fabrication and installation procedures.
    d. Samples, where applicable or requested.
    e. A statement indicating the substitution's effect on the Contractor's CPM Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
    f. Cost information, including a proposal of the net change, if any in the Contract Sum.
    g. The Contractor's certification that the proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
    h. The Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
    i. Confirmation that the same warranty will be furnished for substitute product as for specified product.

## 1.5 UNIVERSITY'S ACTION

A. University will review and take appropriate action upon Contractor's request for substitutions.

1. University's action will be taken with reasonable promptness, while allowing sufficient time in University's professional judgement to permit adequate review.
2. University shall be entitled to rely upon adequacy, accuracy, and completeness of data, and certifications prepared by Contractor.
3. If necessary, University will request additional information or documentation for evaluation after initial review of receipt of request for substitution.

**PART 2 – PRODUCTS** (Not Used)

**PART 3 – EXECUTION** (Not Used)

END OF SECTION 016310

# SECTION 017000 – CONTRACT CLOSEOUT

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:

1. Inspection procedures.
2. Project record document submittal, including the following:
3. Marked-up copies of Contract Drawings.
4. Marked-up copies of Shop Drawings.
5. Newly prepared drawings.
6. Marked-up copies of Specifications, addenda, and Change Orders.
7. Marked-up Product Data submittals.
8. Record Samples.
9. Field records for variable and concealed conditions.
10. Record information on Work that is recorded only schematically.
11. Operation and maintenance manual submittal.
12. Preparing and submitting operation and maintenance manuals for building operating systems and equipment.
13. Preparing and submitting instruction manuals covering the care, preservation, and maintenance of University products and finishes.
14. Instruction of the University's operating personnel in the operation and maintenance of building systems and equipment.
15. Submittal of warranties.
16. Final cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate Sections the specifications.

C. Environmental Requirements: Conduct cleaning and waste-disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and antipollution regulations.
   1. Do not dispose of volatile wastes, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains.
   2. Burning or burying of debris, rubbish, or other waste material on the premises is not permitted.

D. Maintenance of Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition. Make documents and Samples available at all times for the University's inspections.

E. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 DEFINITIONS

A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the University.

B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the University.

1.4 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the University has benefited from use of the Work through a portion of its anticipated useful service life.

D. University's Recourse: Expressed warranties made to the University are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the University can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: The University reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

E. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, the University reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.
F. Reference Division 14, Elevator Warranty Maintenance 14 01 20 and Traction Passenger Elevators 14 21 23, Traction Service Elevators 14 21 43, Section 1.6, A and B.

1.5 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.

1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete.

a. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
b. If 100% completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

2. Advise the University of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
4. Obtain and submit releases enabling the University unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Submit record drawings, maintenance manuals, final project photographs, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra stock, and similar items, including inventory list.
7. Make final changeover of permanent locks and transmit keys to the University. Advise the University's personnel of changeover in security provisions.
8. Complete startup testing of systems and instruction of the University's operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements.
9. Complete final cleanup requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred, exposed finishes.

B. Inspection Procedures: On receipt of a request for inspection, the University will either proceed with inspection or advise the Contractor of unfilled requirements. The University will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The University will repeat inspection when requested and assured that the Work is substantially complete.

2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.6 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.
2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
3. Submit a certified copy of the University's final punch list of items to be completed or corrected, endorsed and dated by the University. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance and will be endorsed and dated by the University.
4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion or when the University took possession of and assumed responsibility for corresponding elements of the Work.
5. Submit consent of surety to final payment.
6. Submit a final liquidated damages settlement statement.
7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Reinspection Procedure: The University will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the University.

1. Upon completion of reinspection, the University will prepare a certificate of final acceptance. If the Work is incomplete, the University will advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

2. If necessary, reinspection will be repeated.

1.7 QUALITY ASSURANCE

A. Maintenance Manual Preparation: In preparation of maintenance manuals, use personnel thoroughly trained and experienced in operation and maintenance of equipment or system involved.

1. Where maintenance manuals require written instructions, use personnel skilled in technical writing where necessary for communication of essential data.
2. Where maintenance manuals require drawings or diagrams, use draftsmen capable of preparing drawings clearly in an understandable format.

B. Instructions for the University's Personnel: Use experienced instructors thoroughly trained and experienced in operation and maintenance of equipment or system involved to instruct the University's operation and maintenance personnel.

1.8 RECORD DOCUMENT SUBMITTALS

A. General: Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for the University's reference during normal working hours.

B. Record Drawings (As-Builts):

1. Markup Procedure: During construction, maintain a set of blue- or black-line white prints of Contract Drawings and Shop Drawings for Project Record Document (As-Built) purposes.

a. Mark these Drawings to show the actual installation where the installation varies from the installation shown originally. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later. Items required to be marked include, but are not limited to, the following:

1) Dimensional changes to the Drawings.
2) Revisions to details shown on the Drawings.
3) Revisions to routing of piping and conduits.
4) Revisions to electrical circuitry.
5) Actual equipment locations.
6) Duct size and routing.
7) Locations of concealed internal utilities.
8) Changes made by change order.
9) Changes made following the University's written orders.
10) Details not on original Contract Drawings.

b. Mark record prints of Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings location.

c. Mark record sets with red erasable colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.

d. Mark important additional information that was either shown schematically or omitted from original Drawings.
e. Note change-order numbers, and similar identification.

2. Responsibility for Markup: The individual or entity who obtained record data, whether the individual or entity is the Installer, subcontractor, or similar entity, shall prepare the markup on record drawings.

a. Accurately record information in an understandable drawing technique.
b. Record data as soon as possible after obtaining it. Record and check the markup prior to enclosing concealed installations.
c. At time of Substantial Completion, submit record drawings to the University for the University's records. Organize into sets and bind and label sets for the University's continued use.

C. Record Specifications

1. During the construction period, maintain one copy of the Project Specifications, including addenda and modifications issued, for Project Record Document purposes.

a. Mark the Specifications to indicate the actual installation where the installation varies from that indicated in Specifications and modifications issued. Note related project record drawing information, where applicable. Give particular attention to substitutions, selection of product options, and information on concealed installations that would be difficult to identify or measure and record later.

1) In each Specification Section where products, materials, or units of equipment are specified or scheduled, mark the copy with the proprietary name and model number of the product furnished.
2) Record the name of the manufacturer, supplier, installer, and other information necessary to provide a record of selections made and to document coordination with record Product Data submittals and maintenance manuals.
3) Note related record Product Data, where applicable. For each principal product specified, indicate whether record Product Data has been submitted in maintenance manual instead of submitted as record Product Data.

b. Upon completion of markup, submit record Specifications to the University.

D. Record Product Data: Maintain one (1) copy of each Product Data submittal. Note related Change Orders and markup of record drawings and Specifications.

1. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site and from the manufacturer's installation instructions and recommendations.

2. Give particular attention to concealed products and portions of the Work that cannot otherwise be readily discerned later by direct observation.
3. Upon completion of markup, submit three complete sets of record Product Data to the University for the University's records.

E. Record Sample Submitted: Immediately prior to Substantial Completion, the Contractor shall meet with the University and the University's personnel at the Project Site to determine which Samples are to be transmitted to the University for record purposes. Comply with the University's instructions regarding delivery to the University's Sample storage area. Dispose of other samples in a manner specified for disposing surplus and waste materials.

F. Miscellaneous Record Submittals:

1. Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Immediately prior to Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Submit to the University for the University's records.

a. Categories of requirements resulting in miscellaneous records include, but are not limited to, the following:
1) Invert elevations of drainage piping.
2) Surveys establishing building lines and levels.
3) Ambient and substrate condition tests.
4) Certifications received in lieu of labels on bulk products.
5) Batch mixing and bulk delivery records.
6) Testing and qualification of tradesmen.
7) Documented qualification of installation firms.
8) Load and performance testing.
9) Inspections and certifications by governing authorities.
10) Leakage and water-penetration tests.
11) Fire-resistance and flame-spread test results.
12) Final inspection and correction procedures.

G. Operation and Maintenance Manuals:

1. General Submission Requirements: The University of Maryland, Baltimore (UMB) requires operation and maintenance manuals (O&MM) to be submitted in electronic

"pdf" file format, by the CM/GC, before substantial completion to the A/E and the University for review.

2. The CM/GC shall use the UMB Master O&M Template pdf file to create the Project O&M Manual. The file can be accessed through the D&C Web Site @ https://www.umaryland.edu/designandconstruction/. See View Current UMB Master O&M Template File.

1.9 INSTRUCTIONS FOR THE UNIVERSITY'S PERSONNEL

A. Prior to final inspection, instruct the University's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Provide instruction at mutually agreed upon times.

1. For equipment that requires seasonal operation, provide similar instruction during other seasons.
2. Use operation and maintenance manuals for each piece of equipment or system as the basis of instruction. Review contents in detail to explain all aspects of operation and maintenance.

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by the manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

**PART 2 – EXECUTION**

3.1 CLOSEOUT PROCEDURES

A. Operation and Maintenance Instructions: Arrange for each Installer of equipment that requires regular maintenance to meet with the University's personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:
1. Maintenance manuals.
2. Record documents.
3. Spare parts and materials.
4. Tools.
5. Lubricants.
6. Fuels.
7. Identification systems.
8. Control sequences.
9. Hazards.

10. Cleaning.
11. Warranties and bonds.
12. Maintenance agreements and similar continuing commitments.

B. As part of instruction for operating equipment, demonstrate the following procedures:

1. Startup.
2. Shutdown.
3. Emergency operations.
4. Noise and vibration adjustments.
5. Safety procedures.
6. Economy and efficiency adjustments.
7. Effective energy utilization.

## 3.2 FINAL CLEANING

A. General: The General Conditions require general cleaning during construction. Regular site cleaning is included in Division 01 Section "Construction Facilities and Temporary Controls."

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion.

a. Clean the Project Site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and foreign substances.
b. Sweep paved areas broom clean. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
c. Remove petrochemical spills, stains, and other foreign deposits.
d. Remove tools, construction equipment, machinery, and surplus material from the site.
e. Remove snow and ice to provide safe access to the building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Broom clean concrete floors in unoccupied spaces.
i. Vacuum clean carpet and similar soft surfaces, removing debris and excess nap. Shampoo, if required.

j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

k. Remove labels that are not permanent labels.

l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

p. Clean ducts, blowers, and coils if units were operated without filters during construction.

q. Clean food-service equipment to a sanitary condition, ready and acceptable for its intended use.

r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs and defective and noisy starters in fluorescent and mercury vapor fixtures.

s. Leave the Project clean and ready for occupancy.

C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.

D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the University's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.

1. Where extra materials of value remain after completion of associated Work, they become the University's property. Dispose of these materials as directed by the University.

END OF SECTION 017000

**SECTION 078100 - APPLIED FIRE PROTECTION**

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

A. Documents of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes sprayed fire-resistive materials.

1.3 DEFINITIONS

A. SFRM: Sprayed fire-resistive materials.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Sprayed fire-resistive materials.
2. Substrate primers.
3. Bonding agent.
4. Metal lath.
5. Reinforcing fabric.
6. Reinforcing mesh.

B. Sustainable Design Submittals:

1. Product Data: For paints and coatings, indicating VOC content.

C. Shop Drawings: Framing plans or schedules, or both, indicating the following:

1. Extent of fire protection for each construction and fire-resistance rating.
2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
3. Minimum sprayed fire-resistive material thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
4. Treatment of sprayed fire-resistive material after application

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. UL System Detail: For each type of spray-applied fire protection system. Where project conditions require modification to a qualified testing and inspecting agency's illustration for a particular condition, submit illustration, with modifications marked, approved by system manufacturer's fire-protection engineer as an engineering judgement or equivalent system.

C. Product Certificates: For each type of sprayed fire-resistive material.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by sprayed fire-resistive material manufacturer as experienced and with sufficient trained staff to install manufacturer's products in accordance with specified requirements.

~~1.8~~1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not apply fire protection when ambient or substrate temperature is 40 deg F or lower unless temporary protection and heat are provided to maintain temperature 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 fire protection, providing complete air exchanges in accordance with manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fire protection dries thoroughly.

**PART 2 - PRODUCTS**

2.1 PERFORMANCE REQUIREMENTS

A. Assemblies: Provide fire protection, including auxiliary materials, in accordance with requirements of each fire-resistance design and manufacturer's written instructions.

B. Source Limitations: Obtain fire protection for each fire-resistance design from single source.

C. Existing Conditions to be verified in the field to ensure Fire-Resistance Design: tested in accordance with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Steel members are to be considered unrestrained unless specifically noted otherwise.

D. Material Emissions and Pollutant Control: Verify field-applied coatings comply with one of the following:

1. Low-Emitting Materials: Verify VOC emissions comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using

Environmental Chambers." Verify formaldehyde emissions do not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

2. Verify VOC content does not exceed limits of authorities having jurisdiction and the following:

   a. Flat Coatings: 50 g/L.
   b. Nonflat Coatings: 100 g/L.
   c. Primers, Sealers, and Undercoaters: 100 g/L.

E. Asbestos: Provide products containing no detectable asbestos.

## 2.2 SPRAYED FIRE-RESISTIVE MATERIALS

A. Sprayed Fire-Resistive Material: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application or conveyed in a dry state and mixed with atomized water at place of application.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Isolatek International; Cafco Blaze-Shield HS or a comparable product by one of the following:

   a. Carboline Company; a subsidiary of RPM International.
   b. GCP Applied Technologies Inc.

2. Bond Strength: Minimum 430-lbf/sq. ft. cohesive and adhesive strength based on field testing in accordance with ASTM E736.
3. Density: Not less than density specified in the approved fire-resistance design, in accordance with ASTM E605.
4. Thickness: To comply with fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E605, whichever is thicker.
5. Combustion Characteristics: ASTM E136.
6. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

   a. Flame-Spread Index: 10 or less.
   b. Smoke-Developed Index: 10 or less.

7. Compressive Strength: Minimum 10 lbf/sq. in. in accordance with ASTM E761.
8. Corrosion Resistance: No evidence of corrosion in accordance with ASTM E937.
9. Deflection: No cracking, spalling, or delamination in accordance with ASTM E759.
10. Effect of Impact on Bonding: No cracking, spalling, or delamination in accordance with ASTM E760.
11. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. in 24 hours in accordance with ASTM E859.
12. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G21 or rating of 10 in accordance with ASTM D3274 when tested in accordance with ASTM D3273.

## 2.3 AUXILIARY MATERIALS

A. Provide auxiliary materials that are compatible with sprayed fire-resistive material and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by sprayed fire-resistive material manufacturer and complying with one or both of the following requirements:

1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
2. Primer's bond strength in required fire-resistance design complies with specified bond strength for sprayed fire-resistive material and with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests in accordance with ASTM E736.

C. Bonding Agent: Product approved by sprayed fire-resistive material manufacturer and complying with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.

D. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required, in accordance with fire-resistance designs indicated and sprayed fire-resistive material manufacturer's written instructions. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive sprayed fire-resistive material.

E. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by sprayed fire-resistive material manufacturer.

F. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by sprayed fire-resistive material manufacturer. Include pins and attachment.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and in accordance with each fire-resistance design.

1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fire protection with substrates under conditions of normal use or fire exposure.
2. Verify that objects penetrating fire protection, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
3. Verify that substrates receiving fire protection are not obstructed by ducts, piping,

equipment, or other suspended construction that will interfere with fire protection application.

B. Verify that roof construction, installation of rooftop HVAC equipment, and other related work are complete before beginning Work.

C. Conduct tests in accordance with sprayed fire-resistive material manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.

D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Cover other work subject to damage from fallout or overspray of fireproofing materials during application. Provide temporary enclosure to confine spraying operations, protect the environment, and ensure maintenance of adequate ambient conditions for temperature and ventilation.

B. Clean substrates of substances that could impair bond of fire protection.

C. Prime substrates where included in fire-resistance design and where recommended in writing by sprayed fire-resistive material manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fire protection.

D. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fire protection. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.3 APPLICATION

A. Construct fire protection assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fire protection Work.

B. Comply with sprayed fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fire protection; as applicable to particular conditions of installation and necessary to achieve fire-resistance ratings indicated.

C. Coordinate application of fire protection with other construction to minimize need to cut or remove fire protection.

1. Do not begin applying fire protection until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.

2. Defer installing ducts, piping, and other items that would interfere with applying fire protection until application of fire protection is completed.

D. Install auxiliary materials as detailed and according to fire-resistance design and sprayed fire-resistive material manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by sprayed fire-resistive material manufacturer.

E. Spray apply fire protection to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by sprayed fire-resistive material manufacturer.

F. Extend fire protection in full thickness over entire area of each substrate to be protected.

G. Install body of fire protection in a single course unless otherwise recommended in writing by sprayed fire-resistive material manufacturer.

H. Provide a uniform finish complying with description indicated for each type of fire protection material and matching finish approved for required mockups.

I. Cure fire protection in accordance with sprayed fire-resistive material manufacturer's written instructions.

J. Do not install enclosing or concealing construction until after fire protection has been applied, inspected, and tested and corrections have been made to deficient applications.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Installation of SFRM will be tested and inspected as required by the IBC, Subsection 1705.14.

B. Fire protection will be considered defective if it does not pass tests and inspections.

1. Remove and replace fire protection that does not pass tests and inspections, and retest.
2. Apply additional fire protection, in accordance with manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

3.5 CLEANING

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.

3.6 PROTECTION

A. Protect fire protection, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fire protection is without damage or deterioration at time of Substantial Completion.

3.7 REPAIRS

A. As installation of other construction proceeds, inspect fire protection and repair damaged areas and fire protection removed due to work of other trades.

B. Repair fire protection damaged by other work before concealing it with other construction.

C. Repair fire protection by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 078100

# SECTION 078413 - PENETRATION FIRESTOPPING

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Penetration firestopping systems for the following applications:

a. Penetrations in fire-resistance-rated walls.
b. Penetrations in horizontal assemblies.

B. Related Requirements:

1. Section 078100 “Applied Fire Protection”
2. Section 078443 “Joint Firestopping”

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each penetration firestopping system. Include type of barrier being penetrated (with rating), size and type of penetrating material, UL System Number, and firestop product name.

C. UL System Detail: For each penetrating firestopping system.

1. Where project conditions require modification to a qualified testing and inspecting agency’s illustration for a particular firestop condition, submit illustration, with modifications marked, approved by firestop system manufacturer’s fire-protection engineer as an engineering judgement or equivalent system.

D. Qualification Data: For Installer(s). Provide manufacturer’s training certificates for all installers.

E. Installer Qualifications: For firm. Provide certificate of compliance with FM Approval FM Approval 4991, "Approval Standard for Firestop Contractors," or UL "Qualified Firestop Contractor Program Requirements" approval.

1.4 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.5 QUALITY ASSURANCE

A. Installation Responsibility: Assign installation of all firestop systems [and fire-resistive joint systems] in project to a single qualified installer.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. CM/GC to coordinate location and sizing of sleeves, openings, and penetrating items to ensure that penetration firestopping systems can be installed according to the approved firestopping system design.

B. Do not paint or conceal any firestopping system until installation has been approved by the UMB Fire Marshal.

**PART 2 - PRODUCTS**

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.

2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
1) UL in its "Fire Resistance Directory."

2) Intertek Group in its "Directory of Listed Building Products."
3) FM Approval in its "Approval Guide."

## 2.2 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

1. Manufacturer's: Subject to compliance with requirements, provide products by one of the following:
   a. 3M Fire Protection Products
   b. Hilti, Inc.
   c. Tremco, Inc.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.

2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

1. Permanent forming/damming/backing materials.
2. Substrate primers.
3. Collars.

E. Fire and Fire/Smoke Dampers: The annular space around fire and fire/smoke dampers shall be sealed according to the manufacturer's installation instructions. Firestopping may or may not be required, as recommended by the damper manufacturer.

## 2.3 PENETRATIONS IN HORIZONTAL ASSEMBLIES

A. Pipe sleeves are required for all new penetrations floor penetrations. Sleeve must be black steel and extend at least 1" above finished floor surface. GC is responsible for coordinating the installation of pipe sleeves prior to installing penetrating item.

B. Provide a UL Class 1 W-Rated firestop system for all new and existing floor penetrations.

## 2.4 PENETRATIONS IN VERTICAL ASSEMBLIES

A. Pipe sleeves are required for all new penetrations in fire rated walls.

B. Pipe sleeves are required at all penetrations in CMU walls (both rated and nonrated).

C. Pipe sleeves installed in walls must be installed flush with both sides of the wall that is penetrated. Sleeves shall be black steel.

D. GC is responsible for coordinating the installation of pipe sleeves prior to installing penetrating item.

## 2.5 FILL MATERIALS

A. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

B. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

C. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.

D. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

E. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

F. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

G. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

H. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

I. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.6 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce 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 configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

C. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
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 the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

## 3.4 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "X HOUR FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes. Replace X with 1, 2, or 3 hr fire rating.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 10 feet (4.57 m) from end of wall and at intervals not exceeding 20 feet (9.14 m).
2. In mechanical equipment rooms, electrical rooms, tele data rooms and utility shaft areas without ceilings, wall identification shall occur at 15 ft intervals at a height of 10 ft above finished floor level.

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 4 inches (150 mm) of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Firestop contractor's name.
3. UL Design No. of firestop assembly.
4. Date of installation.

5. Manufacturer's name.
6. Installer's name.

## 3.5 FIELD QUALITY CONTROL

A. University will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.

B. Where deficiencies are found or penetration firestopping systems are damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

D. Contractor shall be responsible for ensuring all penetrations are correctly firestopped prior to requesting the qualified testing agency inspection. Costs for re-inspections and repeat site visits will be at the contractor’s expense.

## 3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

# SECTION 078443 - JOINT FIRESTOPPING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Documents of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

A. Section Includes:
   1. Joints in or between fire-resistance-rated construction.
   2. Joints in smoke barriers.

B. Related Requirements:
   1. Section 078413 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers and for wall identification.

### 1.3 ACTION SUBMITTALS

A. Product Data:
   1. Joints in or between fire-resistance-rated construction.

B. Sustainable Design Submittals:
   1. Product Data: For sealants, indicating VOC content.
   2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: Submit documentation from a qualified testing and inspection agency that is applicable to each fire-resistive joint system configuration to be installed in or between fire-resistance-rated construction and in smoke barriers for construction and linear void width.

D. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.
   1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering

judgment or equivalent fire-resistance-rated assembly developed in accordance with current International Firestop Council (IFC) guidelines.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Approvals according to FM Approvals 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of joints to accommodate joint firestopping systems.

C. Notify Owner's testing agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on day preceding each series of installations.

**PART 2 - PRODUCTS**

2.1 SOURCE LIMITATIONS

A. Obtain joint firestop systems for each type of joint opening indicated from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:

    a. Joint firestop systems installed with products bearing the classification marking of a qualified product certification agency in accordance with Listed System Designs published by a qualified testing agency.

        1) UL in its online directory "Product iQ."
        2) Intertek Group in its "Directory of Building Products."

## 2.3 JOINT FIRESTOPPING SYSTEMS

A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems must accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
1. Joint firestopping systems that are compatible with one another, with the substrates forming openings, and with penetrating items, if any.
2. Provide products that, upon curing, do not re-emulsify, dissolve, leach, breakdown, or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture.
3. Provide firestop products that do not contain ethylene glycol.

B. Intumescent Gypsum Wall Framing Gaskets (Applied to Steel Tracks, Runners, and Studs prior to Framing Installation): Provide products with fire, smoke, and acoustical ratings that allow movement up to 100 percent compression and/or extension in accordance with UL 2079 or ASTM E1966; have an L Rating less than 1 cfm/ft. in accordance with UL 2079; and a minimum Sound Transmission Class (STC) rating of 56 in accordance with ASTM E90 or ASTM C919.

C. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. 3M Building and Construction.
    b. Hilti, Inc.
    c. ROCKWOOL.
    d. Tremco Incorporated.
2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.

D. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.
1. Verify sealant has a VOC content of 250 g/L or less.

2. Verify sealant complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions do not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

2.4 ACCESSORIES

A. Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Before installing joint firestopping systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by joint firestopping system 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. Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

D. Apply a suitable bond-breaker to prevent three-sided adhesion in applications where this condition occurs, such as the intersection of a gypsum wall to floor or roof assembly where the joint is backed by a steel ceiling runner or track.

3.3 INSTALLATION

A. General: Install joint firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
   1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install elastomeric fill materials for joint firestopping systems by proven techniques to produce the following results:
   1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
   2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
   3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Wall Identification: Permanently label walls containing firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

   1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 ft. from end of wall and at intervals not exceeding 30 ft.

B. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
   1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
   2. Contractor's name, address, and phone number.
   3. Designation of applicable testing agency.
   4. Date of installation.
   5. Manufacturer's name.
   6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections in

accordance with ASTM E2393.

B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.

C. Keep firestopping installations accessible for inspection by authorities having jurisdiction. Proceed with enclosing joint firestopping with other construction only after inspections are complete, inspection reports are issued, and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated joint firestopping systems immediately and install new materials to produce joint firestopping systems complying with specified requirements.

END OF SECTION 078443

DIVISION 14 – CONVEYING EQUIPMENT

14 00 00 Conveying Equipment

14 01 00 Maintenance of Conveying Equipment

14 01 20 – Maintenance of Elevators

Contractor shall furnish elevator interim and warranty maintenance services to The University of Maryland Baltimore on three (3) traction passenger/service elevators and one (1) sidewalk lift located at the University of Maryland Baltimore Institute of Human Virology, 725 West Lombard Street in Baltimore MD.

PART 1 - GENERAL

1.1 ELEVATOR AND SIDEWALK LIFT INTERIM AND WARRANTY MAITENANCE SPECIFICATION INTENT

A. It is the intent of this specification to ensure all requirements, procedures, tests, inspections, service practices, component repairs, equipment renewals, system adjustments, filing procedures and recording documentation as referenced, mandated or otherwise implied herein are all inclusive, and to guarantee to the “Owner” or “Owner's Representative” that the absence or omission of a particular item of work, service or procedure shall not alleviate the Contractor of the sole responsibility to provide such labor, expertise, materials, equipment, services or other procedures applicable to the specifications and practical requirements unless same is specifically excluded; or prorated herein.

B. Minimum standards and requirements for services to be rendered shall be performed in accordance with the O.E.M specifications, Maintenance Control Program, and relative time periods. Where there is no specific requirement for a preventive maintenance procedure, the original equipment manufacturer (O.E.M.) standard shall be employed unless there is no relative documentation available. The absence of both a specification requirement herein and the O.E.M. design standard shall cause the contractor to engage the services of a qualified engineer to formulate the relative standards and incorporate same as an addendum to this specification with the Professionals' Seal and Stamp.

1.2 DEFINITIONS OF TERMS

A. The term “Owner” or “Owner's Representative” as used herein, refers to the person, organization, corporation or other entity representing building ownership and the relative responsibilities under this maintenance specification.

B. The term “Authority,” “Governing Authority (GA)”, “Authority Having Jurisdiction (AHJ),” or references of similar import, as used herein, shall mean the local government agency responsible for enforcement of vertical transportation safety codes and local laws or their designated representative, private inspection agency, consultant or other licensed designee.

C. The term “Contractor,” “Elevator Contractor” or “Vendor” as used herein, refers to any persons, partners, firm, corporation or officer(s) of such companies having an agreement with the “Owner” or “Owner's Representative” to furnish qualified labor and materials for the execution of the services and maintenance work described herein.

D. The term “Subcontractor,” as used herein, refers to any persons, partners, firm or corporation having materials and/or labor for the execution of the work herein described.

## 1.3 ABBREVIATIONS AND SYMBOLS

A. Abbreviations for associations, institutions, societies, reference documents and/or governing agencies, which may appear in this Contract Document, shall mean the following:

| | |
|---|---|
| ADA | Americans With Disabilities Act |
| AIA | American Institute of Architects |
| ANSI | American National Standards Institute |
| ASME | American Society of Mechanical Engineers |
| BOCA | Building Officials and Code Administrators International, Inc. (Basic National Building Code) |
| A.H.J. | Authority Having Jurisdiction |
| G.A. | Governing Agency |
| NEC | National Electrical Code |
| OSHA | Occupational Safety and Health Administration |

## 1.4 SPECIFICATION COVERAGE

A. The entire vertical transportation systems shall be maintained as hereinafter described, in accordance with the following detailed terms. Trained employees of the Contractor will use all reasonable care to keep the systems in proper adjustment and in safe operating condition, in accordance with all applicable codes, ordinances and regulations.

B. With the exception of only those items specifically identified as being performed by others, the specifications are intended to include all engineering, material, labor, testing, and inspections needed to achieve work specified. Inasmuch as it is understood that any incidental work necessary to execute the elevator interim and warranty maintenance is also covered by the contract specifications, the Contractor is cautioned to familiarize

himself with the existing equipment and job site conditions. Additional charges for material or labor shall not be permitted for work, services or procedures covered herein.

C. Maintenance coverage shall include, but is not limited to, preventive services, call-back services, inspection and testing services, repair and/or direct replacement component renewal procedures, and housekeeping.

1.5 HOURS OF WORK

A. All scheduled work shall be performed during regular working hours of the regular working days of the elevator trade, 8:00 A.M. to 4:30 P.M., Monday through Friday, except union designated holidays. Contractor to provide a list of Union designated holidays.

B. Scheduled repairs and/or other major adjustment procedures necessitating removal of a piece of equipment from service for an extended period of time must be scheduled through the “Owner” or “Owner's Representative”.

1. Owner retains the right to have such work completed during overtime hours with the understanding the Contractor shall pay for the regular labor portion and the “Owner” or “Owner's Representative” extraordinary obligation is extra premium labor costs only.
2. Callback services shall be provided twenty-four (24) hours per day, seven (7) days per week including weekends and holidays as further specified herein.

1.6 SOLE RESPONSIBILITY

A. The maintenance work shall be performed only by Certified and/or Qualified Technicians and Mechanics directly employed and supervised by the Contractor, who are experienced and skilled in maintaining vertical transportation units similar to those to be maintained under the interim and warranty maintenance services and shall not be assigned or transferred to any agent or subcontractor without the express consent of the “Owner” or “Owner's Representative”.

B. It is mutually agreed that the Contractor shall not be under any obligation hereunder to make any repairs or replacements except those incidental to the normal operation of the machinery, and that the Contractor is not required under this specification to make repairs or replacements necessitated by reason of malicious damage, fire, including non-elevator component electrical fire, which are the result of causes beyond Contractor's control. All repairs, if necessitated by this paragraph, will be performed at the fees indicated in Exhibit

1. It is mutually agreed that the Contractor shall make any and all repairs or replacements caused by Contractor's improper repair, negligent or willful acts or omissions at Contractor’s expense.

1.7 COMPENSATION

A. Costs for interim and warranty/guaranteed maintenance shall be invoiced in the lump sum indicated on the bid form in the space provided, upon Ownership's final acceptance of the modernization project.

1. Payment for Callback services shall be included in the fixed monthly lump sum price for services rendered twenty-four (24) hours per day, seven (7) days per week, without extra charge to the "Owner" or "Owner's Representative". No additional travel and/or sundries fees will be permitted.

1.8 EXTRA WORK

A. The Contractor is required to provide separate materials, supplies, equipment, and personnel for Extra Work when such is deemed necessary by the "Owner" or "Owner's Representative". Extra Work as used herein shall be defined as work which differs from that expressly or implied as required in these Specifications in their present form.

B. Compensation for such Extra Work shall be determined by mutual agreement between the "Owner" or "Owner's Representative" and the Contractor on a lump sum basis. However, should the parties fail to reach such an agreement, the Contractor's compensation shall be increased by the following amounts and such amounts only:

1. In the case of approved Extra Work performed by the Contractor's personnel, an amount for labor equal to the applicable billing rates specified in Exhibit "A" and adjusted on an annual basis herein shall be used for compensation. Material compensation shall be an amount equal to the actual net cost of the material required plus ten percent (10%) of such net material cost.
2. In the case of Extra Work performed by a Subcontractor, an amount equal to the actual net cost in money of the labor and materials required for such Extra Work, plus ten percent (10%) of such net cost.

C. As used in this numbered clause (and in this clause only):

1. "Labor" means laborers, mechanics, and other employees below the rank of supervisor, directly employed at the Site of the Work "required for Extra Work" and as to the portion of their time allotted to Extra Work; and the agreed upon billing rate.
2. "Net Cost" shall be the Contractor's actual cost after deducting all permitted cash and trade discounts, rebates, allowances, credits, sales taxes, core charges, commissions, and refunds (whether or not any or all of the same shall have been taken by the Contractor) on all parts, shop services and materials purchased by the Contractor solely for the use in performing its obligation hereunder provided, such purchase has received the prior written approval of the "Owner" or "Owner's Representative" as required herein. The Contractor shall promptly furnish to the

"Owner" or "Owner's Representative" such bills of sale and other instruments as may be required by it, executed, acknowledges and delivered, assuring to it title to such materials, supplies, equipment, parts, and tools free of encumbrances.

3. "Materials" means temporary and consumable materials as well as permanent materials; and "cost of materials" means the price (including taxes actually paid by the Contractor pursuant to law upon the basis of such materials) for which such materials are sold for cash by the manufacturers or producers thereof, or by regular dealers therein, whether or not such materials are purchased from the manufacturer, producer or dealer (or if the Contractor is the manufacturer or producer thereof, the reasonable cost to the Contractor of the manufacture and production), plus the reasonable cost of delivering such materials to the Site of the Work in the event that the price paid to the manufacturer, producer or dealer does not include delivery and in case of temporary materials, less their salvage value, if any.
4. The Contractor shall submit all reports, records and receipts as are requested by the Agent so as to enable him to ascertain the time expended in the performance of Extra Work, the quantity of labor and materials used therein and the cost of said labor and materials to the Contractor.
5. The provisions of this interim and warranty maintenance specification relating generally to Work, and its performance shall apply without exception to any Extra Work required and to the performance thereof. Moreover, the provisions of the Specifications relating generally to the Work and its performance shall also apply to any Extra Work required and to the performance thereof, except to the extent that a written order in connection with any particular item of Extra Work may expressly provide otherwise.
6. Itemized invoices for compensation due for Extra Work shall be submitted separately to the Property "Owner" or "Owner's Representative" for each authorized Extra Work item or approved lump sum proposal.

## 1.9 LABOR AND MATERIAL BREAKOUT

A. Any proposal, quotes, billable items, vandalism type repairs, etc. submitted by the elevator contractor shall be itemized to include labor cost, rate, material cost and hours to perform the task. Material cost to include estimated time of arrival.

## 1.10 OWNER AND DUTIES OF THE OWNER'S REPRESENTATIVE

A. In the performance of the elevator interim and warranty maintenance services, Contractor shall conform to all orders, directions and requirements of the "Owner" or "Owner's Representative" and shall perform to the satisfaction of the "Owner" or "Owner's Representative" at such times and places, by such methods and in such manner and sequence as they may require, and the work shall be at all stages subject to the inspection. The "Owner" or "Owner's Representative" shall determine the amount, quality, acceptability, and fitness of all parts of the Work and shall interpret the Specifications

and any orders for Extra Work. The Contractor shall employ no equipment, materials, methods, or persons to which the “Owner” or “Owner's Representative” objects.

## 1.11 NOTICE BY AUTHORITY OR COMPANY TO REPAIR OR REPLACE

A. The Contractor shall comply with all written recommendations of the governing authority or independent inspectors, consultants and insurance carriers employed by the “Owner” or “Owner’s Representative”. However, Contractor is not required under the interim and warranty maintenance to install new attachments or other parts and different from those now constituting the equipment, as recommended, or directed by insurance companies, Government Authorities, or otherwise.

## 1.12 BREAKDOWN, MALFUNCTION OR DAMAGE

A. Immediately upon the Contractor's discovery of any damage or signs of disrepair, mechanical breakdown or malfunction of, or cracks or breaks in any item to be repaired hereunder, they shall advise the “Owner” or “Owner's Representative” and the Contractor shall place such "Out of Order" or warning signs as are appropriate with necessary barricades or other required protection as directed by the “Owner” or “Owner's Representative”. Such signs will be furnished by the Contractor upon request of the “Owner” or “Owner's Representative” and shall remain in place until necessary repairs are completed.

## 1.13 TRASH REMOVAL

A. The Contractor shall arrange to dispose of all liquid and solid refuse produced in a lawful, safe, and efficient and anti-pollutant manner subject to the prior approval of the “Owner” or “Owner's Representative” at no cost to the “Owner” or “Owner's Representative”.

B. The Contractor shall remove daily from the building, all garbage, debris, and other waste materials (whether solid or liquid) arising out of or in connection with its operations hereunder, and any such garbage, debris and other waste materials not immediately removed shall be temporarily stored in a clean and sanitary condition, approved by the “Owner” or “Owner's Representative”, in suitable garbage and waste receptacles, also approved by the “Owner” or “Owner's Representative” and shall be kept covered except when filling or emptying them. The Contractor shall exercise care in removing such garbage, debris, and other waste materials from the building. The manner of such storage and removal shall always be subject in all respects to the continual approval of the “Owner” or “Owner's Representative”. No equipment or facilities of the “Owner” or “Owner's Representative” shall be used in such removal unless with its prior consent in writing. No such garbage, debris or other waste materials shall be permitted to be thrown, discharged, or disposed into or upon the streets bounding the Site of Work.

1.14 HAZARDOUS MATERIALS

A. Contractor shall not use or dispose of any “Hazardous Materials” (as defined below) without prior written consent of “Owner” or “Owner's Representative”, and Contractor shall at all times comply with all Laws relating to Hazardous Materials. As used in this MSA, “Hazardous Materials” shall mean petroleum and petroleum products and compounds containing them, including gasoline, diesel fuel and oil; explosives, flammable materials; radioactive materials; polychlorinated biphenyls (“PCBs”) and compounds containing them; lead and lead-based paint; infectious substances; asbestos or asbestos-containing materials in any form; underground or above-ground storage tanks, whether empty or containing any substance; any substance the presence of which at the property is prohibited by any federal, state or local authority; any substance that requires special handling; and any other material or substance now or in the future defined as a “hazardous substance,” “hazardous material,” “hazardous waste,” “toxic substance,” “toxic pollutant,” “contaminant,” or “pollutant” within the meaning of any Laws that relate to Hazardous Materials, including the Comprehensive Environmental Response, Compensation and Liability Act and the Resource Conservation and Recovery Act (“CERCLA”).

1.15 GENERAL OBLIGATIONS

A. Except with the prior written approval of the “Owner” or “Owner's Representative”, or as specifically authorized or required elsewhere herein, the Contractor shall not erect, maintain, or display any signs, posters, or advertising at the Site of the Work. Interior signs affecting public safety and security shall be in accordance with guidelines established by the “Owner” or “Owner's Representative” and shall be subject to the approval of the “Owner” or “Owner's Representative”.

B. In order to effectuate the policy of the “Owner” or “Owner's Representative”, the Contractor shall comply with all provisions of federal, state, municipal, local and departmental laws, ordinances, rules, regulations and orders which affect the interim and warranty maintenance specifications and the performance thereof, except where stricter requirements are contained in these Specifications, in which event the latter requirements shall apply. The Contractor shall apply for any permits, licenses, or variances in the name of or on behalf of the “Owner” or “Owner's Representative”, where required by law or by the immediately preceding sentence shall obtain express written approval from the Governing Authority.

C. The Contractor shall provide qualified labor or other assistance on behalf of the “Owner” or “Owner's Representative” for work performed by other trades, professionals, inspectors, and “Owner” or “Owner's Representative” personnel when conditions warrant or upon request of the Owner. The “Owner” or “Owner's Representative” shall approve all requests for the Contractor's labor assistance and, when applicable, shall approve requests for additional compensation by the Contractor under "Extra Work" provisions included herein.

1.16 COMMUNICATION

A. CUSTOMER REPRESENTATIVE: A representative of the Contractor will be available to discuss with “Owner” or “Owner's Representative” the elevator needs in the areas of modernization, traffic handling ability, recommendations and requirements of Government Authorities, proper use, and care of the Units.

B. MONTHLY MEETING WITH “OWNER” or “OWNER'S REPRESENTATIVE”: Account Representative shall meet with “Owner” or “Owner's Representative” on a quarterly basis. The meeting should consist of the following agenda items: (1) status of the account, (2) review of the prior month's activities, (3) review of any problem areas and, (4) occupancy level review. “Owner” or “Owner's Representative” shall prepare and distribute minutes for these meetings.

C. REPORTS: Contractor shall provide at each monthly meeting, detailed reports of the previous months activities including details by unit of all callbacks, repairs, testing, preventive maintenance along with dates, reason for car out of service, time taken out of service, task performed (PM, callback, repair, etc.), resolution to any problems, time placed back in service, total time out of service and a listing of all credits to be issued as a result of non-compliance with the requirements of this specification.

1.17 NOTICE BY AUTHORITY OR COMPANY TO REPAIR OR REPLACE

A. The Contractor shall comply with all written recommendations of the governing authority or independent inspectors, consultants and insurance carriers employed by the “Owner” or “Owner's Representative”. However, Contractor is not required under this Contract to install new attachments or parts different from those now constituting the equipment, as recommended or directed by insurance companies, Government Authorities, or otherwise.

1.18 RECORD KEEPING

A. A complete permanent record of inspections, maintenance, lubrication and callback service, including a Maintenance Control Program (MCP) shall be kept in the machine room or other designated location at the site of work, per the requirements of ASME A17.1 and the local AHJ. These records are to be available to “Owner” or “Owner's Representative” at all times. The records shall indicate the reason the mechanic was in the building, arrival and departure time, the work performed, etc., and these records will be property of the “Owner” or “Owner's Representative”. Record keeping requirements shall include Contractor assigned maintenance personnel and scheduled preventive maintenance procedures, inspections, tests, and third party assisted examinations. Records shall be kept on site for the life of the interim and warranty maintenance services. Upon request, a copy of the records shall be provided to the “Owner” or “Owner's Representative”. The Contractor will interface with and utilize the “Owner” or “Owner's

Representative" web-based maintenance software and shall maintain up to date records of all activities related to the elevators. The "Owner" or "Owner's Representative" will provide all necessary system training.

1.19 RECORD DRAWINGS

A. Contractor shall provide and maintain two (2) complete sets of updated electrical wiring diagrams and control schematic drawings on file with the building and they are to become the property of the "Owner" or "Owner's Representative" for each group and/or individual system.

1.20 REPORTS BY CONTRACTOR

A. The Contractor shall, at any time during the term of the interim and warranty maintenance services, upon written request of the "Owner" or "Owner's Representative", render a report of inspections, repairs or replacements made by the Contractor at the premises herein, itemized as to parts installed or services performed, and supply samples of lubricants, compounds, or other materials employed.

1. Contractor shall prepare and issue all required forms and/or reports relative to examinations, tests and inspections as specified herein.

B. Contractor shall provide quarterly to the "Owner" or "Owner's Representative", detailed reports of the previous quarter's activities including details by unit of all callbacks, repairs, testing, preventive maintenance along with dates, reason for car out of service, time taken out of service, task performed (PM, callback, repair, etc.).

1. Callback events and preventative maintenance records will be delivered to "Owner" or "Owner's Representative" on a monthly basis via hard copy or electronically mailed or via OEM online service no later than the 15th of the following month.

1.21 PAYMENT/TERMS

A. The interim maintenance services and two (2) year guarantee/warranty maintenance period shall be invoiced in the lump sum indicated on the bid form in the space provided, upon Ownership's final acceptance of the modernization project. Annual adjustments will not be permitted.

PART 2 - PRODUCTS AND SERVICES

2.1 SCHEDULED PREVENTIVE MAINTENANCE LABOR

A. Contractor shall provide scheduled systematic examinations, adjustments, cleaning and lubrication of all machinery, machinery spaces, hoistways and pits. The Contractor shall include a minimum of two (2) hours per month per unit that is to be dedicated to routine preventive maintenance. “Owner” or “Owner's Representative” shall be credited the hourly billable service costs for any hours not provided under this specification per month on a per hour cost basis listed in Exhibit A.

B. If for any reason the “Owner” or “Owner's Representative” notifies the Contractor that maintenance services are not allowed/required for any said months, the Contractor shall not be penalized for not performing their required hours for that period.

2.2 MAINTENANCE OF ELEVATORS AND SIDEWALK LIFT

A. At no additional cost to “Owner” or “Owner's Representative”, Contractor shall provide full comprehensive repair, replacement, adjustment, and related service coverage for all component systems including spare or replacement parts unless specifically excluded herein. Failure to provide a particular component, service or other procedure does not limit Contractor's obligation or liability to provide the necessary work or service.

1. Contractor shall perform complete maintenance of the elevators to ensure they may be operated safely in accordance with performance standards and other criteria specified twenty-four (24) hours per day, seven (7) days per week except for scheduled preventative maintenance and safety test procedures approved by “Owner” or “Owner's Representative”.

B. Contractor shall furnish all materials, labor, supplies, parts, equipment barricades, warning signs, semi-permanent structures, tools, diagnostic devices, software, meters or other apparatus necessary or proper for and incidental to maintenance procedures.

C. Contractor shall be responsible for clearing and paying for any violations and fines related to the Equipment. Violations shall be cleared within the time limits imposed by the AHJ.

D. Contractor shall be responsible for keeping the exterior of the machinery and any other parts of the equipment free from rust.

E. The following list of equipment is provided as a means to establish the full comprehensive intent of the interim and warranty maintenance services. Coverage shall include all associated parts, apparatus and procedures whether specifically defined or not and shall include the necessary hoisting, rigging or other procedures required for execution of the repair, replacement, adjustment, and service of equipment covered under the elevator warranty maintenance services.

1. Automatic door systems, power operated door systems and manual door/gate systems complete

a. Power operator and engagement linkages
b. Car door top track, hangers, and hanger roller assemblies.
c. Car doors and gates, eccentrics, stops, bumpers and related operating mechanisms for multiple speed or multiple panel doors and gates.
d. Car gates, bottom guides, retainers, fire stops, gibs, entrance sills and threshold plates, gate handles and protection guards.
e. Electrical safety switches and activation mechanisms, door protective and/or reversing devices, and power door operators.
f. Electromechanical safety interlock assemblies, related operating mechanisms, clutch, or other master system engaging devices, linkages, zoned locking devices, and self-closing devices.

2. Car frame, platform and car safety devices complete

a. Crosshead, stiles, cab steadiers, cab isolation pads, hitch plates, anti-spin devices, tie rods, supports and related structures.
b. Car guides, car rollers, shoes, stands, spindles, gibs, rollers and tensioning devices.
c. Sub-platform, under car platform fireproofing, car sills with support cradles, load weighing devices, top/side exit access operating/safety hardware and electrical switches.
d. Car fans, blowers, and cab ventilation systems.

3. Hoisting machinery, and rotating power drives with mounting supports and beams, raised platforms and weighted foundations and structures complete

a. Geared traction and winding drum units, gearless traction, and related systems complete.
b. Worms, gears, shafts, couplings, drive sheaves, deflector sheaves, 2:1 sheaves, bearings, support/mounting apparatus, brake assembly, rotating elements and all associated castings, guards, retainers, and hardware.
c. Integral and free-standing brake units, drums, discs, pulleys, shoes, linings, pads, pins, sleeves, plungers, coils, caps, adjustment devices and hardware complete.
d. AC and DC motors, motor generators, rotating regulators and exciters; armatures, field coils, pole pieces, interpoles, commutators, brush riggings, brush holders, carbon brushes, stator windings, fan or other ventilation mechanisms, bearings, bushings, shafts, caps, packings, seals, junction boxes, leads, connectors and related wiring.

4. Controls, selectors, solid state power drives, encoding devices, transformers with related wiring, conduit, and circuitry complete

a. Relays, contactors, switches, capacitors, resistors, fuses, circuit breakers, overloads, power supplies, regulators, tach generators, arc shields, shunts, holders, and hardware.

b. Circuit boards, transmitters, encoders, transducers, transformers, rectifiers, transistors, solid state switching devices, insulators, timing devices, suppressors, and computer apparatus devices to include software, software upgrades, monitors, keyboards and printers.
c. Filters, fans, blowers, control cabinet air conditioning, wiring, studs, terminal blocks, plug connectors, CRTs or other diagnostic devices, keyboards, and printers.
d. Cabinets, frames, isolation pads, isolation transformers, chokes, diagnostic tools, status indicators, solid state, and hard wire circuitry.
e. Verify operation of firefighters' service monthly and Emergency evacuation systems annually.
f. Verify operation of battery lowering and/or battery rescue devices semi-annually and replace batteries when required.

5. Car and counterweight safety systems

a. Overspeed governors and electromechanical safety devices, wire ropes/coated steel belts and tensioning devices with related hitch and connection apparatus complete.
b. Car and counterweight safety devices, drums, rods, linkages, clamps, and hardware.
c. Rope grippers and similar apparatus used for compliance with ASME A17.1 Rule 2.19.
d. Coated steel belt testing equipment, if applicable.

6. Hoistway and pit equipment

a. Guide rails, fishplates, brackets, inserts and related hardware to include jack bolts or other special mechanisms for mounting and alignment.
b. Wire ropes/coated steel belts, chains and cables with guards used for suspension, compensation, safety, and selector encoding with related hitch and connection hardware complete.
c. Corridor entrance top track and hanger rollers, toe guards, fascia, dust covers, sills, stops, bumpers, eccentrics, retainers, and bottom guides.
d. Overhead machine room, secondary and 2:1 wire rope sheaves, dead-end hitches, rope shackles/wedges, shafts, bearings, bushings, seals, mounting supports, lubrication devices, guards, and hardware complete.
e. Electrical wiring and conduit, electrical traveling cables, electrical limits, slow-downs, activating cams, switches, vanes, inductors, tapes, readers, leveling and encoding systems complete with all related hardware and wiring.
f. Compensation sheaves, shafts, frames, guides, switches, rollers, cams, guards, "S" hooks, guidance systems, safety chains, and all related hardware.
g. Counterweight assemblies, guides, rollers, retainers, stands, strike plates, safeties, and hitch devices.

h. Car and counterweight buffers, stands, strikes, blocking, ladders and platforms, extension devices, mounting hardware, and appurtenances.
i. Pit safety switches, cable tensioning devices, access ladders, light switches, lighting assemblies, bulbs, and guards.
j. Hoistway signage.

7. Operating and signal fixtures with electrical wiring

a. Car operating panels, push buttons, stop switches, audible signals, engraved signage, keyed or other control switches, visual signals, jewels, and indicators with electrical wiring.
b. Car position indicators, riding lanterns, signal annunciators, visual and audible signals complete.
c. Corridor push button stations, hall lanterns, hall position indicators, keyed switches, access controls, electrical wiring, and traveling cables complete.
d. Emergency lighting systems, emergency communication devices, ventilation equipment, and signal systems complete including batteries.
e. Corridor and lobby fixtures with remote controls and operational monitoring devices, starter panels, emergency power selectors, telltale panels, location indicators, security controls and monitors.
f. Remote monitoring systems, controls, monitors, printers, and related apparatus.

8. Inspect all lighting associated with the vertical transportation systems, including, but not limited to pit lights, equipment room lights, shaftway lights, floor indication lights, car and hall station push button lights, interior and exterior direction lights, arrow lights, signal lantern lights, ceiling lighting LED drivers/ballasts, underfloor lights, cab, entrance and roof lights. Relamp as needed.
9. Component Exclusions:

a. The following vertical transportation system components are excluded for normal wear and tear repairs or replacements:
b. Car enclosures (including removable panels, suspended ceilings, lighting fixtures (lamps and LED drivers/ballasts are included), light diffusers, floor coverings, entrance thresholds, trim and car panel doors). Hoistway enclosures, entrance frames and door panels.
c. Machine room power disconnect switches together with fuses, power wiring located before the means of primary disconnect, power fuses or circuit breakers located in the primary means of disconnect, elevator machine/control room general lighting and ventilation. Cab, Pit and shaftway lighting fixtures and wiring (lamps are included). Support structures for machine beams or other apparatus normally provided by others and not subject to preventative maintenance procedures by the Elevator Contractor, machine/control room or other equipment access doors with associated locks, closers, and labeling.

NOTE: Any items not specifically excluded will be covered under this elevator interim and warranty maintenance specification.

2.3 CLEANING

A. The Contractor shall, during the course of all examinations, remove and discard immediately all accumulated dirt and debris from the car top(s) and pit area(s). Prior to the end of the warranty maintenance services, Contractor shall thoroughly clean down the entire hoistway of all accumulated dirt, grease, dust and debris each year.

2.4 PAINTING

A. The Contractor shall keep the exterior of the machinery and any other parts of the equipment subject to rust properly painted, identified and presentable at all times. Motor windings and controller coils shall be periodically treated with proper insulating compound per O.E.M. recommendations or otherwise as needed. The machine/control room floor will be painted when both parties determine that the floor is in poor condition. The machine/control room floor shall be painted annually, when required, with a good quality deck enamel.

2.5 INSPECTIONS / TESTS

A. The Contractor shall conduct safety, efficiency and maintained conditions surveys, inspections and tests as follows:

1. Contractor shall provide any and all tools, diagnostic devices, software, meters etc. required to perform inspections.
2. Semi-Annual quality control evaluations by a qualified supervisor to ensure and confirm the services and procedures as specified herein are properly executed relative to maintenance and performance standards for the systems serviced.
3. Mandated inspections and testing in accordance with the latest ASME A17.1 standards and inspections and tests as required by the AHJ.
4. Payment of all relative fees per the AHJ shall be by the “Owner” or “Owner’s Representative”.
5. As required, the Contractor shall correct noted deficiencies in addition to preparation and filing of appropriate Affirmation of Corrections within the stipulated timeframe as required by the AHJ. Applicable fees associated with this filing shall be covered under the terms of the interim and warranty maintenance specifications.
6. Where required work necessary to resolve aforementioned deficiencies is not covered under the terms of this warranty and maintenance specification, Contractor shall submit proposals in a timely fashion in an effort to meet applicable correction

deadlines within five (5) business days on critical items otherwise, within fourteen (14) business days in an effort to meet applicable correction deadlines.

7. Proposals shall indicate the material and labor costs in addition to anticipated time of completion from approval of proposals by "Owner" or "Owner's Representative".

    a. Proposals shall indicate the material and labor costs in addition to anticipated time of completion from approval of proposals by "Owner" or "Owner's Representative".

8. Provide independent testing of Fire Emergency Operating Systems and/or Emergency Power System tests in accordance with local law requirements and ASME A17.1 standards. Contractor shall notify "Owner" or "Owner's Representative" thirty (30) days prior to the scheduled inspection(s) in order to coordinate "Owner" or "Owner's Representative" Fire Emergency Operating Systems and/or Emergency Power System contractor(s).
9. The "Owner" or "Owner's Representative" retains the right to have these tests performed on a not-to-interfere basis at any hour of the day and any day of the week; and the cost for overtime work shall be limited to the premium labor portion for work performed on an overtime basis.
10. Contractor shall conduct tests and maintain records of ASME code-required safety tests, fireman's service tests, telephone/intercom tests, and emergency power tests on site.

B. The Contractor shall conduct testing procedures in accordance with the applicable ASME A17.1 standards at intervals specified or provided in ASME A17.1 , and per local code requirements in place at commencement of interim and warranty maintenance, complete and execute all governing authority filing procedures including payment of all associated fees or other charges where mandated by local authorities, and forward confirmation of all authority required filings to the "Owner" or "Owner's Representative" within ten (10) working days of the date the test procedure was completed. Any fines incurred for failure to complete required testing, complete testing per mandated schedules, or for filing irregularities will be paid by the Contractor.

1. Annual Electric Traction Elevator and Sidewalk Lift Safety Test

    a. Contractor shall perform an Annual Electric Traction Elevator Safety Test conforming to the requirements contained in ASME A17.1 Category 1, Inspection and Test Requirements on all Traction Elevators covered by this Contract, and as required by the AHJ.

2. Five Year Full Load Safety Test

    a. Contractor shall perform a Five-Year Safety Test conforming to the requirements contained in ASME A17.1 Category 5, Inspection and Test Requirements on all Traction Elevators covered by this contract.

Note: The time required for said tests shall not be included in the minimum preventive maintenance hours mandated in Section 2.1.

C. The “Owner” or “Owner's Representative” may engage the services of a third-party qualified and certified agency for the sole purpose of mandated inspections of the equipment per local code authority requirements. The Contractor shall conform to the third-party agency schedule and provide qualified labor to assist in these inspections (including assistance in gaining access to hoistways, pits and machine rooms) at no additional charge to “Owner” or “Owner’s Representative”.

D. The Contractor shall be responsible for the payment of any fines or retesting fees and all applicable labor should an inspection failure be as a result of any component or system covered under this elevator interim and warranty maintenance specification. Should an inspection failure be the result of both a component or system covered under this interim and elevator warranty maintenance specification and a related building system that is the responsibility of the “Owner” or “Owner's Representative”, the cost of re-inspection shall be proportionally split between the Contractor and “Owner” or “Owner’s Representative”.

E. The Contractor shall be responsible for the payment of any and all fees for “Owner” or “Owner’s Representative” Fire Emergency Operating Systems and/or Emergency Power System contractor(s), including the third-party qualified and certified agency fees, should the Contractor fail to perform the inspection on the scheduled date and/or provide forty-eight (48) hour notice of cancellation.

1. The Contractor shall file for and obtain any abatement necessary should any violation noted by an inspector be found to be cited in error with the applicable code.
2. It shall be the Contractor's responsibility to contact the “Owner” or “Owner's Representative” to establish mutually convenient dates for the performance of the inspections and tests. Where possible, these inspections and tests shall be scheduled so as to coincide with the Contractor's regular maintenance inspections on a "not to interfere" basis.
3. Any deficiencies discovered as a result of the inspections and testing, whether witnessed by an “Owner” or “Owner's Representative” or not, shall be characterized as follows:

    a. Condition I - "Immediate"
    b. Condition II - "Priority"
    c. Condition III - "Routine"

        1) Condition I - "Immediate" shall be utilized for life safety or other immediate deficiencies that adversely affect normal, safe operations and mandate removal of the unit from service at the time of testing. Upon the occurrence of the aforementioned, the Contractor shall notify the “Owner” or “Owner's Representative” verbally and provide a

written confirmation prior to 10:00 AM on the next regular business day. Work required to correct such deficiencies not covered under this interim and warranty maintenance specification shall be proposed immediately and, upon approval and completion, notification given to the “Owner” or “Owner's Representative” to witness the re-inspection procedure.

2) Condition II - "Priority" shall be utilized for those deficiencies which could become life threatening or further impair the safe operation of vertical transportation systems. Condition II "Priority" deficiency classifications shall be applied to units and/or conditions that will create critical service interruptions. Required repairs, replacements and adjustments not covered under this interim and warranty maintenance specifications shall be proposed for corrective actions and re-inspection within forty-eight (48) hours of recording the deficiency. The “Owner” or “Owner's Representative” will approve the extra work proposals and coordinate this mandated work based on the severity of the reported condition and building operations.

3) Condition III - "Routine" shall be utilized for deficiencies that may be addressed as soon as possible. Such conditions and/or deficiencies shall not be considered as safety infractions or conditions that will otherwise cause unscheduled removal from service of units or create conditions that will hamper regular building operations. The Contractor shall issue itemized proposals for recommended extra work procedures not covered under this interim and warranty maintenance specification shall within two (2) weeks of recording the deficiency.

4. When repairs, adjustments or other equipment replacements are instituted over an extended time period, the Contractor shall update reports and ensure outstanding deficiencies are indicated on any new inspection or test procedures that may be undertaken prior to the satisfactory completion of work previously specified.
5. The “Owner” or “Owner's Representative” shall retain the right to witness all re-inspection and/or test procedures as required to expunge the outstanding deficiencies.

## 2.6 CALLBACK SERVICE (24 HOURS, 7 DAYS PER WEEK)

A. Provide emergency callback service which consists of promptly dispatching qualified employees in response to requests from the “Owner” or “Owner's Representative”, by telephone or otherwise, for emergency adjustment or minor repairs on any day of the week, at any hour, day or night. If repairs cannot be made immediately, the mechanic shall notify the “Owner” or “Owner's Representative” as to the reason why and provide supplemental information regarding the restoration of services.

1. Callback service in response to passenger entrapments shall be provided within one-half (½) hour during regular working hours and within one (1) hour during overtime periods.
2. Callback services for out-of-service units that have been secured by the "Owner" or "Owner's Representative" shall be provided within one (1) hour during regular working hours and within two (2) hours between 6:00 a.m. and 8:00 a.m. and 4:30 p.m. and 6:30 p.m. Monday through Friday, except holidays.
3. Callback services for out-of-service units that have been secured by the "Owner" or "Owner's Representative" shall be provided within three (3) hours at all other times not specified above in "1" or "2."
4. Callback services for non-essential system malfunctions that do not constitute an operational or other safety condition shall be provided during normal working hours of regular working days within four (4) hours of the request for service.

## 2.7 OWNER'S RIGHT TO MONITOR CONTRACTOR SERVICE AND PERSONNEL

A. In addition to the Contractor's management and supervision of services specified herein, the "Owner" or "Owner's Representative" shall retain the right to monitor the actions of the Contractor and services rendered.

B. The "Owner" or "Owner's Representative" may employ direct labor for management supervision or indirect outside consultants, inspectors, engineers or other qualified personnel to monitor the maintenance services provided by the Contractor with the understanding that such actions do not limit the Contractor's responsibilities for management of services or supervision of personnel.

C. When conditions warrant, in the opinion of the "Owner" or "Owner's Representative", the Contractor shall provide the necessary labor and/or materials, at no additional cost, to assist the "Owner" or "Owner's Representative" to evaluate the services rendered, work performed, and equipment conditions.

D. There shall be no extra charge to the "Owner" or "Owner's Representative" for normal coordination of services, scheduling procedures, reporting requirements, or other service management and supervision mandated under the terms of the interim and warranty maintenance to include assistance labor as specified above when assigned personnel are removed from normal duties without replacement by additional personnel for such assistance to the "Owner" or "Owner's Representative".

E. In the event the Contractor changes assigned management or supervisory personnel, the "Owner" or "Owner's Representative" shall retain the right to interview and evaluate all new personnel assigned for direct or indirect management and supervision of the interim and warranty maintenance work.

F. In the event the Contractor union affiliated personnel fail to perform their duties satisfactory to the "Owner" or "Owner's Representative" or display an attitude that is not

conducive to good relationships or proper servicing of the elevator systems, the “Owner” or “Owner's Representative” may request a position reassignment based on submission of substantial evidence that such Contractor employee is not serving the best interests of the building and/or the Contractor in performing services specified herein. The Contractor shall honor said request within twenty-four (24) hours of notification and provide labor satisfactory to the “Owner” or “Owner's Representative”.

G. The “Owner” or “Owner's Representative” reserves the right to purchase related vertical transportation system services, attachments or other appurtenances not covered under the terms of the elevator interim and warranty maintenance specification from other than the Maintenance Contractor. The Contractor shall cooperate and assist the Owner in coordination of such projects or acts to insure safe and adequate vertical transportation is provided. When conditions warrant, in the opinion of the “Owner” or “Owner's Representative”, the Contractor shall provide technical assistance to the “Owner” or “Owner's Representative” upon request.

## 2.8 SECURITY

A. Contractor and Contractor’s personnel shall comply with all security regulations and requirements of “Owner” or “Owner's Representative” and Owner’s tenants.

B. Contractor and Contractor’s personnel shall submit to security background checks as required.

## 2.9 OBSOLESCENCE

A. For the purpose of this contractual contingency, Component Obsolescence shall be defined as the inability to purchase and/or otherwise repair, rebuild or refurbish parts of the system no longer produced by the original equipment manufacturer or a third-party after-market supplier in the same form, fit and/or function. Claims of component obsolescence shall not be allowed when replacement parts, components or assemblies of equivalent design and functionality are available in the market.

1. The exception to the above shall be the full warranty and replacement of any controller drive(s), proprietary or non-proprietary which shall be replaced at no cost to the “Owner” or “Owner's Representative”, if for any reason the drive(s) is no longer manufactured, but can still be obtained or repaired, either though the original manufacturing company or a third party provider. If the drive(s) are no longer manufactured and no longer available through the original manufacturing company or a third party provider and cannot be repaired, the drive(s) will then be considered obsolete and the “Owner” or “Owner's Representative” shall be responsible for 30% of the cost of the drive(s) but shall not be charged any labor costs.

B. In the event of component obsolescence as defined in paragraph A above, the condition shall be reported to the "Owner" or "Owner's Representative" with the following information:

1. Alternative equipment or component parts renewal options for restoration of the system due to obsolescence.
2. Procurement and installation time for restoration of system service.
3. Any local law or safety code requirements that will be triggered by the alternative equipment or component renewal (i.e., including filing, tests and approvals).
4. Certification by the manufacturer of the replacement parts that the parts meet or exceed the original equipment design intent including, but not limited to, durability, reliability, maintainability, longevity and safety.

C. Payment for obsolescence work shall be based on the extra cost to the contractor only.

1. Labor cost over and above the time necessary for standard equipment and component renewal or repair procedures.

a. Contractual hourly rate schedule as provided under Exhibit "A" shall be used to compute the extraordinary labor charge if applicable.
b. 30% of the actual material cost deemed obsolete (with no mark-up) will be paid to the contractor by the "Owner" or "Owner's Representative".
c. If the part is custom makeable, in the same form, fit and function, the "Owner" or "Owner's Representative" will pay up to 40% of the cost of that part. The "Owner" or "Owner's Representative" shall not be responsible for labor cost associated with this repair or fabrication.
d. At "Owner" or "Owner's Representative" option, a lump sum extra cost price may be employed in lieu of time and material as indicated above.

2. Subsequent to the "Owner" or "Owner's Representative" authorization to proceed with an alternative obsolescence repair and approval of the relative extra cost, if any, the contractor shall immediately perform such work and restore operating services.

D. The "Owner" or "Owner's Representative" shall retain the right to competitively bid obsolescence repairs and replacements; and, such work as performed by another qualified contractor shall not diminish or otherwise alter the coverage provided under this elevator interim and warranty maintenance specification subject to the following:

1. The Maintenance Contractor has the right to inspect work performed by others; and, when conditions warrant, reject obsolescence procedures that increase their contractual liability. The Maintenance Contractor shall provide written notification of acceptance or rejection.
2. Should the Contractor reject an obsolescence repair made by others, the "Owner" or "Owner's Representative" may have a qualified third party professional engineer

evaluate the work and render a decision regarding the acceptability of the prevailing conditions.

NOTE: No other claim for obsolescence of any kind will be considered by the Customer during the course of the elevator interim and warranty maintenance services.

2.10 SCHEDULED SERVICE PROCEDURES

A. Maintenance requirements, in addition to scheduled and emergency repairs, renewals and testing, shall include but are not limited to:

1. Examination of wire ropes and/or coated steel belts to maintain proper tensioning and legal bottom clearances on a monthly basis for shortening and adjusting ropes as required and performance of all re-shackling procedures per ASME A17.1 and/or ASME A17.6 standards and local laws in conjunction with maintenance of related slack cable devices, machine limits or other safety equipment.
2. Examination, repair, and replacement of all electrical wiring, traveling cables, conduits, connections, and related apparatus extending from the main line power supply switch in the machine/control room or other power supplies in hoistways.
3. Maintenance of pit, hoistway, and machine/control room lighting to include re-lamping, wiring, and switch controls.
4. Mandated inspections and relative labor requirements for third party examinations and/or test procedures as approved by the “Owner” or “Owner's Representative”.

B. Monthly Firemen’s Recall Service

1. Monthly Firemen’s Recall Service Tests following the ASME Code A17.1/A17.2 requirements must be performed monthly and test logs kept current and stored in an accessible location in the elevator machine/control room / space, and per the requirements of the Local AHJ.

PART 3 - EXECUTION AND SUPPLEMENTAL REQUIREMENTS

3.1 PERFORMANCE TIMES, LEVELING AND CONTRACT SPEED

A. The control system shall be maintained to provide smooth acceleration and retardation. Contractor must maintain elevators in accordance with the original equipment manufacturer’s (O.E.M.) design performance specifications (including floor-to-floor times, door timing, rated speed, group supervisory system, etc.). The door close pressure must never exceed thirty (30) footpounds. The following performance schedule shall be adhered to:

1. Contract Speed: The contract speed shall be provided for up direction travel with full-capacity load in the elevator car. The speed in either direction under any loading condition shall not vary more than 3% of the contract speed on traction equipment and 10% on hydraulic equipment.
2. In accordance with the ASME A17.1 Code, the elevators shall be maintained and adjusted to safely lower, stop and hold the car with a load of 125% of the rated capacity.
3. Leveling Accuracy: The elevator shall be adjusted to provide accurate leveling within 1/4" ± of the floor level without releveling regardless of load.
4. Door Operating Times and Floor-to-Floor Time: (Recorded from the doors start to close on one floor until they are 3/4 open at the next floor) under various loading conditions (based on 13'- 0" floor heights):

| Elevator | Door Type | Opening (sec) | Close (sec) | Floor to Floor Performance (sec) |
|---|---|---|---|---|
| No.1 | 3'-6" x 8'- 0" SSSO | 2.5 – 2.9 | 4.0 – 4.4 | 11.4 – 11.6 |
| No.2 | 3'-6" x 8'- 0" SSSO | 2.5 – 2.9 | 4.0 – 4.4 | 11.4 – 11.6 |
| No.3 | 4'- 6" x 7'- 8" 2SSO | 3.4 – 3.8 | 5.1– 5.1 | 14.9 – 15.9 |

   a. Door dwell time for hall calls: 5.0 sec without Advance lantern signals.
   b. Door dwell time for car calls: 3.0 seconds.
   c. Reduced non-interference dwell time: 1.0 seconds.

5. Maintain the following ride quality requirements for the passenger elevators:

   a. For speeds up to 1400 fpm, the speed of the car roller guides shall not exceed 500 rpm.
   b. Where pit permits, extend bottom roller guides by not less than one half the distance from the centerline of the upper roller guides to the platform.
   c. Noise levels inside the car shall not exceed the following:

      1) Car at rest with doors closed and fan off - 40 dba.
      2) Car at rest with doors closed, fan running - 55 dba.
      3) Car running at high speed, fan off - 50 dba.
      4) Door in operation - 60 dba.

   d. Vertical accelerations shall not exceed 14 milli-g and horizontal accelerations shall not exceed 20 milli-g.

      1) The accelerometer used for this testing shall be capable of measuring and recording acceleration to nearest 0.01 m/s² (1 milli-g) in the range of 0-2 m/s² over a frequency range from 0-80 Hz with ISO 8041 filter

weights applied. Accelerometer should provide contact with the floor similar to foot pressure, 60 kPA (8.7psi).

e. The amplitude of acceleration and deceleration shall not exceed 2.6 - 2.8 ft./sec$^2$ for geared and MRL traction, and 3.5 - 4 ft./sec$^2$ for gearless traction elevators.
f. The maximum jerk rate shall be 1.5 to 2.0 times the acceleration and deceleration.
g. The maximum velocity which the elevator achieves in either direction of travel while operating under load conditions that vary between empty car and full rated load shall be within ± 3% of the rated speed

## 3.2 PARTS INVENTORY AND WIRING DIAGRAMS

A. The Contractor shall maintain an inventory of spare parts at the site of the work for scheduled preventive maintenance procedures and common callback service repairs. Such parts shall include but are not limited to contacts, coils, solid-state boards, relays, resistors, timing devices, computer devices, interlock safety switch and linkage parts, bottom guides, door closers, fuses, bulbs, car guides and an assortment of hardware. Contractor shall provide the “Owner” or “Owner's Representative” an inventory of the part inventory within 90 days of signing this contract. Parts cabinets shall be provided by the Contractor.

B. The Contractor shall maintain and continually update wiring diagrams and control schematics to ensure “as built” documents remain on site and the property of the “Owner” or “Owner's Representative” per the interim and warranty maintenance specifications.

## 3.3 MATERIALS AND WORKMANSHIP

A. All materials and parts are to be new and of the best quality available. Installation of such materials shall be accomplished in a neat workmanlike manner. In case the Contractor should receive written notification from the “Owner” or “Owner’s Representative” stating the presence of inferior, improper, or unsound materials or workmanship, the Contractor shall, within twenty-four (24) hours proceed to remove such work or materials and make good all other work or materials damaged thereby. If the “Owner” or “Owner’s Representative” permits said work or materials to remain, the “Owner” or “Owner’s Representative” shall be allowed the difference in value or shall, at its election, have the right to have said work or materials repaired or replaced as well as the damage caused thereby, at the expense of the Contractor, at any time during the interim and warranty maintenance term; and neither payments made to the Contractor, nor any other acts of the “Owner” or “Owner’s Representative” shall be construed as evidence of acceptance and waiver.

## 3.4 PROTECTION OF WORK AND PROPERTY

A. The Contractor shall continuously maintain adequate protection of all their work from damage and shall protect the Owner's property from injury or loss arising out of the interim and warranty maintenance services. The Contractor shall make good any such damages, injury or loss, except such as may be directly caused by agents or employees of the Owner. The Contractor shall provide all barricades required to protect open hoistways or shafts per OSHA regulations. Such protection shall include any necessary guards or other barricades for employee protections during and after the maintenance procedure.

## 3.5 PERFORMANCE GUARANTEE

A. Contractor's failure to provide the specified Minimum Hours in "Section 2.1" for routine preventive maintenance monthly shall result in the Contractor providing a refund to the "Owner" or "Owner's Representative" for the unexpended hours at the "Straight Time Rate Hourly Selling Price" or overtime rate, if appropriate, for Maintenance Mechanics listed in "Exhibit A."

B. The Elevator Contractor shall be responsible for all AHJ fees levied for not per forming tests, inspections, re-inspections, or clearing mandated corrections related to the equipment as specified by the AHJ requirements.

EXHIBIT “A”

SCHEDULE OF INITIAL BASE HOURLY RATES FOR CONTRACTOR’S PERSONNEL

| | Straight Time Rate | *1.5 Premium Time Rate | *1.7 Time Rate | **Double Time Rate |
|---|---|---|---|---|
| Mechanic | _____ | _____ | _____ | _____ |
| Apprentice | _____ | _____ | _____ | _____ |
| Team | _____ | _____ | _____ | _____ |

*Hours and Days of the Week that the Rate applies: _____

**Hours and Days of the Week that the Rate applies: _____

DIVISION 14 – CONVEYING SYSTEMS

14 00 00 Conveying Equipment

14 21 00 – Traction Elevators

14 21 23 – Electric Traction Passenger Elevators
14 21 43 – Electric Traction Service Elevators
14 44 00 – Sidewalk Lifts

PART 1 - GENERAL

1.1 SUMMARY AND DEFINITIONS

A. Related Documents

1. Contract Documents

B. Intent

1. The following specifications provide for a turnkey, code compliant elevator modernization, including all work necessary to return the elevators to automatic operation with local Code authority approval of two (2) gearless traction passenger elevators, one (1) geared traction service elevator and replacement of one (1) sidewalk lift located at the University of Maryland Baltimore Institute of Human Virology, 725 West Lombard Street in Baltimore MD.
2. All work shall be performed between 6:00 a.m. to 5:00 p.m. except where otherwise specified.
3. Modernization work on Elevators No.1 – No.3 and the sidewalk lift shall be performed consecutively. Only one (1) traction passenger elevator can be taken out of service at any one time.
4. Related equipment shall be designed, constructed, installed and adjusted to produce the highest results with respect to smooth, quiet, convenient and efficient operation, durability, economy of maintenance, and the highest standard of safety.
5. It is not the intent of these specifications to detail the construction and design of all parts of the equipment, but it is expected that the type, materials, design, quality of work and construction of each part shall be adequate for the service required, durable, properly coordinated with all other parts, and in accordance with the best commercial standards applicable and of the highest commercial efficiency possible.
6. Electric and magnetic circuits and related parts shall be of proper size, design and material to avoid heating and arcing, and all other objectionable effects which may reduce the efficiency of operation, economy of maintenance and/or net-useful life of the apparatus.
7. Minimum requirements for design, materials, etc., are for certain parts of the equipment. Equivalent requirements approved by the Consultant shall apply to

such parts as are of special design, construction or material and to which the specified requirements are not directly applicable. These minimum requirements as a whole shall be considered as establishing proportionate general minimum standards for all parts of the equipment.

8. General requirements for design, materials and construction are intended primarily to apply to the heavy-duty and important parts of the equipment specifically mentioned and to other parts of similar duty and importance. Less important and light-duty parts may be of the standard design, materials and construction provided that, in the opinion of the Consultant, such standards are in accordance with the best commercial practice and are fully adequate for the purpose of use. All such variations shall be made only on the Consultant's written approval.
9. All equipment and component parts installed, supplied or provided under this contract shall be manufactured and distributed by a third-party, non-installer company servicing the vertical transportation industry.

    a. Apparatus shall conform to the design and construction standards referenced herein, and shall be rated the best commercial grade suitable for this application.
    b. Equipment and component systems shall not employ any experimental devices or proprietary designs that could hamper and/or otherwise prohibit subsequent maintenance repairs or adjustments by all qualified contractors.
    c. Manufacturers of the apparatus shall provide technical support and parts replacements for their equipment and component systems for a minimum of twenty (20) years, and issue such guarantee of support to the purchaser with written certification naming the final Owner of their product(s) to ensure the apparatus or systems remain maintainable regardless of who may be selected for future service.

10. All equipment provided shall be factory and field tested with a history of design reliability and net-useful life established.

    a. Contractor must be able to demonstrate the apparatus to be installed has been used successfully in a substantially similar manner under comparable conditions.
    b. If the apparatus proposed differs substantially in construction, material composition, design, size, capacity, duty or other such rating from the equipment previously used for the same purpose by the manufacturer, the Consultant may reject the apparatus or require the vendor test and demonstrate the adequacy and suitability for this particular situation. Any necessary tests shall be performed at the sole expense of the Contractor with no prior guarantee of acceptance after the testing procedure.

11. The Contractor shall not use as part of the permanent equipment any experimental devices, proprietary design, components, construction of materials which have not been fully tried out in at least substantially similar or under comparable service, except as may be especially approved by the Consultant. If any important

equipment or devices to be used on this installation differ substantially in construction, materials, design, size, capacity or duty from corresponding items previously used for the same purpose by the manufacturer, they shall pass such tests as the Consultant may require to fully show their adequacy and suitability. These tests shall be in addition to tests herein specified and shall be made at the expense of the Contractor.

12. Certain design limitations, tests, etc., are herein specified as a partial check of the adequacy of design, construction and materials used. These requirements do not cover all features necessary to ensure satisfactory and approved operation, etc., of the equipment.
13. It is understood, the entire system shall be designed, fabricated, modified and/or upgraded in full compliance with applicable local laws and code standards. The absence of a particular item or requirement shall not relieve the Contractor of the full and sole responsibility for such equipment, features and/or procedures.
14. With the exception of only those items specifically identified as being performed by others, the Specifications are intended to include all engineering, material, labor, testing, and inspections needed to achieve work specified by the Contract Documents. Inasmuch as it is understood that any incidental work necessary to complete the project is also covered by the Specifications, bidders are cautioned to familiarize themselves with the existing job site conditions. Additional charges for material or labor shall not be permitted subsequent to execution of the Contract.
15. Bidders must report discrepancies or ambiguities occurring in the Specifications to the Consultant for resolution prior to the bidding deadline, otherwise the Specifications shall be deemed acceptable in their existing form.

C. Abbreviations and Symbols

1. The following abbreviations, Associations, Institutions, and Societies may appear in the Project Manual or Contract Documents:

| | |
|---|---|
| AHJ | Authority Having Jurisdiction |
| AIA | American Institute of Architects |
| ANSI | American National Standards Institute |
| ASME | American Society of Mechanical Engineers |
| ASTM | American Society for Testing and Materials |
| AWS | American Welding Society |
| IBC | International Building Code |
| IEEE | Institute of Electrical and Electronics Engineers |
| NEC | National Electrical Code |
| NEMA | National Electrical Manufacturers Association |
| NFPA | National Fire Protection Association |
| OSHA | Occupational Safety and Health Act |

D. Codes and Ordinances / Regulatory Agencies

1. Work specified by the Contract Documents shall be performed in compliance with applicable Federal, State, and municipal codes and ordinances in effect at the time of Contract execution. Regulations of the Authority Having Jurisdiction shall be fulfilled by the Contractor and Subcontractors. The entire installation, when completed, shall conform with all applicable regulations set forth in the latest editions of:

    a. Local and/or State laws applicable for logistical area of project work.
    b. Building Code applicable to the AHJ.
    c. Elevator Code applicable to the AHJ.
    d. Safety Code for Elevators and Escalators, ASME A17.1 and all supplements as modified and adopted by the AHJ.
    e. Safety Code for Elevators and Escalators, A17.1S supplement to A17.1 as modified and adopted by the AHJ.
    f. Guide for Inspection of Elevators, Escalators, and Moving Walks, ASME A17.2.
    g. Safety Code for Existing Elevators and Escalators, ASME A17.3 as modified and adopted by the AHJ.
    h. Guide for emergency evacuation of passengers from elevators, ASME A17.4.
    i. National Electrical Code (ANSI/NFPA 70).
    j. American with Disabilities Act - Accessibility Guidelines for Building and Facilities and/or A117.1 Accessibility as may be applicable to the AHJ.
    k. ASME A17.5/CSA-B44.1 - Elevator and escalator electrical equipment.
    l. ECC (Energy Conservation Code) as may be applicable to the AHJ.

2. The Contractor shall advise the Owner's Representative of pending code changes that could be applicable to this project and provide quotations for compliance with related costs.

E. Definitions

1. Comply with the requirements of Division 01.
2. Defective Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
3. Provide: Where used in this document, provide shall mean to install new device, apparatus, system, equipment or feature as specified in this document.
4. Definitions in ASME A17.1 as amended or modified by the AHJ apply to work of this Section.

1.2 PERMITS AND SUBMITTALS

A. Permits

1. Comply with the requirements of Division 01.
2. Prior to commencing work specified by the Contract Documents, the Contractor shall, at its own expense, obtain all permits or variances as may be required by the AHJ and provide satisfactory evidence of having obtained said permits and variances to both the Owner's Representative and Consultant.
3. File necessary drawings for approval of all Authorities Having Jurisdiction.

B. Submittals

1. Comply with the requirements of Division 01.
2. Prior to beginning the work, the Contractor shall submit and have approved copies of layout drawings, shop drawings and standard cuts. Submit the following for the elevators as a minimum:

    a. Controllers.
    b. AC VVVF drives.
    c. Load weighing.
    d. Hoist machines.
    e. AC hoist motors.
    f. Deflector Sheaves.
    g. Overspeed governors.
    h. Emergency brakes.
    i. Car safeties.
    j. Hoist and governor ropes.
    k. Roller guides.
    l. Traveling cable.
    m. Hoistway Door equipment (tracks, locks, hangers, rollers, closers).
    n. Car door equipment (tracks, hangers, rollers).
    o. Car door operators.
    p. Door protection and re-opening devices.
    q. Car door panels.
    r. Hoistway Door Panels (if required).
    s. Car sills.
    t. Car and hall fixtures.
    u. Cab shells (if required).
    v. Cab interiors.
    w. Cab interior protection pads.
    x. Hoistway jamb braille.

3. Samples of wood, metal, plastic, paint or other architectural finish material applicable to this project shall be submitted for approval by the Owner's designee.

4. The Consultant and the Owner's Representative shall pass on the submittals with reasonable promptness and the Contractor shall be responsible to ensure that there will be no delay in their work or that of any other trade involved.
5. Approved filing and submittal requirements must be completed before equipment and related materials are ordered.
6. Copies of Department of Buildings' permits and/or governing authority's documents will be posted at the job site with copies issued to the Owner's Agent, Owner's Representative and Consultant.

C. Measurements and Drawings

1. Drawings or measurements included with the bidding material shall be for the convenience of the bidders only and full responsibility for detailed dimensions lies with the Contractor.
2. In the execution of the work on the job, the Contractor shall verify all dimensions with the actual conditions.
3. Where the work of the Elevator Contractor is to join other trades, the shop drawings shall show the actual dimensions and the method of joining the work of the various trades.

D. Substitutions

1. Requests for substitutions will be considered under the following time limitations and situations:

    a. Not less than ten (10) calendar days before bids are due.
    b. Work or equipment specified becomes unavailable through unforeseen events such as strikes, loss of manufacturer's plant through fire, flood or bankruptcy.

2. Requested substitutions will be reviewed and adjudged. Failure of the Consultant to raise objection shall not constitute a waiver of any of the requirements of the Contract Documents.
3. Request for substitutions shall include complete data with drawings and samples as required, including the following:

    a. Quality Comparison - Proposed substitution versus the specified product.
    b. Changes required in other work because of the substitution.
    c. Effect on the construction schedule.
    d. Cost Data - Resulting from the proposed substitution versus the specified product. The Contractor shall certify that the cost data presented is complete and includes all related costs under this Contract.

4. When proposing a substitution, the Contractor represents that:

    a. They have investigated the proposed substitution and have determined that it is equal to or better than the product specified.

b. They will guarantee the substitution in the same manner as the product specified.
c. They will coordinate and make other changes as required in the work as a result of the substitution.
d. They waive all claims for additional costs as a result of the substitution, with the exception of those identified above under "cost data".

5. The Consultant will be sole judge of the acceptability of the proposed substitution.
6. The Consultant will have authority to approve or reject substitutions or to change the specified standards of quality. However, neither this authority to act under this provision nor any decision made in good faith, either to exercise or not to exercise this authority, shall give rise to any duty or responsibility of the Consultant to the Contractor, any Subcontractor, any Sub-Subcontractor, any of their agents or employees or any other persons performing the work or offering the perform the work.

E. Keys

1. Upon the initial acceptance of work specified by the Contract Documents on each unit, the Contractor shall deliver to the Owner, six (6) keys for each general key-operated device that is provided under these specifications in accordance with ASME A17.1, Part 8 standards as may be adopted and modified by the AHJ.
2. All other keying of access or operation of equipment shall be provided in accordance with ASME A17.1 Part 8 as may be adopted and modified by the AHJ.

F. Diagnostic Tools

1. Prior to seeking final acceptance of the project, the Contractor shall deliver to the Owner any specialized tools required to perform diagnostic evaluations, adjustments, and/or programming changes on any microprocessor-based control equipment installed by the Contractor. All such tools shall become the property of the Owner.

a. Owner's diagnostic tools shall be configured to perform all levels of diagnostics, systems adjustment and software program changes which are available to the Contractor.
b. Owner's diagnostic tools that require periodic re-calibration and/or re-initiation shall be performed by the Contractor at no additional cost to the Owner for a period equal to the term of the maintenance agreement from the date of final acceptance of the project.
c. The Contractor shall provide a temporary replacement, at no additional cost to the Owner, during those intervals in which the Owner might find it necessary to surrender a diagnostic tool for re-calibration, re-initiation or repair.

2. Contractor at time of request for substantial completion shall deliver to the Owner, printed instructions, access codes, passwords or other proprietary information necessary to interface with the microprocessor-control equipment.

G. Service Support Requirements

1. Software / Firmware Updates

a. During the life of the equipment and subject to the term of the maintenance agreement, where revisions to firmware and/or software are issued by the control manufacturer or manufacturer of solid state and microprocessor based subsystems subsequent to the beneficial use of the equipment, updates shall be provided so that the installation and spare circuit boards are current with respect to software and firmware versions.

H. Wiring Diagrams, Operating Manuals and Maintenance Data

1. Comply with the requirements of Division 01.
2. Contractor shall submit this information 30 days prior to request for substantial completion.
3. Deliver to the Owner, three (3) identical volumes of printed information organized into neatly bound manuals prior to seeking final acceptance of the project.
4. The manuals shall also be submitted in electronic format via ebuilder, incorporating raw 'CAD' and/or Acrobat 'PDF' file formats.
5. Manuals, as well as electronic copies, shall contain the following:

a. Step-by-step adjusting, programming and troubleshooting procedures that pertain to the solid-state microprocessor-control and motor drive equipment.
b. Passwords or identification codes required to gain access to each software program in order to perform diagnostics or program changes.
c. A composite listing of the individual settings chosen for variable software parameters stored in the software programs of both the motion and dispatch controllers.
d. Method of control and operation.

6. Provide three (3) sets of "AS INSTALLED" straight-line wiring diagrams in both hard and electronic format in accordance with the following requirements:

a. Displaying name and symbol of each relay, switch or other electrical component utilized including identification of each wiring terminal.
b. Electrical circuits depicted shall include all those which are hard wired in both the machine room and hoistway.
c. Supplemental wiring changes performed in the field shall be incorporated into the diagrams in order to accurately replicate the completed installation.

7. Furnish three (3) bound instructions and recommendations for maintenance, with special reference to lubrication and lubricants.

8. Manuals or photographs showing controller repair parts with part numbers listed.

I. Training

1. Comply with the requirements of Division 01.
2. Prior to seeking final acceptance of the project, the Contractor shall conduct a six (6) hour training program on-site with building personnel selected by the Owner.
3. Provide video recording of the full six (6) hour training session. Prior to the training session coordinate with the Owner to assure a clear and audible recording-determine place, time, video equipment. Do not proceed if background is interfering. Recordings using a cellphone will not be allowed. Deliver recording to Owner, edited if necessary.
4. The focus of the session shall include:

    a. Instructions on proper safety procedures and who to contact for the purpose of assisting passengers that may become entrapped inside an elevator car.
    b. Explain each control feature and its correct sequence of operation.

5. Control features covered shall include but, not be limited to:

    a. Independent Service Operation.
    b. Emergency Fire Recall Operation - Phase I.
    c. Emergency In-car Operation - Phase II.
    d. Emergency Power Operation.
    e. Emergency Communications Equipment.
    f. Security Operating Features.
    g. Interactive Systems Management.
    h. Remote Monitoring/Controls.

J. Patents

1. Patent licenses which may be required to perform work specified by the Contract Documents shall be obtained by the Contractor at its own expense.
2. The Contractor agrees to defend and save harmless the Owner, Consultant and agents, servants, and employees thereof from any liability resulting from the manufacture or use of any patented invention, process or article of appliance in performing work specified in the Contract Documents.

K. Advertising

1. Advertising privileges shall be retained by the Owner.
2. It shall be the responsibility of the Contractor to keep the job site free of posters, signs, and/or decorations.
3. Contractor's logo shall not appear on faceplates or entrance sills without the approval of the Owner.

1.3 QUALITY ASSURANCE

A. Materials and Quality of Work

1. Comply with the requirements of Division 01.
2. All materials are to be new and of the best quality of the kind specified.
3. Installation of such materials shall be accomplished in a neat manner and be of the highest quality.

a. Should the Contractor receive written notification from the Owner stating the presence of inferior, improper, or unsound materials or quality of installation, the Contractor shall, within twenty-four (24) hours, remove such work or materials and make good all other work or materials damaged.
b. Should the Owner permit said work or materials to remain, the Owner shall be allowed the difference in value or shall, at its election, have the right to have said work or materials repaired or replaced as well as the damage caused thereby, at the expense of the Contractor, at any time within one (1) year after the completion of the work; and neither payment made to the Contractor, nor any other acts of the Owner shall be construed as evidence of acceptance and waiver.

B. Mechanical Design Requirements (General)

1. The following typical requirements shall apply to all parts of the work where applicable and are supplementary to other requirements noted under the respective headings.

a. All bearings, pivots, guides, guide shoes, gearing, door hanger sheaves, door hanger tracks and similar elements subject to friction or rolling wear in the entire elevator installation shall be accurately and smoothly finished and shall be arranged and equipped for adequate and convenient lubrication. Means shall be provided for flushing and draining the larger bearings and gear case. All oiling holes shall have dustproof, self-cleaning caps.
b. Bearings of governor and governor sheaves and important supporting bearings of other parts in motion when the elevator is traveling shall, unless otherwise specified or approved, be of ball or roller bearing type.
c. Bearings for brake levers and similar uses where the amount of movement under load is light and the wear negligible may be unlined.
d. All plain bearings shall be liberally sized in accordance with the best commercial elevator usages which have proved entirely satisfactory on heavy-duty installations.
e. Bearings of motors shall be arranged and equipped for adequate automatic lubrication. Ring or chain oilers, spring-fed grease cups and equivalent devices properly used in accordance with the best commercial elevator practice will be acceptable. Approved means shall be provided for visibly checking the amount of lubricant contained and for flushing and draining.

Means shall also be provided for preventing leakage of lubricant when the reservoirs or grease cups are filled to proper levels.

f. Ball and roller bearings shall be of liberal size and of a type and make which have been extensively and successfully used on other similar, heavy-duty elevator installations. They shall be fully enclosed. Loading, lubrication, support and all other conditions of use shall be in accordance with the recommendations of the bearing manufacturer based on previous extensive and satisfactory elevator usage.

g. All armature spiders and similar items intended to rotate with their shafts shall be keyed and/or firm press or shrunk fit on the shafts. Set screw fastening will be permitted only for minor items not subject to hoisting loads and where means for field adjustment is required.

h. All bolts used to connect moving parts, bolts carrying hoisting stresses and all other bolts, except guide rail bolts, subject to vibration or shock shall be fitted with adequate means to prevent loosening of the nuts and bolts. Bolts transmitting important shearing stresses between machine parts shall have tight body fit in drilling holes.

i. All machine work, assembling and installing shall be done by skilled and experienced mechanics using first-class, modern equipment and tools. All work shall be thoroughly high grade in every respect. All parts will be manufactured to high precision standards so that wearing parts will be readily interchangeable with stock repair parts with a minimum of field fitting.

j. All bearing and sliding surfaces of shafts, pins, bearings, bushings, guides, etc., shall be smoothly and accurately finished. They shall be assembled and installed in accurate alignment and with working clearance most suitable for the load, speed, lubrication and other conditions of use.

k. Structural steel used for supporting and securing equipment and for the construction of car slings, etc., shall conform to the A.S.T.M. specification for Structural Steel for Buildings. Design stresses shall not exceed those specified in the local Building Code.

l. Castings of motor frames, sheaves, gear casings, etc., shall be of the best quality metallurgically controlled, hard, close grained gray machinery cast iron, free from blow holes, sand holes, or shrinkage cracks, ground to remove overruns, sanded and machined so as to leave a finish suitable for its particular application. Surfaces of sheaves and brake drums shall be entirely free from defects and shall show a hardness of not less than 220 Brinell.

C. Electrical Design Requirements (General)

1. Comply with the requirements of Division 260000.
2. The following typical requirements shall apply to all parts of the work and are supplementary to other requirements noted under the respective headings.

a. The design and construction of the motors shall conform to the requirements of these specifications and to the ASME Standards for Rotating Electrical

Machinery with revisions issued to the first day when the work of this Contract was advertised.

1) Motors shall operate successfully under all loads and speeds and during acceleration and deceleration.
2) Motors shall be designed for quiet operation without excessive heat.
3) Insulation on motor coils and windings and on all insulated switch, relay, brake and other coils shall conform to the requirements of minimum Class "F" insulation, as defined in ANSI Standards for Rotating Electrical Machinery. All motors shall be impregnated twice.
4) Switches, relays, etc., on controller, starter and signal panels and similar items on other parts of the equipment shall be the latest improved type for the condition of use. They shall function properly in full accordance with the requirements of the machines controlled and with the specified operating requirements of the elevator. Any of these parts showing wear or other injurious effects during the guarantee period to the extent that abnormal maintenance is required or indicated shall be replaced with proper and adequate parts by the Contractor.
5) Contacts in elevator motor circuits which are intended to be opened by governors or other safety devices shall be copper to carbon or other approved non-fusing type.
6) Where required, controllers and other component parts of the installation shall be labeled in accordance with the latest codes and standards as adopted and/or otherwise modified by the AHJ.
7) Electrical equipment, motors, controllers, etc., installed under this contract shall have necessary CSA/US or UL/US listing as may be required by the AHJ. Equipment shall be labeled or tagged accordingly.

D. Energy Conservation Code

1. The Contractor shall comply with the requirements set forth in the Energy Conservation Code as may be applicable to the AHJ.
2. Except for equipment or systems under the purview of other disciplines, elevator equipment provided by the Contractor requiring compliance shall include, but not be limited to:

a. Gear ratio efficiencies in geared machines.
b. Energy efficiencies of geared and gearless motors.
c. Absorption of regenerated power for elevators.
d. Energy efficiencies of car interior lighting and ventilation.
e. Automatic operation of car interior lighting and ventilation through the individual car controller.

E. Materials, Painting and Finishes

1. Two (2) coats of rust inhibiting machinery enamel shall be applied to exposed ferrous metal surfaces in the pit that do not have a galvanized, anodized, baked enamel, or special architectural finishes.
2. Two (2) coats of rust inhibiting enamel paint to the machinery located within the machine room and secondary level (where applicable) as well as to the machine room floors.
3. Architectural metal surfaces of bronze or similar non-ferrous materials which are specified to be refinished, reclad and/or provided new, shall be sufficiently clear coated so as to resist tarnishing during normal usage for a period of not less than twelve (12) months after final acceptance by the Owner.
4. Identify all equipment including buffers, crosshead, safety plank, machine, controller, drive, governor, disconnect switch, etc., by 4" high numerals which shall contrast with the background to which it is applied. The identification shall be either decalcomania or stencil type.
5. Paint or provide decal-type floor designation not less than six (6) inches high on hoistway doors (hoistway side), fascias and/or walls as required by Code at intervals not exceeding 7'-0". The color of paint used shall contrast with the color of the surface to which it is applied.
6. Apply two (2) coats of paint to the machine room floor and walls.
7. Apply two (2) coats of waterproof paint to the pit floor and Walls.

F. Accessibility Requirements

1. Locate the alarm button and emergency stop switch at 35”, and floor and control buttons not more than 48” above the finished floor. The alarm button shall illuminate when pressed for visual acknowledgement to user.
2. Provide raised markings in the panel to the left of the car call and other control buttons. Letters and numbers shall be a minimum of 5/8” and raised .03” and shall be in contrasting color to the call buttons and cover plate.
3. The centerline of new hall push button shall be 42” above the finished floor.
4. The hall arrival lanterns or cab direction lantern provided shall sound once for the “up” direction and twice for the “down” direction. Design and locate fixtures per Federal standards.
5. Provide floor designations at each entrance on both sides of jamb at a height of 60” above the floor.

    a. Designations shall be 2” high, raised .03” on a contrasting color background as selected by the Owner.

6. Provide an audible signal within the elevator to tell passenger that the car is stopping or passing a floor served by the elevator.
7. Provide a verbal annunciator to announce the floor at which the elevator is stopping, in addition to standard messages such as; fire service independent service etc.
8. Provide signal control timing for passenger entry/exit transitions per Federal and/or Local standards.

9. Ensure sill-to-sill running clearances do not exceed 1-1/4" at all landings served.
10. Provide visual call acknowledgment signal for car emergency intercommunication device.

## 1.4 DELIVERY / STORAGE / HANDLING / COORDINATION

A. Delivery and Storage of Material and Tools

1. Comply with the requirements of Division 01.
2. Delivery, Storage and Handling:

    a. Deliver materials to the site ready for use in the accepted manufacturer's original and unopened containers and packaging, bearing labels as to type of material, brand name and manufacturer's name. Delivered materials shall be identical to accepted samples.
    b. Store materials under cover in a dry and clean location, off the ground.
    c. Remove delivered materials which are damaged or otherwise not suitable for installation from the job site and replace with acceptable materials.

3. Coordinate all deliveries with Owner. All deliveries that will disrupt facility operations and/or crane picks shall be on "off" hours.
4. The Owner shall bear no responsibility for the materials, equipment or tools of the Contractor and shall not be liable for any loss thereof or damage thereto.
5. The Contractor shall confine storage of materials on the job site to the limits and locations designated by the Owner and shall not unnecessarily encumber the premises or overload any portion with materials to a greater extent than the structural design load of the Facility.

B. Work with Other Trades / Coordination

1. Coordinate installation of sleeves, block outs, equipment with integral anchors, and other items that are embedded in concrete or masonry for the applicable equipment. Furnish templates, sleeves, equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
2. Coordinate sequence of installation with other work to avoid delaying the Work.
3. Coordinate locations and dimensions of other work relating to the equipment scheduled for installation including pit ladders, sumps, and floor drains in pits; entrance subsills; machine beams; and electrical service, electrical outlets, lights, and switches in pits and machine rooms, secondary levels, overhead sheave rooms and hoistways as it relates to the specific equipment.
4. Coordination of equipment installation and location with HVAC prime who will be employed and managed by UMB.

C. Removal of Rubbish and Existing Equipment

1. On a daily basis, the Contractor shall remove all rubbish generated in performing work specified in the Contract Documents from the job site.
2. Any component of the existing elevator plant that is not reused under the scope of work specified in the Contract Documents shall become property of the Contractor and, as such, shall be removed from the premises at the Contractor's sole expense.
3. The Contractor agrees to dispose of the aforementioned equipment and rubbish in accordance with any and all applicable Federal, State, and municipal environmental regulations, and further accepts all liability that may result from handling and/or disposing of said material.

D. Protection of Work and Property

1. The Contractor shall continuously maintain adequate protection of all their work from damage and shall protect the Owner's property from injury or loss arising out of this contract.
2. The Contractor shall make good any such damages, injury or loss, except such as may be directly caused by agents or employees of the Owner.
3. The Contractor shall provide all barricades required to protect open hoistways or shafts per OSHA regulations. Such protection shall include any necessary guards or other barricades for employee protections during and after the modernization procedure.

1.5 RELATED WORK

A. Work by Elevator Contractor Included in the Base Bid. The following requirements shall be applicable based on prevailing conditions at the site of work but not limited to mandated modifications for code compliance.

1. The following requirements shall be applicable based on prevailing conditions at the site of work and/or mandated modifications for code compliance.

a. Installation of new fully enclosed, externally operated, heavy duty fused, main line Shunt trip disconnect switches, properly located in accordance with local law that can be locked in the open (off) position.
b. Provide remote/auxiliary disconnects where new disconnect switches are not in line-of-sight of the controller.
c. Installation of new heavy duty 120V disconnects for cab lights and fan exhaust, lockable in the OFF position only. Provide dedicated circuits for each
d. Installation of new electrical conduit and power feeders between the load side of new main line and 120 V disconnect switches and new elevator control equipment.

e. Provide auxiliary power feeds with required distribution load center (circuit breaker panel) for intercommunication, cab lighting or other specialty devices existing or to be provided by the Elevator Contractor.

   1) Voltage shall be 110 VAC with one 15 Amp fused disconnect for lighting of the elevator car enclosure.
   2) Fused disconnects shall be lockable in the "OFF" position in accordance with applicable code.

f. Properly label all electrical devices with source of power with phenolic tags.
g. Provide necessary receptacles as required by Elevator Contractor to supply power to auxiliary elevator equipment and/or remotely located monitors.
h. The top surface of any setback or projection in the hoistway that measures 2" or more in width shall be beveled at an angle of not less than 75 degrees from horizontal. Each bevel plate shall be constructed from prime painted 14 gauge cold-rolled steel and installed so as to conform with ASME A17.1 elevator safety code as modified by, and/or in addition to codes and standards accepted by the AHJ.
i. Installation of new permanent LED lighting fixtures with protective guards and 110-volt duplex GFI receptacles inside the machine room. Illumination shall be no less than 19 foot-candles at floor level. A light control switch shall be provided immediately adjacent to the machine room entrance door. Provide necessary receptacles as required to supply power to auxiliary elevator equipment and/or remotely located monitors.
j. Provide hoist rope guards at the car and counterweight drop side of the hoisting machine sheave to prevent accidental contact with the hoisting ropes. The guard shall extend from the point where the hoisting ropes penetrate the machine room floor slab to a point beyond where the ropes contact the traction and deflector sheaves. The guards shall be constructed so as to conceal pinch-points between ropes and sheave grooves.
k. Provide to paint the machine room walls and ceiling off-white with one (1) coat of primer and one (1) finish coat.
l. Provide each machine room with a self-closing, self-locking access door. Locking means shall be spring-type arranged to permit the doors to be opened from the inside without a key.
m. Provide the following signage, plates and tags:

   1) Provide access doors to each electrical control room, secondary or machinery space with signs that read "ELEVATOR MACHINE ROOM". Letters shall be not less than 2" high.
   2) Provide all required manufacturer data plates and installation-specific tags and signs of the types and styles containing information as required by applicable Codes and Standards as adopted and/or modified by the AHJ.

n. Provide each elevator pit with a 110-volt GFI duplex receptacle and permanent LED lighting fixtures equipped with protective guard. Illumination shall be no less than 10 foot-candles at pit floor level. A light control switch must be provided and so positioned as to be readily accessible from the pit entrance door or ladder.

o. Provide means to detect and/or remove water infiltration into pit as required by ASME A17.1 and/or the Local Governing Authority. Sumps in pits where provided, shall be covered. The cover shall be level with the pit floor so as not to produce a tripping hazard.

p. Apply two (2) coats of waterproof paint to the pit floor and Walls

q. Where the pit extends more than 3 feet below the sill of the pit access door, provide a permanent fixed metal ladder.

1) Ladder shall extend no less than 48" above the sill of the access door. Handgrips shall extend from the ladder to a point no less than 48" above the sill of the access door where the ladder does not comply.
2) The rungs shall be a minimum of 16" wide. Where prevailing conditions prevent a 16" wide rung, the rung may be reduced to no less than 9".
3) The rungs shall be spaced 12" on center.
4) A clear distance of no less than 4 ½" from the centerline of the rungs and handgrips to the nearest permanent object in back of the ladder shall be provided.

a) Where prevailing conditions prohibit the installation of the required ladder as specified above, the Elevator Contractor shall coordinate requirements necessary for compliance with the Authority Having Jurisdiction.

r. Provide to remove/enclose all non-elevator related conduit and equipment located within the elevator machine room, hoistway and pit.

s. Provide necessary patching, repairing and installation of masonry and/or dry wall for smooth and legal elevator hoistways.

t. Provide patching, fire-stopping and fireproofing in machine rooms and hoistways as required to meet code.

u. Cutting and patching as required for hall fixtures.

v. Removal of existing exhaust vents, duct and/or ventilation fans per code requirements. Block and seal/infill.

w. Retain the existing machine room HVAC system. Coordination of equipment installation and location with HVAC prime who will be employed and managed by UMB.

x. Provide a minimum of 10 foot candles (fc) of lighting/illumination at hoistway sills per code. Lighting shall be approved by Owner and match lobby lighting.

y. Modify existing and/or provide a smoke detector system meeting the requirements of A17.1 and/or the Local Governing Authority. Install as needed additional devices

where required or in the elevator machine room as needed due to raised ceiling in the back of machine room or where pockets exist.

z. Installation of fire emergency control interface provisions for automatic recall of the elevators through operation of the fire detection system. Provisions shall be made for primary, alternate and third-zone (fire-hat) designated fire recall landing with connection contingent on Codes recognized by the local governing authority. The interfacing contacts shall be wired to an electrical junction box located inside each elevator machine room for connection to the elevator control systems by the Elevator Contractor. Each wire shall be clearly labeled with its control function. Coordinate the type of interface required for the specific elevator control apparatus with the Elevator Contractor.

aa. Standby power of normal voltage characteristics via normal electrical feeders to run one (1) elevator at a time in each group of elevators or single (simplex) elevator at full rated car speed and capacity per ASME A17.1 and/or the Local Governing Authority.

bb. Installation of emergency power control interface provisions to signal the elevator control apparatus of a transfer from normal (utility) power to the building emergency (generator) power supply. Also, provide additional control interface to give advanced notification to the elevator control apparatus that the power source will transfer from emergency (generator) power to normal (utility) power. Interfacing contacts shall be wired to an electrical junction box located inside each machine room for connection to the elevator control equipment by the Elevator Contractor. Coordinate the type of interface required for the specific elevator control apparatus with the Elevator Contractor.

1) On the line side of each main line disconnect switch, provide some means to absorb power that may be regenerated by the elevator hoist motor during emergency power operation.
2) Normal Power/Emergency Power Control Signals consisting of two (2) dry contacts provided by others to function as follows:

a) One (1) dry contact normally open to make when Normal Power is available. (Logic state of dry contact is to be confirmed by the Manufacturer of the Elevator Control Equipment).
b) One (1) dry contact normally open to make when emergency power is available. (Logic state of dry contact is to be confirmed by the Manufacturer of the Elevator Control Equipment).

cc. Verify and/or relocate move/install heat detectors within 24” of each sprinkler head.

dd. Where sprinkler fire protective systems are provided inside any elevator hoistway, machine room or associated machinery space, provisions shall be made for the disconnecting of the main line power supply from the affected

elevator prior to activation. This means of disconnect shall be manually reset in accordance with code.

ee. Furnish and install new 200°F rate of rise sprinkler heads to replace the existing sprinkler heads within the elevator machine room and hoistway/pit, per code requirements.

ff. Furnish and install guards at all sprinkler heads within elevator related areas.

gg. Provide to reconfigure existing sprinkler system to ensure supply lines and heads do not pass over elevator equipment.

1) Supply lines should be kept high enough to maintain 7' clear headroom in the elevator machine room.
2) Sprinkler heads in the pit shall be placed 24" or less from the pit floor.

hh. Provide for fire alarm pre-testing and programming.

ii. Standby for elevator recall testing and inspections.

jj. Provide necessary telephone wiring with connection to local telephone service for remote elevator monitoring and/or two-way voice emergency communications systems.

1) Terminate the telephone wiring in junction boxes or standard phone jack terminals in the machine room.
2) Coordinate the quantity and termination method of individual phone connections with the Elevator Contractor.
3) Identify each phone line for connection by the Elevator Contractor to the appropriate elevator devices.
4) Telephone wiring, where required by applicable codes, shall be installed in conduit.

**SIDEWALK LIFT**

MACHINE ROOM

1. Coordination of equipment installation and location with HVAC prime who will be employed and managed by UMB.
2. Demolish and remove the existing door and frame to the machine room.
3. Demolish and remove all conduit and wiring within the machine room.
4. Furnish and install fire stopping and patching of holes and voids in the elevator machine room, per code requirements.
5. Furnish and install new B-label hollow metal machine room door and frame with code compliant hardware and closure. Furnish and install new door signage as required.
6. Provide to remove abandoned or unrelated equipment from elevator machine room, as per code requirements.
7. Furnish and install painting of the machine room walls.
8. Furnish and install one (1) 10 lb. class ABC fire extinguisher in the elevator machine room.

HOISTWAY AND PIT AREA

1. Demolish and remove all conduit and wiring within the hoistway.
2. Demolish and remove the existing upper lift platform frame.
3. Furnish and install new upper platform hatch door angle and grout solid.
4. Furnish and install new PVC piping to new integral hatch door frame with gutter and seal around the new platform door.
5. Furnish and install new permanent safety railing at the new lift hatch door as required.
6. Furnish and install fire stopping and patching to holes and voids within the hoistway, per code requirements.
7. Furnish and install one (1) new pit ladder, with grab bars 48" above sill, 4" of clearance on all sides, rungs at least 16" wide and to have a rung adjacent/flush with the entrance sill as required per code.
8. Furnish and install concrete modifications at the pit ladder as required.
9. Provide and install rail bracket inserts as required.
10. Furnish and install one (1) 3,000 GPH sump pump with alarm and backflow preventer and install discharge piping to nearest approved drainage location.
    a. Provide to demolish pit slab, excavate, and set sump pump crock.
    b. Furnish and install diamond plate sump pump cover, flush with pit floor.
11. Furnish and install temporary safety barricades as required at the lift during construction activities.

POWER AND LIGHTING FOR LIFT

*Note: All final connections to the elevator controller will be performed by the elevator contractor. Mainline feeders are to be retained.*

1. Furnish and install one (1) new heavy duty mainline shunt trip breaker within NEMA 12R enclosure, to be lockable in the OFF position only.
2. Furnish and install isolated building ground to mainline power feeders.
3. Furnish and install one (1) new NEMA 3R heavy duty 120V disconnects for cab lights and fan exhaust, lockable in the OFF position only.
4. Furnish and install loadside conduit and copper wire from the new mainline disconnect and the new 120V disconnect to the lift controller. *Note: Final Connection by Elevator Company.*
5. Furnish and install new 4-foot vapor proof LED light fixtures in the machine room to reach 19-foot candles, as per code requirements.
    a. Furnish and install one (1) illuminated light switch in the machine room adjacent to machine room door.
    b. Furnish and install one (1) GFCI duplex receptacle with weather proof cover in the elevator machine room.
    c. Furnish and install one (1) wall mounted emergency LED light fixture within the elevator machine room.

6. Furnish and install two (2) LED lights with NEMA 3R enclosures in the pit to reach 10-foot candles, as per code requirements.
    a. Furnish and install one (1) new illuminated light switch in the elevator pit.
    b. Furnish and install one (1) dedicated GFCI duplex receptacle with weather proof cover in the elevator pit.
    c. One (1) new light fixture in each pit is to be on battery backup.
7. Furnish and install labelling of all disconnects within the machine room and all power sources used during the execution of the scope of work.
8. Provide a minimum of 10-foot candles (fc) of lighting/illumination at hoistway entrances per code.
9. Furnish and install dedicated circuit for the new sump pump.
10. Relocate conduit from behind pit ladder to meet code requirements.

FIRE ALARM & SPRINKLER

1. Furnish and install one (1) new addressable smoke detector in the machine room area, per code requirements.
2. Furnish and install one (1) new addressable heat detector within 24” of the sprinkler head in the machine room, per code requirements.
3. Provide to relocate the existing machine room sprinkler piping so that piping and sprinkler heads are not located directly above elevator equipment, to meet code requirements.
4. Furnish and install new 155°F rate of rise sprinkler heads to replace the existing sprinkler heads within the elevator machine room and hoistway/pit, per code requirements.
5. Furnish and install guards at all sprinkler heads within elevator related areas.
6. Provide for fire alarm pre-testing and programming.
7. Standby for testing and inspections.

## 1.6 WARRANTY / MAINTENANCE SERVICES

A. Contract Close-Out, Guarantee and Warranties

1. Comply with the requirements of Division 01.
2. The Contractor agrees to certify that work performed in accordance with the Contract Documents shall remain free of defects in materials and quality of work for a period of two (2) years after final acceptance of the completed project, or acceptance thereof by beneficial use on a unit by unit basis, whichever occurs first.
3. The sole duty of the Contractor under this warranty is to correct any non-conformance or defect and all damages caused by such defect without any additional cost to the Owner and within fifteen (15) days of notification.
4. The express warranty contained herein is in lieu of all other warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose.
5. In the event the Contractor fails to fulfill its obligations defined herein, the Owner shall have the express right to perform the Contractor’s obligations and to charge

the Contractor the cost of such performance or deduct an equal amount from any monies due the Contractor.

B. Maintenance Coverage

1. The following maintenance coverage apply:

a. Interim Maintenance

1) Provide full protective maintenance services and equipment coverage for three (3) traction elevators and one (1) sidewalk lift upon removal of the first elevator for modernization and during the work implementation procedure, until final acceptance of the finished project.
2) Interim full comprehensive maintenance services shall be provided in accordance with Section 14 01 20, Owner's Form of Agreement issued with the modernization documents for subsequent services.
3) Costs related to interim maintenance shall be included in the base bid quotation.
4) Interim maintenance shall be invoiced monthly until final acceptance of the last elevator and shall include the deduction for units out of service for upgrading.

b. Guarantee Maintenance

1) Provide full comprehensive preventative maintenance services for a period of twenty-four (24) months after the final completion and acceptance of the project.
2) Guarantee maintenance and related services shall be provided in accordance with Section 14 01 20, Owner's Form of Agreement issued with the modernization documents for subsequent services.
3) Costs related to guarantee maintenance shall be included in the base bid quotation.
4) Guaranteed maintenance shall be invoiced in the lump sum indicated on the bid form in the space provided, upon Ownership's final acceptance of the modernization project.

1.7 ALLOWANCES

A. Allowances

1. Comply with the requirements of Division 01.
2. Carry the following allowances for Elevators No.1 – No.3

a. Passenger Elevator Cab Interior Allowance: $45,000.00 (Per Elevator)
b. Service Elevator Cab Interior Allowance: $25,000.00 (Per Elevator)

c.

3. The above allowances are exclusive of any handling charge, applicable sales and/or use taxes. Wiring, installation and coordination of allowance items shall be included in the base contract.

## PART 2 - PRODUCTS

### 2.1 GENERAL DESCRIPTION

A. Elevators No.1 and No.2

| | | |
|---|---|---|
| 1. | Quantity | Two (2) |
| 2. | Type | Passenger |
| 3. | Capacity (lbs.) | 3,500 |
| 4. | Speed (fpm) | 350 |
| 5. | Travel in Feet | Existing / Retain |
| 6. | Ropes / Roping | New |
| | a. Hoisting | New |
| | b. Governor | New |
| 7. | Number of Landings | Elevator No.1: Six (6)<br>Elevator No.2: Seven (7) |
| 8. | Number of Openings | Elevator No.1: Six (6)<br>Elevator No.2: Seven (7) |
| 9. | Front Openings | Elevator No.1: Six (6) *1, 2 - 6<br>Elevator No.2: Seven (7) B1, *1, 2 - 6 |
| 10. | Operation | Automatic Group Duplex Selective Collective Operation |
| 11. | Control | Microprocessor / New |
| 12. | Fireman's Service | Phase I and Phase II / New |
| 13. | Machine Type | Gearless Traction / New |
| 14. | Power Drive | VVVF / New |
| 15. | Machine Location | Overhead |
| 16. | Governor | New |
| 17. | Car Platform / Sling | Reuse / Refurbish |
| 18. | Safety | Reuse / Refurbish |
| 19. | Counterweight | Reuse / Refurbish |
| 20. | Guide Rails | Reuse / Refurbish |
| 21. | Roller Guides | New |
| 22. | Buffers | Reuse / Refurbish |
| 23. | Car Door Size / Type | 3'- 6" W x 8'- 0" H/SSSO |
| 24. | Hoistway Door Size / Type | 3'- 6" W x 8'- 0" H/SSSO |
| 25. | Master Door Operator | New |
| 26. | Entrance Sills | Reuse / Refurbish |
| 27. | Tracks / Hangers | New |

| | | |
|---|---|---|
| 28. | Interlocks / Closers / Rollers | New |
| 29. | Pit Ladder | Modify Existing / New |
| 30. | Power Supply | 480 Volts (Field Verify) |
| 31. | Wiring and Traveling Cables | New |
| 32. | CCTV Provisions | New |
| 33. | Security / Card Reader Provisions | New |
| 34. | Number of Push Button Risers | One (1) / New |
| 35. | Hall Operating Fixtures | New |
| 36. | Car Operating Fixtures | New |
| 37. | Communication | New |
| 38. | Door Protective Device | New |
| 39. | Emergency Cab Lighting | New |
| 40. | Car Ventilation | New |
| 41. | Car Shell | Retain / Refurbish |
| 42. | Car Doors | New |
| 43. | Car Sill | New |
| 44. | Cab Interiors | $45,000.00 Allowance Per Elevator |

B. Elevator No.3

| | | |
|---|---|---|
| 1. | Quantity | One (1) |
| 2. | Type | Service |
| 3. | Capacity (lbs.) | 5,000 |
| 4. | Speed (fpm) | 350 |
| 5. | Travel in Feet | Existing / Retain |
| 6. | Ropes / Roping | New |
| | c. Hoisting | New |
| | d. Governor | New |
| 7. | Number of Landings | Seven (7) |
| 8. | Number of Openings | Seven (7) |
| 9. | Front Openings | Seven (7) *1, 2 – 6, PH |
| 10. | Operation | Simplex Selective Collective Operation |
| 11. | Control | Microprocessor / New |
| 12. | Fireman’s Service | Phase I and Phase II / New |
| 13. | Machine Type | Geared Traction / New |
| 14. | Power Drive | VVVF / New |
| 15. | Machine Location | Overhead |
| 16. | Governor | New |
| 17. | Car Platform / Sling | Reuse / Refurbish |
| 18. | Safety | Reuse / Refurbish |
| 19. | Counterweight | Reuse / Refurbish |
| 20. | Guide Rails | Reuse / Refurbish |
| 21. | Roller Guides | New |
| 22. | Buffers | Reuse / Refurbish |
| 23. | Car Door Size / Type | 4’- 6” W x 7’- 8” H/2SSO |
| 24. | Hoistway Door Size / Type | 4’- 6” W x 7’- 8” H/2SSO |

| | | |
|---|---|---|
| 25. | Master Door Operator | New |
| 26. | Entrance Sills | Reuse / Refurbish |
| 27. | Tracks / Hangers | New |
| 28. | Interlocks / Closers / Rollers | New |
| 29. | Pit Ladder | Modify Existing / New |
| 30. | Power Supply | 480 Volts (Field Verify) |
| 31. | Wiring and Traveling Cables | New |
| 32. | CCTV Provisions | New |
| 33. | Security / Card Reader Provisions | New |
| 34. | Number of Push Button Risers | One (1) / New |
| 35. | Hall Operating Fixtures | New |
| 36. | Car Operating Fixtures | New |
| 37. | Communication | New |
| 38. | Door Protective Device | New |
| 39. | Emergency Cab Lighting | New |
| 40. | Car Ventilation | New |
| 41. | Car Shell | Retain / Refurbish |
| 42. | Car Doors | New |
| 43. | Car Sill | New |
| 44. | Cab Interiors | $25,000.00 Allowance |

## 2.2 MANUFACTURERS

A. Pre-Approved Equipment Manufacturers

1. The following manufacturer's equipment and materials have been pre-approved for use on this project. Other equipment not specifically mentioned shall be considered for approval on an individual basis.

    a. Controller - Virginia Controls – Vision 2.0.
    b. Tracks, Hangers, Interlocks and Door Operators - G.A.L.
    c. Fixtures - Innovation, Monitor.
    d. Door Protective Device - Janus, Adams, G.A.L.
    e. Cabs and Entrances/Entrance Door Panels – Snap Cab, Cab Craft, EMCO.
    f. Machines - Hollister-Whitney, Titan, Imperial, Torin.
    g. Motors - Imperial Electric, General Electric, Baldor, Reuland Electric.
    h. VVVF Power Drives - MagneTek, Yaskawa, TorqMax, Mitsubishi.
    i. VVVF Emergency Power Systems - MCE, Reynolds & Reynolds Electronics.
    j. Electrical Traveling Cables - Draka, James Monroe.
    k. Guide Shoes/Rollers – ELSCO, G.A.L.
    l. Wire Ropes - Paulsen, Bethlehem, Wayland, Draka.
    m. Intercommunications/Telephones – Rath or approved equal.

2. Original Equipment Manufacturers may substitute their own branded equipment as an Alternate under Contractors Value Engineering Options, subject to the

following:

a. All requirements of the specifications are met regarding performance, appearance, serviceability and support.
b. A full stock of all regular and critical replacement parts required for this project are maintained at a facility within fifty (50) miles of the project site.

    1) Any parts not stocked at the above referenced facility shall be identified with the location of the nearest source and shall be available for next-day delivery upon demand.

c. All parts and software shall be made available for purchase to a qualified elevator maintenance firm with one (1) business day delivery without direct Owner involvement.

    1) Provide details of parts supply facility and a list of current parts pricing for all major components required for the installation.

d. All specialized tools, equipment, software, and passwords, required to maintain, repair, adjust the operation, and perform code mandated inspections are provided to the Owner as part of the base installation.

    1) Updates to these items shall be available via the parts supply facility referenced above.

e. Technical support of the product(s) shall be available to the Owner's elevator service provider.

## 2.3 CONTROL FEATURES / OPERATION

A. Motion Control (New)

1. Smooth stepless acceleration and deceleration of the elevator car shall be provided in either direction of travel during both single and multiple floor runs.
2. Use digital logic to calculate optimum acceleration and deceleration patterns during each run.
3. Acceleration, deceleration, jerk, maximum velocity, leveling accuracy and elapsed flight time, for a typical elevator one floor run, shall not exceed values as further specified.

B. Automatic Group Duplex / Selective Collective Operation (New – Elevators No.1, No.2)

1. Provide duplex selective collective operation with the two cars arranged to operate from a single riser of hall push buttons.
2. When there is no demand for elevator service, park one car at the Lobby Floor and the other shall be a "free car", parking at the floor last served.

a. Park both cars with doors closed.
b. The "free car" shall normally respond to any registered hall call except:

1) A hall call registered at the Lobby Floor shall be answered by the car parked at the Lobby Floor.
2) A hall call registered below the Lobby Floor shall be answered by the car parked at the Lobby Floor.

3. When the car parked at the Lobby Floor responds to a registered call for a floor above the Lobby Floor, the "free car" shall be dispatched automatically to the Lobby Floor, and shall become the assigned Lobby Floor parking car.
4. When the "free car" is responding to registered calls, the Lobby Floor parking car shall automatically dispatch from the Lobby Floor under any of the following conditions:

a. Registration of hall call below the "free car" while it is traveling in the up direction.
b. Registration of hall call above the "free car" while it is traveling in the down direction.
c. Inability of the "free car" to move in response to a registered hall call within a predetermined time.

5. When both cars are responding to registered car and hall calls, the first car to complete its calls shall become the assigned Lobby Floor parking car and shall be dispatched automatically to the Lobby Floor.
6. If either car is removed from service, the other car shall respond to all registered hall calls and its own car calls.
7. When a car arrives at its last stop and reverses direction of travel, all previously registered car calls shall be automatically cancelled.
8. When a car has responded to the highest or lowest call, and hall calls are registered for the opposite direction, the car shall reverse direction automatically and respond to those registered calls.
9. When a car arrives at a landing where both up and down hall calls are registered, it will answer the call in the direction of travel.

a. If no car call is registered, the car shall be assigned to respond to call registered for the opposite direction. The car doors shall immediately close and re-open to respond to the call in the opposite direction.
b. Hall lantern operation shall always correspond to direction of service.

10. When an empty car reverses direction at a landing with no hall calls, the doors shall not open and the hall lantern shall not operate.
11. If a car has no car calls registered and arrives at a floor where both up and down hall calls have been registered, the car shall respond to the hall call corresponding to the direction of car travel.

12. If, after making its stop, a car call is not registered and no other hall calls exist ahead of the car corresponding to its original direction of travel, the doors shall close and immediately reopen in response to the hall call for the opposite direction.
13. The car shall maintain its original direction at each stop until the doors are fully closed to permit a passenger to register a car call before the car reverses its direction of travel.
14. In the event that any car is delayed for more than a predetermined time interval after it received a start signal, the system shall automatically permit the remaining car in the two car group to respond to signals and be dispatched in the specified manner.
15. Coincident calls: The dispatching system shall be designed with a twenty (20) second parameter whereby an elevator with a car call will receive priority to answer a corresponding corridor call if it can do so within twenty (20) seconds. If it cannot answer the call within the prescribed time, the first available car shall be assigned. A continuous reassessment of calls shall be made, with the processor having the capability of reassessing five (5) times per second.
16. In the event the supervisory control system should malfunction so that neither elevator is assigned calls within a predetermined interval and in accordance with the conditions of the operating strategy in effect, the system shall automatically assume a back-up mode of operation whereby the elevators shall be arranged to provide continuous service to each landing in a predetermined pattern without regard to actual corridor call demands.

C. Simplex Selective Collective Operation (New – Elevator No.3)

1. Provide simplex selective collective operation from a riser of hall push button stations.
2. The registration of one or more car calls shall dispatch the car to the selected floors.

    a. The car shall also respond to registered hall calls in the same direction of travel.
    b. Car and hall calls shall be canceled when answered.

3. Stops in response to calls that are registered in either the car or hall push button stations shall occur in the natural order of progression in which the floors are encountered, depending on the direction of car travel, and irrespective of the order in which calls are registered.
4. When the car has responded to the highest or lowest call, and calls are registered for the opposite direction, the car shall reverse direction automatically and respond to those registered calls.
5. When the car arrives at its last stop and reverses direction of travel, all previously registered car calls shall be automatically cancelled.
6. When the car arrives at a landing where both up and down hall calls are registered, it will answer the call in the direction of travel.

a. After a pre-determined delay, if no car call is registered, the car shall respond to calls registered for the opposite direction. Car doors shall close immediately, re-open and respond to the call for the opposite direction.
b. Hall lantern operation shall always correspond to direction of service.

7. When an empty car reverses direction at a landing with no hall calls, the doors shall not open and the hall lantern shall not operate.
8. If the car has no car calls registered and arrives at a floor where both up and down hall calls have been registered, the car shall respond to the hall call corresponding to the last direction of car travel. If, after making its stop, a car call is not registered and no other hall calls exist ahead of the car corresponding to its original direction of travel, the doors shall close and immediately reopen in response to the hall call for the opposite direction.
9. The car shall maintain its original direction at each stop until the doors are fully closed to permit a passenger to register a car call before the car reverses its direction of travel.

D. Independent Service Operation (New)

1. The car operating station shall be equipped with a key-operated switch labeled "IND SER".
2. Locate the switch in the locked service compartment.
3. When placed in the "on" position the following shall occur:

a. Group elevator - the elevator shall bypass corridor calls and travel directly to any floor chosen by registration of a car call. Hall calls shall remain registered for service by another elevator in the group.

4. During Independent Service Operation, the elevator doors shall remain open at any landing until the door close or a car call push button is pressed and maintained until the doors are fully closed.
5. If more than one (1) car call is registered, all registered car calls shall extinguish when the elevator stops in response to the first call.
6. Fire Emergency Recall shall automatically override Independent Service Operation and engage Phase I - Fire Emergency Recall Operation following a period of approximately forty-five (45) seconds.

E. Inspection Service Operation (New)

1. The car shall move at a speed not to exceed 150 feet per minute (0.75 meters per second) as per code with both the hall and car door panels in the closed and locked position.
2. The top of the elevator car shall be equipped with a control for limited operation of the car during repairs, maintenance and inspection conducted in the hoistway. The transfer of control to the top of car operating device shall cause that device to be the sole means of control for the elevator.

a. Visual and audible indication shall be provided on the top of the car when Firefighters' Emergency Operation is initiated.

3. Power door operating equipment shall be rendered inoperative while the car is being operated in the Inspection Service mode with the exception of power closing of the door. The control system shall maintain closing power on the door while the elevator is moving under Inspection Service Operation.
4. Machine Room Inspection Operation and Inspection Operation with open door circuits shall be provided in accordance with A17.1 Safety Code, as modified and adopted, where required or allowed by the AHJ.

F. Hoistway Access Operation (New)

1. Provisions shall be made to allow access to the hoistway through the use of hoistway access switches.
2. Operating the access switch shall permit the car to move at a speed not to exceed 150 feet per minute (0.75 meters per second) as per code with the hall and car doors in the open position to obtain access to the top of the car or climb-in pit.
3. The car shall automatically stop motion when the car top is level with the hoistway door sill for access to top of car.
4. The access key switches shall be keyed differently than other typical keys used in the operation of the elevator. Keying shall be in accordance with Security Group Classifications as required by applicable code.
5. Access operation shall be disabled when top of car inspection operation is in effect.

G. Load Weighing Operation (New)

1. A positive means shall be provided to continuously monitor the amount of load being transported by the elevator car.
2. The system shall be used to:

a. Preload static motor drives.
b. Activate control features that include:

1) anti-nuisance operation.
2) load dispatch operation.
3) load dependent non-stop operation where applicable.

3. The anti-nuisance feature shall operate at loads not exceeding 200 lbs., whereas load dispatch and load non-stop shall be set to function at 65% of the rated loading capacity for the initial set up and adjustment procedure.

H. Anti-Nuisance Operation

1. In the event car loading is not commensurate with the number of car calls registered, all car calls shall be canceled.

a. The system shall monitor the door protection device to determine if passenger transfer has occurred.
b. If after the third (3rd) stop a passenger transfer has not occurred, the system shall cancel all remaining registered car calls and respond to assigned hall call demand.
c. The number of calls registered with no passenger transfer that will trigger anti-nuisance shall be adjustable and initially set to three (3) calls.

I. Firefighters' Emergency Operation (New)

1. Phase I Emergency Recall Operation shall be provided for each car in accordance with ASME A17.1 code as modified under the applicable local or State law.
2. Each main or auxiliary car operating station shall be provided with an indicator light and warning buzzer, each of which shall become activated whenever Phase I Operation is engaged.

    a. The warning buzzer shall cease to function once the car has completed the recall sequence and is positioned at the designated recall landing.
    b. The indicator light shall remain illuminated as long as Phase I Operation is activated.

3. A three-position, key-operated switch shall be provided on the designated recall landing to manually activate Phase I Operation.

    a. When activated, Phase I Operation shall be arranged so that in order to reset normal service, all cars must first be returned to the designated recall landing, after which the Phase I key-switch must be turned to the "OFF" position.

4. A standardized Fire Recall Key shall be used where required by the codes and standards applicable to the AHJ.
5. Phase II Emergency Recall In-Car Operation shall be provided for each car in accordance with ASME A17.1 code as modified under local or State law.
6. Locate controls required for Phase II In-Car Operation in a locked access cabinet in the main car operating panel.

    a. The cover of the locked access panel shall be engraved as required by local or State law.
    b. The locked access panel shall contain:

        1) Phase II key switch.
        2) Fire indicator light.
        3) Call cancel push button.
        4) Door open push button.
        5) Door close push button.
        6) Run/Stop switch.
        7) Other devices as may be required by local law.

c. Engrave the Firefighters' Service operating Instructions on the inside of the locked cabinet door.

J. Emergency Power Operation / Duplicate Existing (New)

1. Existing provisions shall be duplicated.
2. Provisions shall be included in the elevator control system whereby all affected elevators shall automatically return to the fire recall designated landing in progressive numerical sequence at normal speed, unless otherwise specified, immediately after transferring to the emergency power system.

    a. Car and corridor calls shall become inoperative and all previously registered calls shall be canceled.
    b. As each car arrives at the designated landing, it shall park out of service with its door(s) in the open position.

3. An illuminated signal marked "ELEVATOR EMERGENCY POWER" shall be provided in the elevator lobby at the designated level to indicate that the normal power supply has failed and the emergency power is in effect.
4. In the event an elevator fails to respond to a recall command within forty-five (45) seconds under Emergency Power Operation, that car shall be bypassed and the next car in the sequence shall be recalled.
5. Upon completion of the recall process, one or more elevators shall be automatically selected to run on the emergency power source. Where more than one (1) elevator can operate on emergency power simultaneously, the Contractor shall coordinate the maximum number of elevators with Owner.
6. Duplicate existing and coordinate the sequence of automatic recall operation of the elevators with the Owner.
7. Interlock all elevators to allow to operate the maximum number of elevators at a time (elevators No.1, No.2).
8. The main lobby landing hall station shall contain an indicator light that becomes illuminated whenever a transfer to emergency power takes place.
9. A key-operated override switch, manual selector switch shall be provided in the main lobby hall station.

    a. Activating the key-operated override switch while on emergency power shall cancel the previously mentioned automatic recall sequence and allow positioning of the manual selector switch to select a car for operation.

10. Prior to return to normal power, the building ATS shall provide a "pre-transfer" signal to the elevator equipment that will initiate the landing of elevators prior to transfer from emergency power to normal power.

    a. Timer of the pre-transfer signal shall be adjustable from 15 to 30 seconds.

11. The following additional requirements apply:

a. Firefighters' Service Operation will remain active at all times during emergency power operation but limited to the elevator selected to be in operation.
b. All car lighting will remain active with car lighting on separate emergency power feeders in addition to battery back-up.
c. Communications will remain active all times via emergency power feeders in addition to battery back-up.
d. Remote monitoring will be active from each group dispatcher for selected elevators using an uninterrupted power supply (UPS) to maintain the central processing unit during power transfers.
e. Position indicator for each elevator will be active in the selected elevator and security room (where applicable), as well as lobby display panels.

12. Testing of elevators under emergency power shall be accomplished with the building ATS providing necessary "pre-transfer" signals to the elevator control apparatus.

a. Prior to testing, the building ATS shall provide a "pre-transfer" signal to initiate the landing of the elevators prior to the transfer from normal to emergency power.
b. After testing, the building ATS shall provide a "pre-transfer" signal to initiate the landing of the elevators prior to the transfer from emergency to normal power.

13. Where modernization of elevators is to be performed in phases, emergency power operation shall be tested by the building personnel upon completion of each individual elevator, after regular business hours. Contractor shall provide all necessary labor and include all corresponding overtime cost in the base bid.

K. Emergency Power / Power Regeneration Control (New)

1. The elevator control system shall be provided with a means to divert regenerated power when operating on a "Co-Generation" Emergency Power system, or any system using an "inverter" to produce Alternating Current for the elevator system. Comply with ASME A17.1 Rule 2.26.10

a. Upon receipt of a signal provided by others, the control system shall redirect regenerated power, produced by the elevator system, from the building main line wiring to a bank of resistors.
b. Resistors used for the absorption and dissipation of the regenerated power may be the same resistor bank used for dynamic braking of the elevator.
c. Resistors shall be of the correct power rating and properly isolated/insulated from the controller steel frame.

L. Floor Lockout Feature / Keyless - Card Reader Control / Wiring Provisions (New)

1. Wiring: Provide six (6) pair of 20 gauge two (2) flexible conductor low voltage cables with an overall braided shield in the traveling cable of all elevators for card reader interface.

    a. The cables shall extend from the security interface terminal cabinet in the elevator machine room to behind the elevator return panel above the space allotted for the card reader.
    b. Terminate the cable to dual screw barrier terminal strips on each end.

2. Card Reader Space: Allocate card reader space provisions behind COP in each main car station as directed by the Owner or Consultant.
3. Interface: For floor programmable card access control in all elevators, provide a pair of terminals for all floors such that application of a momentary dry (no voltage present) contact closure across those terminals by the security system shall enable the selection of the corresponding floor from the floor selector button in the elevator cab.

    a. Locate the terminals inside an interface terminal cabinet in the elevator machine room.
    b. Provide all relays required to interface the elevator control system to the momentary dry contact closures provided for under another section of these specifications.
    c. If applicable, the card reader shall be operable and compatible with the issued card keys used building wide.
    d. Coordinate system requirements with the manufacturer of the issued card key system.

4. Card Reader "Secure/Bypass" Switch: Provide separate card reader control bypass key switches for each elevator.

    a. The bypass key switches shall be located in the elevator service cabinet.
    b. The bypass key switches shall be a maintained contact type key switch with the key removable in the secure or bypass position.

        1) When the key switch is in the secure position, the card reader control mode shall be initiated.
        2) When in the bypass position, the card reader control mode shall be bypassed and the elevator shall return to normal operation, permitting free access to any floor.

5. The card reader operation shall bypass floor cut-out switches.
6. Firefighters' Service Operation shall override Floor Lockout Feature.
7. Card readers provided by others. Coordinate requirements and installation with Convergint (Access Control), Michael Thellman (443) 463-0196, Michael.thellman@convergint.com

M. CCTV Camera / Wiring Provisions (New)

1. Wiring: Provide two (2), RG-59U stranded center conductor coax cables and one (1), two (2) conductor 20 gauge stranded, low voltage cable with an overall braided in the traveling cable of all elevators for CCTV Camera interface.

    a. The cables for the CCTV camera shall extend from the elevator / security interface terminal cabinet in the elevator machine room to the top of the elevator cab. Provide an excess loop of 10 feet of cable at each end.
    b. Provide one (1) 120V duplex unswitched outlet dedicated to security on top of each elevator.

N. Car to Lobby Operation (New)

1. Provide a key-operated Car-to-Lobby feature.

    a. Provide a three-position key-operated switch for each elevator in the main lobby landing hall station to activate the Car-to-Lobby operating feature.

2. When engaged, this feature shall:

    a. Cause the affected elevator to return non-stop to the lobby after it has discharged all registered car calls.
    b. Open the door upon arriving at the lobby for approximately ten (10) seconds, after which the elevator shall park out of service with the door closed.
    c. Maintain door open button function during the interval in which the car is out of service.

3. Returning the key-operated switch in the main landing hall station to the "on" position shall restore the car to normal operation.
4. Override the Priority Service feature with Firefighters' Service in accordance with code and local law.

O. Door Operation (New)

1. Car and hoistway doors shall be arranged to operate in unison without excessive noise or slamming in either direction of travel.

    a. Door opening speeds of two (2) feet per second shall be provided in conjunction with closing speeds of 1.0 foot per second in accordance with governing code.
    b. Door operation shall commence as the car stops level at the floor and the machine brake is applied. Pre-door opening shall not be permitted.

2. Where the hoistway door and the car door are mechanically coupled, the kinetic energy of the closing door system shall be based upon the sum of the hoistway and the car door weights, as well as all parts rigidly connected thereto, including the

rotational inertia effects of the door operator and the connecting transmission to the door panels.

3. The force necessary to prevent closing of the car and hoistway door from rest shall not exceed thirty (30) lbf. This force shall be measured on the leading edge of the door with the door at any point between one-third and two-thirds of its travel.
4. Door open and door close time shall be measured between the moment car door operation in either direction begins and the instant at which that cycle is completed.
5. When responding to either a car or corridor call, the amount of time that the elevator door remains stationary in the open position shall be adjustable up to sixty (60) seconds.

    a. Door open dwell time for a corridor call shall be separate of that for a car call, and in both cases, dwell time shall be canceled whenever the car door protection device is momentarily interrupted by passenger transfers, followed by a reduced door open dwell time of approximately one (1) second (adjustable) after the door protection device is cleared of obstructions.

6. The operation of the door protective device by interruption of one or more infrared light beams (dual or multi-beam non-contact) during the close cycle shall cause the immediate reversing of the doors to the full open position.
7. The door closing cycle shall be arranged so that, in the event the door protective devices become continually obstructed after the normal door open dwell time has expired, and following a time interval of approximately thirty (30) seconds (adjustable), a warning tone shall sound and the door closing cycle shall commence at reduced speed and torque per applicable Code requirements.
8. Each car operating station shall be provided with a “door open” and “door close” push button.

    a. Pressure on the “door open” button shall cause doors in the full open position to remain so and doors engaged in the close cycle to reverse direction and assume the full open position so long as pressure remains applied to the button.
    b. The “door open” buttons shall also control the open cycle during Phase II - Emergency In-car Operation.
    c. The “door close” push button shall function on Independent Service, Attendant Service and Phase II - Emergency In-car Operation as well as during normal automatic operations.

9. Each car operating station shall be provided with a “door hold” push button.

    a. Pressure on the “door hold” button shall cause doors in the full open position to remain in the open position and doors operating in the close cycle to reverse direction and travel to the full open position for an extended (adjustable) period of time to allow for loading and unloading.
    b. The “door hold” feature shall be overridden when the elevator is on Fire Emergency Phase I and Phase II.

c. The “door hold” feature shall be canceled when the “door close” button is pressed.

10. Repeated attempts by the power door operator to open or close the door at any landing shall be monitored by the control system.

    a. In the event the door fails to cycle properly after a preset (adjustable) number of attempts, the car shall either travel to the next stop or remove itself from service, depending upon whether the malfunction is in the open or close cycle.

11. Each hoistway door shall be provided with an automatic self-closing mechanism arranged so that the door shall close and lock if the car should leave the landing while the hoistway door is unlocked.
12. Car doors shall be arranged to prevent their being manually opened from inside the car unless the elevator is positioned within a floor landing zone.

## 2.4 MACHINE ROOM / SECONDARY EQUIPMENT

A. Control Equipment (New)

1. The elevator shall have microprocessor-based controller/dispatcher.
2. Digital logic shall calculate optimum acceleration, deceleration and velocity patterns for the car to follow during each run.
3. Closed-loop distance and velocity feedback shall monitor the actual performance of the elevator car with the desired speed profile.
4. System operating software shall be stored in non-volatile memory.
5. Elevator control relays, contactors, switches, capacitors, resistors, fuses, circuit breakers, overload relays, power supplies, electronic circuit boards, microprocessors, static motor drive units, wiring terminal blocks and related components shall be totally enclosed inside a free-standing metal cabinet with hinged access doors.

    a. Provide natural or mechanical ventilation for the controller cabinets.
    b. Equip the vent openings and exhaust fans with filters.

6. Mount equipment to moisture-resistant, noncombustible panels supported from the steel frame.
7. Provide "noise filter" between hoistway wiring and controller/dispatchers to eliminate interference.
8. Optically isolate communication cables between components.
9. Wiring: Wiring on the units, whether factory or field wiring, shall be done in neat order, and all connections shall be made to studs and/or terminals by means of grommets, solderless lugs or similar connections. All wiring shall be copper.
10. Terminal Blocks: Provide terminal blocks with identifying studs on units for connection of board wiring and external wiring.

11. Marking: Identifying symbols or letters shall be permanently marked on or adjacent to each device on the unit, and the marking shall be identical with marking used on the wiring diagrams. In addition to the identifying marks, the ampere rating shall be marked adjacent to all fuse holders.
12. The manufacturer's standard on-board "LCD" display shall be incorporated on the main processor board and/or otherwise incorporated in the controller cabinet. The "LCD" shall be capable of providing alpha-numeric characters to view the operational status of the elevator and/or group functions depending on the application. The display shall provide the user with necessary information for troubleshooting and reprogramming of the basic system parameters.

    a. Where the "LCD" is not an integral part of the controller and troubleshooting/reprogramming requires the use of a separate tool, the tool shall be maintained in the machine room and accessible to service personnel. This tool, along with all technical documentation for the correct use of the tool, shall remain the property of the Owner.
    b. Password protection of critical programming features is required to prevent accidental changes to life-safety and other non-typical control settings.
    c. Where a separate dispatch or group control panel is provided, a separate "LCD" display shall be provided to view group functions.

13. In the event diagnostics and monitoring is accomplished via Field Service Tools, provide the required Field Service Tools with related control system appurtenances for diagnostic evaluations, system monitoring and field adjustments.

    a. Provide instructions for proper use of such diagnostic tools and/or equipment with all coding and other operational requirements.
    b. Maintain and calibrate the diagnostic tools and update the associated instructions and other related documents under the service agreement.

        1) Should the agreement be cancelled for any reason by either party, maintenance and updating of diagnostic tools shall be provided to the Owner at the Contractor's cost without the need to purchase or lease additional diagnostic devices, special tools or instructions from the original equipment provider.
        2) The Owner may request field and technical instructions be provided by the original installation contractor or manufacturer for proper servicing by other qualified elevator company personnel.
        3) The established cost-plus profit as previously specified, shall be applicable for the life of the system.

            a) If the equipment for fault diagnosis is not completely self-contained within the controllers but requires a separate detachable device, that device shall be furnished to the Owner as part of this installation.
            b) Such device shall be in possession of and become property of the Owner.

14. Building Automated Control Network (BAS).

    a. The Virginia controller (Vision 2.0) shall include BACnet modules and be capable of seamless integration with the existing University of Baltimore building automated control network (BAS).
    b. Connections and equipment from elevator controller to BAS system by Siemens. Coordinate requirements and installation with Siemens, Dave Lawson (443) 324-9505, dave.lawson@siemens.com

15. Microprocessor Documentation

    a. Provide and/or obtain complete information on systems' design, component parts, installation and/or modification procedures, adjusting procedures and associated computer conceptual logic circuitry and field connection.

B. Machine Beams (Existing/New)

1. Provide additional support beams, angles, plates, bearing plates, blocking steel members, etc., to support new machine, governors, dead end hitches, deflector and overhead sheaves from existing machine beams where applicable.
2. Contractor shall verify adequacy of all existing supports scheduled to be reused and report any potential issues to the Owner.

C. Gearless Elevator Hoisting Machine (New – Elevators No.1, No.2)

1. Provide alternating current (AC) gearless traction machine, specially designed and manufactured for elevator service. The machine shall have high starting torque and low starting current, rated for $50^0$ C ($90^0$ F) continuous operation.

    a. The traction driving sheave and brake drum shall be cast integral and bolted securely to the main armature shaft.
    b. Securely mount the machine frame, including motor fields, bearing stands and brake on a heavy steel bedplate.
    c. The armature shaft shall be supported in ball or roller type bearings.
    d. The driving sheave shall be cast from the best grade of metal with a Brinell hardness of 215 to 230 and shall be machined with grooves, providing maximum traction with a minimum of rope and sheave wear.

        1) Roping requirements and type of steel rope used as suspension means shall be engineered by the contractor and manufacturer of the equipment for maximum life of ropes and sheave.

    e. Ensure that adequate ventilation of internal stator windings and rotating element is provided to prevent overheating with thermal overload protection. (Constant velocity fan for constant cooling.)
    f. Equip housing with eyebolt(s) for lifting.

g. Provide a spring applied and electrically released electro-mechanical brake.
h. Swivel type brake shoes shall be applied to the braking surface simultaneously and with equal pressure by means of helical compression springs.
i. Design the brake for quick release to provide smooth and gradual application of the brake shoes.

1) An emergency brake shall be an integral part of the machine design.

j. Provide 14-gauge hoist cable guards at the car-drop and counterweight-drop side of the machine sheave.

1) Guards shall cover cables from the point of slab penetration to the point where the hoist cables contact the sheave.
2) Guards shall prevent access to cables at pinch points.
3) Guards shall have no sharp edges.
4) Guards shall be properly mounted to prevent vibration.

k. Provide machine room deflector sheaves with adequate steel blocking members to support the sheaves and machine assembly.
l. Provide additional support beams, angles, plates, bearing plates, blocking steel members, etc., to support new machine, governors, deflector and overhead sheaves from existing machine beams if applicable. Contractor is required to verify adequacy of existing machine support and report same to the Owner.
m. Contractor is responsible for all engineering. Professional engineers' stamp(s) and notching existing beams (if required).
n. Where a secondary level exists, span the distance between the car and counterweight with an accurately grooved deflector sheave mounted in the secondary level.
o. Provide a sheave guard to prevent hoisting rope from jumping off grooves and to prevent possible entrapment on both sides of the floor penetrations.
p. Design and construct the hoisting machine based on passenger elevator cab enclosure weight and selected cab interior design.

D. Geared Traction Machine / Sheaves / Brake (New – Elevator No.3)

1. Provide a worm-geared traction machine with a direct current brake and demountable drive sheave, mounted in proper alignment on a common bedplate.
2. The worm shall be accurately machined from steel and provided with a single end, double race ball bearing thrust.
3. The worm gear shall be made from a phosphor bronze rim, accurately cut, fitted and bolted to a cast iron spider.
4. The drive sheave shall be a demountable casting from the best grade of metal with a Brinell hardness of 215 to 230, and shall be machined with grooves, providing maximum traction with a minimum of rope and sheave wear.

a. Roping requirements and type of steel rope used as suspension means shall be engineered by the contractor and manufacturer of the equipment for maximum life of ropes and sheave.

5. Provide means for lubricating the machine.
6. The gear housing shall have a gasketed hole to inspect the gear.
7. Provide machine with an electro-mechanical brake.

   a. The brake shall be spring applied and electrically released where drum or disk-type brakes are employed.
   b. Design the brake electro-magnet for quick release and application of the brake.
   c. The brake lining material shall be non-asbestos.
   d. The brake pulley or disk shall act as the coupling between the drive motor shaft and the worm shaft.

8. Provide a raised machine arrangement so that the new deflector sheave is located above the machine room slab. Provide adequate steel blocking members to support the machine assembly.
9. Provide sheave guards to prevent ropes from jumping off of the sheave grooves.
10. Provide hoist cable guards at the car and counterweight-drop side of the machine sheave.

    a. Guards shall cover cables from the point of slab penetration to the point where the hoist cables contact the sheave.
    b. Guards shall prevent access to cables at pinch points.

11. Provide hoisting machine based on elevator total car weight and interior finishes including flooring selected**.**

E. AC Drive Motor / Geared Applications (New – Elevator No.3)

1. Provide a vector duty, variable speed, reversible alternating current induction motor with high starting torque and low starting current, rated for 50$^{o}$ C (122$^{o}$ F) during continuous operation, designed for this particular elevator application.

   a. Provide adequate ventilation of internal stator windings and rotating element to prevent overheating. (Constant velocity fan for constant cooling.)
   b. Provide thermal overload protection of the stator windings.

2. The hoist motor housing shall have a rigid cast iron stator frame.

   a. Core plate stator laminations shall be press fit into frame and properly secured.
   b. Minimum class “F” (or approved equal) insulation shall be used to ensure long-term reliability.

3. The rotating element shall be fabricated from drawn bars machined and fitted in slots with end rings brazed together and shall be dynamically balanced for vibration-free operation. The motor shaft shall be manufactured from high-strength alloy steel for maximum strength.
4. Provide a motor coupling machined for proper fit on motor shaft with slotted keyway and key to properly secure same for standard NEMA mounted construction (foot or footless).
5. Properly align the hoisting motor to the hoisting machine for vibration-free operation.
6. The motor shall have proper labeling in accordance with the requirements of the AHJ.

F. Deflector Sheaves Hoist Machined (New)

1. Provide hoisting machine wire rope deflector sheaves with related apparatus and structural mounting supports.

    a. Locate and size new sheave to maximize use of available clearances maintaining the present car and counterweight hitch drops.
    b. New support bearings shall be of a roller type designed for a minimum of twice the total load calculation.
    c. The sheaves shall be equipped with suitable lubrication devices.
    d. The deflector sheave shall be provided with means to guard the hoist ropes so they do not jump out of their respective grooves during a slack rope condition.
    e. Provide a raised machine arrangement so that the new deflector sheave is located above the machine room slab. Provide adequate steel blocking members to support the machine assembly.

G. VVVF AC Drive (New)

1. Provide a solid-state, variable voltage, variable frequency (VVVF), 3-phase AC hoist motor drive system as part of the microprocessor-based equipment.

    a. VVVF drive system shall be a low-noise, flux-vector inverter device.
    b. Include a digital LED readout and touch-key pad to facilitate software parameter adjustments, monitor system operation and display fault codes.

2. The drive shall utilize a 3-phase, full wave rectifier and capacitor bank to provide direct current power for solid-state inversion.
3. The inverter shall utilize IGBT power semiconductors and duty cycle modulation fundamental frequency of not less than one kilohertz to synthesize 3-phase, variable voltage variable frequency output.
4. The system shall be designed and configured with the following countermeasures for noise generated by the pulse-width modulated (PWM) inverters.

    a. Control of radiated noise via inverter and/or motor cables.

b. Conducted noise through power lines.
c. Induction noise and ground noise.

5. Inverter shall be encased in metal and independently grounded.
6. A noise filter for the input power line shall be provided to prevent penetration into radios, wireless equipment and smoke detectors.
7. A 3% three-phase line reactor shall be provided on the power system rated at the utility voltage input to the drive and sized for the rated drive current.
8. The drive shall:

   a. Be configured as a complete digital drive system.
   b. Be totally software configurable.
   c. Interface with external equipment/signals via either discrete local I/O connections or high speed Local Area Network (LAN).
   d. Be located within the limits of the control cabinet (where system size allows) or separately mounted in an appropriate chassis with hinged swing-out doors with clearances equal to the cabinet width dimensions.
   e. Provide programmable linear or S-curve acceleration.
   f. Provide free run or programmable linear or S-curve deceleration.
   g. Have controlled reversing.

9. Operating and Environmental Conditions:

   a. Have a service factor of 1.0.
   b. Rated for continuous duty.
   c. Humidity - 90% rated humidity non-condensing.
   d. Cooling - forced air when required.
   e. Digital display for:

      1) Running - output frequency, motor RPM, output current, voltage.
      2) Setting - Parameters values for setup and review.
      3) Trip - separate message for each trip, last thirty (30) trips to be retained in memory.

10. Protective Features:

    a. Motor overspeed.
    b. Adjustable current limit.
    c. Isolated control circuitry.
    d. Digital display for fault conditions.
    e. Selectable automatic restart at momentary power loss.
    f. Manual restart.
    g. Over/Under Voltage.
    h. Line to line and line to ground faults.
    i. Over-temperature.

H. VVVF AC Drive - Regenerative Module (New)

1. The system shall provide full regenerative capabilities to control overhauling motor speed and reduce hoist motor deceleration time by allowing overhaul power to be discharged back into the power lines.

    a. The regenerative section may be an integral part of the drive or a stand-alone unit mounted in a separate cabinet with proper ventilation as required by the manufacturer.

I. Overspeed Governor (New)

1. Provide a speed governor, located overhead, to operate the car safety.

    a. Maintain the proper tension in the governor rope with a weighted tension sheave located in the pit.

        1) Springs used to develop the tension are not acceptable.

    b. Provide rope grip jaws, designed to clamp the governor rope to actuate the car safety upon a predetermined overspeed downward.

        1) The centrifugal type governor shall trip and set rope jaws within 60 degrees of governor sheave rotation after reaching rated tripping speed.

    c. Design the governor rope tripping device so that no appreciable damage to or deformation of the governor rope shall result from the stopping action of the device in operating the car safety.
    d. Provide an electrical governor overspeed protective device which shall remove power from the driving machine motor and brake before or at the application of the safety.

        1) The setting for the overspeed switch shall be as prescribed in the ASME A17.1 Safety Code.
        2) Locate and enclose the switch to ensure that excess lubrication will not enter the switch enclosure.
        3) Overspeed switch shall operate in both direction of travel on systems employing a static power drive unit.

    e. Seal and tag the governor with the running speed, tripping speed and date last tested.
    f. Design the governor to prevent false tripping due to conditions caused by rope dynamics.

J. Equipment Isolation (New)

1. Provide sound reducing vibration isolation elements at all support points of elevator controller, solid-state motor drives, isolation transformers, reactance units, hoisting motors and machines.
2. The elements for controllers, solid-state motor drives and isolation transformers shall be similar to double deflection neoprene-in-shear mounts, as manufactured by Mason Industries, Type ND, with 0.35" static deflection under design load ratings.
3. Elements between the hoisting machine unitized base and machine support beams shall be similar to triple layer ribbed neoprene pads, separated by appropriate steel shims as manufactured by Mason Industries, Type W pads, at 50 durometer, loaded for 40 psi or approved equal.
4. All bolts through isolation elements, where necessary, are to incorporate resilient washers and bushings.
5. Isolation of hoisting machine and motor is contingent on the OEM design of the apparatus.

K. Emergency Brake (New)

1. Ascending Car Overspeed Protection Device

   a. Provide a device designed to prevent an ascending elevator from striking the hoistway overhead structure.
   b. The device shall decelerate the car with any load up to the rated capacity by applying an emergency brake.

      1) The device shall detect an ascending car overspeed condition of not greater than 10% higher than the speed that the car governor is set to trip.
      2) The device, when activated, shall prevent operation of the car until the device is manually reset.
      3) The device shall meet the requirements of the ASME A17.1 Safety Code as may be modified by the AHJ.

2. Unintended Car Movement Protection Device

   a. Provide a device to prevent unintended car movement away from the landing when the car and hoistway doors are not closed and locked.

      1) The device shall prevent such movement in the event of failure of:

         a) The electric driving machine motor.
         b) The brake.
         c) The machine shaft or shaft coupling.
         d) Machine gearing.
         e) Control system.
         f) Any component upon which the speed of the car depends.

g) Suspension ropes and the drive sheave of the traction machine are excluded.

2) The device shall prevent operation of the car until the device is manually reset.
3) The device shall meet the requirements of the ASME A17.1 Safety Code as may be modified by the AHJ.

3. Where the installation of the Emergency Brake involves the raising of existing hoisting machines or modifications to the machine room slab, the contractor shall provide necessary engineering data, structural review and drawings as part of the submittal process.

## 2.5 HOISTWAY EQUIPMENT

A. Guide Rails / Inserts / Brackets (Reuse/Refurbish)

1. Car and counterweight guide rails, fishplates, rail brackets, backing support and related attachments shall be inspected to determine if unfavorable conditions exist that diminish the structural integrity of any component.

a. In the event substandard conditions are disclosed by means of this inspection, the Contractor shall immediately inform the Consultant as to the exact nature of said problems and then undertake whatever repairs and/or replacements the Consultant may deem appropriate to remedy the situation.

2. Each stack of guide rails shall be individually examined to determine if excessive compression has occurred from building settlement.

a. In the event such conditions are found to exist, each affected stack shall be cut off enough to relieve pressure.
b. Jacking bolts shall be provided underneath each stack of both car and counterweight guide rails.

3. Surface rust shall be removed from all reused components and painted with a rust inhibitive primer/paint.
4. Each stack of guide rails shall be realigned so that total deviation from plumb in any direction does not exceed 1/8” over the entire length of the hoistway and that DBG measurements never vary more than .030”.
5. As required, car guide rails joints shall be individually filled, filed and sanded in order to eliminate minor variations in adjoining machined surfaces.

B. Counterweight Assembly (Reuse/Refurbish)

1. The existing counterweight assembly shall be refurbished to as new condition and reused.

2. Individual counterweight frame members shall be inspected for any indication of damage and to determine if the overall assembly is twisted, racked, or otherwise distorted.

    a. All fastenings between counterweight frame members shall be individually examined, tightened and if necessary renewed.
    b. In case any of these conditions are found to exist, the Contractor shall immediately inform the Consultant about the exact nature of the problem and undertake whatever corrective action the Consultant may deem appropriate to remedy the situation.

3. Surface rust shall be removed from counterweight assembly and painted with a rust inhibitive primer/paint.
4. The amount of filler weight placed within the counterweight frame shall be adjusted so the weight of the entire counterweight assembly is equal to that of the renovated elevator car, plus forty to forty-two percent (40-42%) of its rated loading capacity unless otherwise required by a manufacturer where new hoisting machinery is employed.

    a. Filler weights shall be held securely in place at all times with tie rods passing through holes in both the weights and the counterweight frame with tie rods secured on each end with double lock nut and a cotter pin arrangement.

C. Roller Guides (New)

1. Provide roller guide shoes with adjustable mounting base, rigidly bolted to the top and bottom of each side of the car and counterweight frame.

    a. Roller guides shall consist of a set of sound reducing wheels in precision bearings held in contact with the three (3) finished rail surfaces by adjustable stabilizing springs.
    b. The bearings shall be sealed or provided with grease fittings for lubrication.
    c. Equip roller guides with adjustable stops to control postwise float.
    d. Fit the top car roller guides with galvanized, painted or powder coated steel guards.

2. Approved applications and manufacturers:

    a. Elevators No.1, No2: ELSCO Model B for car roller guides and ELSCO Model D for counterweight guides, or approved equal.
    b. Elevator No.3: ELSCO Model A for car roller guides and ELSCO Model C for counterweight guides, or approved equal

3. Roller guides shall not be installed on counterweight frames where traveling buffers with separate guide shoes are employed and lubrication of the rails is necessary for proper guide operation.

4. Roller guides shall not be installed on counterweight frames where counterweight safeties are employed and prevailing conditions prohibit installation due to limitations in clearances or in cases where rollers will interfere with the operation of the safety plank.

D. Hoist Ropes (New)

1. Pre-formed traction steel wire rope, specifically constructed for elevator applications, shall be provided for suspension of the elevator car and counterweight assembly.

    a. Fastenings shall be accomplished by use of individual tapered rope sockets (wedge clamp) with adjustable shackles.
    b. General design requirements for rope shackles and the method of securing wire rope shall conform with ASME A17.1 elevator safety code as modified by, and/or in addition to codes and standards accepted by the AHJ.

2. New ropes shall be identical in number and construction to those which are currently in use.
3. Broken rope shackle springs shall be replaced on an as needed basis.
4. New rope shackles shall be provided.
5. Existing hitch plates shall be inspected for wear. Hitch plates with elongated holes or other conditions that may damage shackles shall be replaced with new.
6. Provide anti-spinout as required by applicable code at all shackles where applicable.

E. Governor Rope (New)

1. Pre-formed wire rope specifically constructed for elevator applications, shall be provided for governor ropes.

    a. Rope shall be traction steel or iron in accordance with OEM design requirements.
    b. Rope diameter and method of fastening shall be in accordance with ASME A17.1 Safety Code as adopted and/or otherwise modified by the AHJ.

F. Electrical Conduit / Wiring / Traveling Cable (New)

1. Electrical wiring shall be provided.

    a. All wiring shall be stranded copper conductors, manufactured in compliance with ANSI/ASTM B174-71 and UL 62 requirements, and polyvinyl chloride insulation complying with ETT requirements of UL 62 and Article 400 of the National Electric Code.
    b. Electrical wiring provided for hoistway interlock shall be of a flame retardant type, capable of withstanding temperatures of at least 392 degrees Fahrenheit. Conductors shall be Type SF or equivalent.

c. Each run of electrical conduit or duct shall contain no less than 20% spare wires and, in any case, no fewer than two (2) spare wires.
d. Crimp-on type wire terminals shall be used where possible.

2. Traveling cable shall be provided.

a. Each traveling cable shall be provided with a flame and water resistant polyvinyl chloride jacket.
b. Electrical wiring shall consist of stranded copper conductors, manufactured in compliance with ANSI/ASTM B174-71 and UL 62 requirements, and polyvinyl chloride insulation complying with ETT requirements of UL 62 and Article 400 of the National Electric Code.
c. Each traveling cable shall contain no less than 10% spare wires.
d. Traveling cable exceeding 100’ in length shall be provided with a steel wire rope support strand from which the cable shall be suspended.
e. Traveling cable must be contained within an approved electrical conduit to within 6’ of the final suspension point in the hoistway.
f. Each traveling cable shall be arranged to provide no fewer than six (6) individually shielded pairs of 20 gauge wire and arranged to contain no less than two (2) coaxial cables for CCTV remote monitoring provisions.
g. Traveling cable conductors that terminate at a hoistway center box shall be connected to stud blocks provided for that purpose.

1) Each wiring terminal shall be clearly identified by its nomenclature as shown on the “as built” wiring diagrams and solderless, crimp-on type wire terminals shall be used where possible.

h. The attachment of a traveling cable to the underside of the elevator car shall be performed so that a minimum loop diameter of 30x the cable diameter is provided.
i. Pre-hang the cables for at least twenty-four (24) hours with ends suitably weighted to eliminate twisting during operation.

3. Rigidly supported EMT conduit, flexible metal conduit and galvanized steel trough shall be utilized throughout the hoistway.

a. Both EMT and flexible conduit shall be connected on either end by use of compression fittings and secured in place with metal clamps sized in accordance with the diameter of conduit utilized.

1) Wire or plastic wire ty-raps shall not constitute an acceptable means of fastening.

b. The use of flexible metal conduit shall be limited to runs not greater than three feet (3’) in length.
c. All abandoned or unused electrical conduit shall be removed from the hoistway and machine room.

d. Existing conduit and wiring duct may be reused if suitable for the application. Reuse of existing conduit/duct shall be at the discretion of the Consultant.

G. Normal and Final Terminal Stopping Devices (New)

1. Provide normal terminal stopping devices to stop the car automatically from any speed obtained under normal operation within the top and bottom overtravel, independent of the operating devices, final terminal stopping device and the buffers.
2. Provide final terminal stopping devices to stop the car automatically from the speed specified within the top clearance and bottom overtravel.
3. The terminal stopping devices shall have rollers with rubber or other approved composition tread to provide silent operation when actuated by the cam fixed to the top of the car.

   a. Terminal stopping devices that are not mechanically operated (i.e.: magnetic proximity) shall be provided by the manufacturer of the control equipment, intended for use as a terminal limit, and designed for reliable operation in the hoistway environment.

4. Final terminal limits shall be pinned so as to prevent movement after final adjustment where required by the AHJ.

H. Emergency Terminal Stopping Device

1. Provide necessary emergency terminal stopping devices where static motor control is used at speeds over 200 feet per minute.

   a. Operation of the device shall be independent of the operation of the normal terminal stopping device.
   b. Arrange the device to remove power from the driving machine motor and brake should the normal terminal stopping device fail to cause the car to slow down at the terminal as intended.

## 2.6 PIT EQUIPMENT

A. Car and Counterweight Buffer (Reuse/Refurbish)

1. Existing car and counterweight buffers shall be reused.

   a. Pit channels, related supports and fastenings shall be inspected for damage and to determine if the structural integrity of any component is diminished by the effects of rust or other unfavorable conditions.

      1) In the event defects are found, the Contractor shall immediately inform the Consultant and undertake whatever repair and/or replacement the Consultant may deem appropriate.

b. Surface rust shall be removed from all reused components.
c. Apply two (2) coats of rust inhibitive primer/paint to pit channels, buffer springs and all reused components.
d. Buffer plungers shall be honed free of all surface rust and blemishes and provided with a protective coating of machinist bluing.
e. The hydraulic fluid reservoir on each buffer shall be drained, flushed and refilled with fresh oil. The grade and amount of fluid added to each buffer shall conform to O.E.M. specification.
f. Provide a permanent buffer marking plate which indicates the manufacturer's name, identification number, rated impact speed and stroke.
g. Provide a permanent data plate in the vicinity of the counterweight buffer indicating the maximum designed counterweight runby in accordance with ASME A17.1 as may be modified by, and/or in addition to codes and standards accepted by the AHJ.
h. The buffer shall undergo testing in accordance with ASME A17.1 Code as modified by, and/or in addition to codes and standards accepted by the AHJ.

B. Pit Stop Switch (New)

1. Where pit depth does not exceed 67", each elevator pit shall be provided with a push/pull or toggle switch that is conspicuously designated "EMERGENCY STOP" and located so as to be readily accessible from the hoistway entrance on the lowest landing served at a height of approximately 18" above the floor.

a. This switch shall be arranged to prevent the application of power to the hoist motor and machine brake when placed in the "OFF" position.

C. Ladders (Modify Existing or Provide New)

1. Provide the following secondary metal work in the pit.

a. Pit access ladders.

2. Modify the existing or provide new pit ladder per code requirements. The pit ladder shall have continuous steel flat bar side rails 12 mm (1/2") x 75 mm (3"), with eased edges, spaced a minimum of 400 mm (16") apart. Rungs shall be steel bars 18 mm (3/4") in diameter, spaced 300 mm (12") apart with top to have a non-slip surface. Rungs shall be located along centerline of side rails, located not less than 180 mm (7") from the nearest permanent object or structure. Plug weld and grind smooth on outer rails faces. Support each ladder at top and bottom and at intermediate points spaced not more than 1500 mm (60"). Extend side rails 1200 mm (48") above top rung.
3. Prime paint and apply two (2) coats of rust inhibiting machinery enamel to metal work specified above as approved by the Consultant.

D. Governor Rope Tension Assembly (New)

1. Provide a governor rope tension assembly.

a. Maintain the proper tension in the governor rope with a weighted tension sheave located in the pit.

1) Springs used to develop the tension are not acceptable.

b. The sheave shall be of proper diameter and set directly plumb with the governor rope drop to prevent the rope from pulling off of the sheave at an angle.
c. Lubrication fittings shall be provided on the assembly.
d. The assembly shall have necessary rope guards to prevent accidental contact of the rope/sheave by service personnel and to prevent the governor rope from jumping off of the sheave.

## 2.7 HOISTWAY ENTRANCES

A. Hoistway Entrances (Reuse/Refurbish)

1. Hoistway entrances (jambs and head sections) shall be electrostatically painted on all floors in color as selected by Owner's representative.
2. Hoistway entrance sills, sill supports, entrance frames, headers and header supports shall be reused and refurbished.

a. Hoistway entrances that have become distorted or bent shall be straightened, plumbed, reset to the proper width dimension and reinforced as necessary.
b. Provide 14-gauge steel fascia plates that extend at least the full width of the door and be secured at hanger support and sill with oval head machine screws.

1) Reinforce fascia to allow not more than ½" of deflection.
2) Provide fascia plates where the clearance between the edge of the loading side of the platform and the inside face of the hoistway enclosure exceeds the code allowed clearance.

c. Provide 14-gauge steel toe guards that extend 12" below any sill not protected by fascia.

1) The toe guards shall extend the full width of the door and shall return to the hoistway wall at a 15-degree angle and be firmly fastened.

d. Remove oil, dirt and impurities on new and existing apparatus and give a factory coat of rust inhibitive paint to all exposed surfaces of struts, hanger supports, covers, fascias, toe guards, dust covers and other ferrous metal.

B. Slide Type Hoistway Entrance Door Panels (Reuse/Refurbish) Retain Existing or New

1. Hoistway entrances door panels shall be electrostatically painted on all floors in color as selected by Owner's representative.
2. Hoistway entrance door panels shall be reused and refurbished.

    a. Provide each door panel with two (2) removable laminated plastic composition guides, arranged to run in existing sill grooves with a minimum clearance.

        1) The guide mounting shall permit their replacement without removing the door from the hangers.
        2) A steel wear indicator shall be enclosed in each guide.

3. In multi-speed door arrangements, provisions shall be made to interlock the individual panels so all panels close should the normal door panel relating means fail.
4. Provide a special key so that an authorized person can open any landing door when the car is elsewhere.

    a. The key hole shall be not less than 3/8" in diameter and shall be fitted with a stainless steel or bronze ferrule to match related equipment.
    b. Where applicable, plug the abandoned hoistway door access hole in each door panel, secured from the hoistway side of the door, finished to match existing or as otherwise directed by the Owner/Consultant.

5. Where conditions warrant, or where otherwise required by code, equip all hoistway landing doors with one-piece full height non-vision wings of material and finish to match hall side of door panels.

C. Tracks / Hangers / Closers / Related Equipment (New)

1. Formed or extruded steel landing door hanger tracks shall be provided.
2. Each landing door panel shall be suspended from a pair of door hanger assemblies that are compatible with the hanger tracks.

    a. Hanger assemblies shall be directly mounted to the door panel using 3/8" diameter or better hardware.
    b. Solid steel blocks shall be used where job-site conditions dictate the use of spacers between hanger assemblies and the landing door panel.
    c. Hanger assemblies shall be adjusted or shimmed so that door panels are suspended in a plumb manner with no more than 3/8" vertical clearance to the cab entrance threshold.
    d. Upthrust rollers shall be adjusted for minimal operating clearance against the bottom edge of the hanger track.
    e. Means shall be provided to prevent hangers from jumping the track.

f. Blocks shall be provided to prevent rollers from overrunning the end of the track.

3. Each set of multi-speed center opening or side slide landing doors shall be provided with a sill-mounted spring closing mechanism with necessary door panel relating hardware.
4. In multi-speed door arrangements, provisions shall be made to interlock the individual panels so all panels close should the normal door panel relating means fail.
5. Each set of single speed side slide landing doors shall be provided with a sill-mounted spring closing mechanism.

   a. Spirator-type spring closers shall be acceptable should prevailing sill depth or runby clearance conditions require their use.

6. Where applicable, each hoistway door interlock assembly shall be provided with an emergency release mechanism utilizing manufacturers' standard type access key at all landings served.

   a. Drill each hoistway door to accommodate manufacturers standard lock release key and install escutcheon.

      1) Escutcheon shall be brushed stainless steel.

D. Interlocks / Unlocking Devices (New)

1. Each set of landing doors shall be provided with a complete electromechanical interlock assembly.

   a. Each interlock assembly shall consist of:

      1) A switch housing with contacts.
      2) Lock keeper.
      3) Clutch engagement/release subassembly.
      4) Associated linkages.

   b. Arrange the lock so that individual leading door panels (side slide or center opening) are locked when in the closed position.

2. Non-typical mounting arrangements for interlocks and/or related mechanisms must receive prior approval from the Consultant.
3. Each hoistway door interlock assembly shall be provided with an emergency release mechanism utilizing a drop-leaf type access key at all landings served.

   a. Each hoistway door shall accommodate manufacturers standard lock release key with escutcheon.

1) The key hole shall be fitted with a metal ferrule that matches the door finish.

E. Hoistway Door Bottom Guides / Safety Retainers (New)

1. The bottom of each side sliding type hoistway door panel shall be equipped with a minimum of two (2) guiding members.

   a. Metal mounting angles shall be secured to the integral panel frame structure; and when conditions warrant, additional external metal support plates or angles shall be installed to ensure the integrity of the panel frame is not compromised.
   b. Guides shall be manufactured of low friction non-metal material with sufficient strength to withstand forces placed on door panels per ASME A17.1 Standards.
   c. Each guide assembly shall incorporate a steel wear indicator and be so designed to permit sliding member replacements without removal of door panel(s) from top hanger devices.
   d. Panels shall be hung with a maximum vertical clearance of 3/8 inch between top of sill and bottom of panel and the guide shall engage the sill groove by not less than 1/4 inch.

2. The bottom of each side sliding type hoistway door panel shall be equipped with a guiding member safety retainer to prevent displacement in the event of primary guide means failure.

   a. A metal reinforcement (12 gauge stainless or galvanized steel) shall be installed between the two (2) primary guiding members (a.k.a. “Z” bracket).
   b. The reinforcement shall be designed with a minimum length of eight (8) inches or the maximum possible length that will fit between the primary members and a minimum overall height of two and one-half (2.5) inches secured on the internal face of the door panel. (Hoistway side)
   c. The retainer shall be set with the supplemental safety angle 3/8 inch into the corresponding sill groove; and be capable of preventing displacement of the panel no more than 3/4 inch with an applied force of 1125 lbf at right angles over an area twelve (12) inches x twelve (12) inches at the approximate center of the door panel.

## 2.8 CAR EQUIPMENT / FRAME

A. Car Frame (Reuse/Refurbish)

1. The existing car frame assembly shall be refurbished to as new condition and reused.

2. Individual car frame members, platform isolation framework, door operator support structure, related bracing and hardware shall be inspected for any indication of damage or distortion.

    a. Where damage is detected, the Contractor shall immediately inform the Consultant and then undertake corrective action deemed appropriate by the Consultant to remedy the condition.

3. Surface rust shall be removed from car frame and painted with a rust inhibitive primer/paint.
4. Provide new elastomer isolation pads for all existing platforms where pads are presently installed.
5. The car frame, door operator support and related bracing shall be modified or reconfigured as necessary in order to accommodate new cab enclosure and/or master door operating equipment specified herein.
6. The elevator car shall undergo static balancing upon substantial completion of all work described in the project specifications and subsequent to any car interior refinishing or cab replacement work performed in conjunction with the project.

B. Car Platform (Reuse/Refurbish)

1. The existing platform shall be modified to accommodate the new apparatus specified herein.

    a. Where necessary, the underside of platform shall be refurbished and treated with fire-rated material.
    b. Top of platform shall be refurbished with a marine grade plywood set to receive new finished floor covering as selected by Owner.

C. Car Safety (Reuse/Refurbish)

1. The existing governor actuated car safety device shall be retained, overhauled and upgraded for current code compliance.
2. Readjust safety for proper operation in accordance with current ASME A17.1 design standards.
3. Check the existing safety operated switch (plank-switch) for proper adjustment and operation.

    a. Provide a new plank-switch where none currently exists.

4. A new safety shall be provided where the existing is not suitable for reuse due to overall condition or in conjunction with an increase in the elevator speed or full load capacity.

D. Automatic Leveling / Releveling / Positioning Device (New)

1. Equip the elevator with a floor leveling device which shall automatically bring the car to a stop within 1/4" of any floor for which a stop has been initiated regardless of load or direction of travel.
2. This device shall also provide for releveling which shall be arranged to automatically return the elevator to the floor in the event the elevator should move below or above floor level in excess of 1/4".
3. This device shall be operative at all floors served and whether the hoistway or car door is open or closed provided there is no interruption of power to the elevator.
4. A positioning device shall be part of the controller microprocessor systems.

    a. Position determination in the hoistway may be through fixed tape in the hoistway or by sensors fitted on each driving machine to encode and store car movement.
    b. Design the mechanical features and electrical circuits to permit accurate control and rapid acceleration and retardation without discomfort.

5. Where there are consecutive floors/stops that are short stops, the system shall be capable of distinguishing between the two landing zones without error.
6. All equipment and logic required for leveling system to properly function with short stops shall be included.

E. Top-of-Car Inspection Operating Station (New)

1. An inspection operating station shall be provided on top of the elevator car.
2. This station shall be installed so that the controls are plainly visible and readily accessible from the hoistway entrance without stepping on the car.
3. When the station is operational, all operating devices in the car shall be inoperative.
4. Provide the following control devices and features:

    a. A push/pull or toggle switch designated "EMERGENCY STOP" shall be arranged so as to prevent the application of power to the hoist motor or machine brake when in the "off" position.
    b. A toggle switch designated "INSPECTION" and "NORMAL" to activate the top of car Inspection Service Operation.
    c. Push button designated "Up", "Down" and "Enable" to operate the elevator on Inspection Service (the "Enable" button shall be arranged to operate in conjunction with either the "Up" or "Down" button).
    d. An indicator light and warning buzzer that are subject to activation under Phase I - Fire Emergency Recall Operation.

F. Load Weighing Device (New)

1. Provide means to measure the load in the car within an accuracy of ± 4% of the elevator capacity.
2. Provide one of the following types of devices:

a. A device consisting of four (4) strain gauge load cells located at each corner of the car platform and supporting a free floating car platform and cab with summing circuits to calculate the actual load under varying conditions of eccentric loading.
b. A strain gauge device located on the crosshead, arranged to measure the deflection of the crosshead and thus determine the load in the car.
c. A device consisting of four (4) strain gauge load cells, supporting the weight of the elevator machine with summing circuits to calculate the actual load under varying conditions of load.
d. A device to measure the tension in the elevator hoist ropes and thus determine the load in the car.

3. Arrange that the output signal from the load weighing device be connected as an input to the signal and motor control systems to pre-torque of the hoisting machine motors where applicable.
4. Provide audible and visual signals in connection with the load weighing device when used as an "overload" device.

G. Car Enclosure Work Light / Receptacle (New)

1. The top and bottom of each car shall be provided with a permanent lighting fixture and 110 volt GFI receptacle.
2. Light control switches shall be located for easy accessibility from the hoistway entrance.
3. Where sufficient overhead clearance exists, the car top lighting fixture shall be extended no less than 24" above the crosshead member of the car frame.
4. Light bulbs shall be guarded so as to prevent breakage or accidental contact.

H. Emergency Exits / Top (Reuse/Refurbish)

1. Ensure they operate as per code and have proper electrical contacts and mechanical locks on the exterior of the cab enclosure.

I. Master Door Power Operator System – VVVF/AC (New)

1. Provide a heavy-duty master door operator on top of the elevator car enclosure for power opening and closing of the cab and hoistway entrance door panels.
2. The operator may be of the belted linear drive type (Elevators No.1, No.2) or pivot/lever drive type (Elevator No.3).
3. Operator shall utilize an alternating current motor, controlled by a variable voltage, variable frequency (VVVF) drive and a closed-loop control with programmable operating parameters.

a. System may incorporate an encoder feedback to monitor positions with a separate speed sensing device or an encoderless closed-loop VVVF-AC control to monitor motor parameters and vary power applied to compensate for load changes.

4. The type of system shall be designated as a high speed operator, designed for door panel opening at an average speed of two (2.0) feet per second and closing at approximately one (1.0) foot per second.

    a. Reduce the closing speed as required to limit kinetic energy of closing doors to within values permitted by ASME A17.1 as may be adopted and/or modified by the AHJ.

5. The door shall operate smoothly without a slam or abrupt motion in both the opening and closing cycle directions.

    a. Provide controls to automatically compensate for load changes such as:

        1) Wind conditions (stack effect).
        2) Use of different weight door panels on multiple landings.
        3) Other unique prevailing conditions that could cause variations in operational speeds.

    b. Provide nudging to limit speed and torque in conjunction with door close signaling/closing and timing devices as permitted by ASME A17.1 as may be adopted and/or modified by the AHJ. Nudging shall be initiated by the signal control system and not from the door protective device.

6. In case of interruption or failure of electric power from any cause, the door operating mechanism shall be so designed that it shall permit emergency manual operation of both the car and corridor doors only when the elevator is located in the floor landing unlocking zone.

    a. The hoistway door shall continue to be self-locking and self-closing during emergency operation.
    b. The door operator and/or car door panel shall be equipped with safety switches and electrical controls to prevent operation of the elevator with the door in the open position as per ASME A17.1 Code Standards.
    c. Provide zone-lock devices as required by ASME A17.1 as may be adopted and/or otherwise modified by the AHJ.

7. Construct all door operating levers of heavy steel or reinforced extruded aluminum members.
8. Belts shall be designed for long life and operate noise free.
9. All components shall be designed for stress and forces imposed on the related parts, linkages and fixed components during normal and emergency operation functions.

    a. All pivot points, pulleys and motors shall have either ball or roller-type bearings, oilite bronze bushings or other non-metallic bushings of ample size.

10. Provide operating data / data tag permanently attached to the operator as required by applicable code and standards.

J. Car Door Hangers / Tracks / Gate Switch (New)

1. Provide sheave type two-point suspension hangers and track for each car door.

    a. Sheaves shall be hardened steel, not less than 3-1/4 inches in diameter with sealed grease packed precision ball bearings.
    b. The upthrust shall be taken by a roller mounted on the hanger and arranged to ride on the underside of the track.

2. The track shall be of formed cold rolled steel or cold drawn steel and shall be rounded on the track surface to receive the hanger sheaves.

    a. The track shall be removable and shall not be integral with the header.

3. Provide a gate switch that mounts directly to the car door track.

    a. The gate switch shall prevent movement of the elevator until such time as it signals the control equipment that the car door has physically closed.

K. Car Door Panels (New)

1. Provide standard 1" thick, 14-gauge hollow metal flush construction panels, reinforced for power operation and insulated for sound deadening. Car door finish shall be satin-stainless steel No.4.
2. Paint the hoistway side of each panel black and face the cab side with 16-gauge sheet steel matching the existing returns or in selected material and finish as otherwise directed by Owner/Consultant.
3. The panels shall have no binder angles and welds shall be continuous, ground smooth and invisible.
4. Drill and reinforce panels for installation of door operator hardware, door protective device, door gibs, etc.

    a. Provide each door panel with two (2) removable laminated plastic composition guides, arranged to run in the sill grooves with minimum clearance.
    b. The guide mounting shall permit their replacement without removing the door from the hangers.

L. Door Reopening Device / "3D" (New)

1. Provide a combination infrared curtain and 3D door protection system.
2. The door shall be prevented from closing and will reopen when closing if any one of the curtain light rays is interrupted or should an object enter the 3D detection zone.
3. The door shall start to close when the protection system is free of any obstruction.
4. The infrared curtain and 3D zone protective system shall provide:

a. Protective curtain field not less than 71" above the sill.
b. 3D protective zone field not less than 61" above the sill.
c. Accurately positioned infrared lights to conform to the requirements of the applicable handicapped code.
d. Modular design to permit on board test operation and replacement of all circuit boards without removing the complete unit.
e. Self-contained, selectable 3D zone timeout feature to allow for closing at nudging speed with audible signal.
f. Automatic turning-off of the 3D zone in the event of three (3) consecutive 3D triggers.

1) Light curtain shall continue to operate after 3D system timeout.

g. Selectable control of the 3D zone operation on an "always-on" or "as doors close" basis.

h. Controls to shut down the elevator when the unit fails to operate properly.
i. Provide audible and visual notification of pending door close.

## 2.9 FINISH / MATERIALS / SIGNAGE

A. Material, Finishes and Painting

1. General

a. Cold-rolled Sheet Steel Sections: ASTM A366, commercial steel, Type B
b. Rolled Steel Floor Plate: ASTM A786
c. Steel Supports and Reinforcement: ASTM A36
d. Aluminum-alloy Rolled Tread Plate: ASTM B632
e. Aluminum Plate: ASTM B209
f. Stainless Steel: ASTM A167 Type 302, 304 or 316
g. Stainless Steel Bars and Shapes: ASTM A276
h. Stainless Steel Tubes: ASTM A269
i. Aluminum Extrusions: ASTM B221
j. Nickel Silver Extrusions: ASTM B155
k. Bronze Sheet: ASTM B36(36M) alloy UNS No. C2800 (Muntz Metal)
l. Structural Tubing: ASTM A500
m. Bolts, Nuts and Washers: ASTM A325 and A490
n. Laminated / Safety Tempered Glass: ANSI Z97.1

2. Finishes

a. Stainless Steel

1) Satin Finish: No. 4 satin, long grain.

b. Sheet Steel:

1) Shop Prime: Factory-applied baked on coat of mineral filler and primer.
2) Finish Paint: Two (2) coats of low sheen baked enamel, color as selected by the Owner or Consultant.
3) Steel Equipment: Two (2) coats of manufacturer's standard rust-inhibiting paint to exposed ferrous metal surfaces in both the hoistway and pit that do not have galvanized, anodized, baked enamel, or special architectural finishes.

3. Painting

a. Apply two (2) coats of paint to the machine room floor.
b. Apply two (2) coats of paint to the machine room walls.
c. Apply two (2) coats of waterproof paint to the pit floor and height of pit walls.
d. Surface rust shall be removed from all reused components and two (2) coats of rust inhibitive primer/paint applied, where indicated in the specifications.
e. Apply two (2) coats of clear lacquer to bronze or similar non-ferrous materials to prevent tarnishing during a period of not less than twelve (12) months after initial acceptance by the Owner or Agent.
f. Identify all equipment including buffers, car apron, crosshead, safety plank, machine, controller, drive, governor, disconnect switch, etc., by 4" high numerals which shall contrast with the background to which it is applied. The identification shall be either decalcomania or stencil type.
g. Paint or provide decal-type floor designation not less than four (4) inches high on hoistway doors (hoistway side), fascias and/or walls as required by A17.1 as may be adopted and/or modified by the AHJ. The color of paint used shall contrast with the color of the surface to which it is applied.

B. Hoistway Entrances Finish and Design

1. Hoistway entrances and door panels shall be finished as specified.
2. Where no finish is specified, finishes shall be baked enamel primer gray.
3. Refer to specifications for other design requirements.

C. Hoistway Entrances

1. Entrance Frames:

a. Hoistway entrances (jambs and head sections) shall be electrostatically painted on all floors in color as selected by Owner's representative.

2. Door Panels:

a. Hoistway entrances door panels shall be electrostatically painted on all floors in color as selected by Owner's representative.

D. Car Interior Finishes

1. Refer to Section 2.11 for cab interior allowance.
2. Car interior finishes shall be as selected by Owner.
3. Contractor shall provide samples of finishes as required for approval prior to fabrication.
4. Refer to specifications for other design requirements where provided.

E. Designation and Data Plates, Labeling and Signage.

1. Provide an elevator identification plate on or adjacent to each entrance frame where required by the AHJ.
2. Provide floor designation cast plates at each elevator entrance, on both sides of the jamb at a height of sixty (60) inches to the baseline of floor indication.

    a. Floor number designations and Braille shall be 2” high, 0.03” raised.

3. Identify the designated medical emergency services elevator with 3” high international symbol at each elevator entrance on both sides of the jamb.
4. Provide raised designations and Braille markings to the left of the car call and control buttons of the car operating panel(s).

    a. Designations shall be a minimum of 5/8” high, 0.03” raised.

5. Provide elevators with data and marking plates, labels, signages and refuge space markings complying with A17.1 Elevator Safety Code as may be adopted and/or otherwise modified by the AHJ.
6. Consultant / Owner shall select the designation and data plates from manufacturer’s premium line of plates.

## 2.10 FIXTURES / SIGNAL EQUIPMENT

A. General - Design and Finish

1. The design and location of the hall and car operating and signaling fixtures shall comply with the ADAAG and local requirements of the AHJ.
2. The operating fixtures shall be selected from the manufacturer's premium line of fixtures.
3. Custom designed operating and signaling fixtures shall be as shown on the drawings or as approved by the Owner / Consultant.
4. The layout of the fixtures including all associated signage and engraving shall be as approved by the Owner / Consultant.
5. Where no special design is shown on the drawings, the buttons shall be as follows:

a. Elevators No.1, No.2: Stainless steel type as selected by the Owner / Consultant from the manufacturer's premium line of push buttons. The button shall have a collar with LED illuminated halo call registered light
b. Elevator No.3: Stainless steel vandal resistant type as selected by the Owner's representative/consultant from the manufacturer's premium line of push buttons. The button shall have a round indicator on the button with LED call registered light.
c. Provide oval surround brail.

6. Where no special design is shown on the drawings, the faceplates shall be as follows:

a. Passenger and Service Elevators

1) All Floors: 1/8" thick satin stainless-steel faceplate. Faceplates shall be oversized to cover existing fixture cut-outs and faceplate dimensions.

7. Mount passenger and service elevator fixtures with tamperproof fasteners. The screw/fastener and key switch cylinder finishes shall match faceplate finish.
8. Where key-operated switch and or key operated cylinder locks are furnished in conjunction with any component of the installation, four (4) keys for each individual switch or lock shall be furnished, stamped or permanently tagged to indicate function.
9. All caution signs, pictographs, code mandated instructions and directives shall be engraved and filled with epoxy in code required colors.

B. Main Car Operating Panel (New)

1. Provide a main car operating push button panel on the inside front return panel of the car.
2. Car operating panel shall be incorporated in the swing-front return of the elevator cab.

a. Coordination with car front manufacturer shall be the responsibility of the Elevator Contractor.
b. Mount all key switches that are required to operate and maintain the elevators exposed on the car station except those specified within a locked service cabinet.

3. The push buttons shall become individually illuminated as they are pressed and shall extinguish as the calls are answered.
4. The operating panel shall include:

a. A call button for each floor served, located not more than 48" above the cab floor.
b. "Door open" / "Door close" / "Door Hold" buttons.

c. "Alarm" button, interfaced with emergency alarm. The alarm button shall illuminate when pressed.
d. Self-dialing, hands-free emergency communication system actuation button with call acknowledging feature, video and per ASME A 17.1 Standards as modified by the AHJ.
e. Three (3) position firefighter key operated switch, call cancel button and illuminated visual/audible signal system with mandated signage engraved per ASME A 17.1 Standards as modified by the AHJ.

5. Locked Firemen's Service cabinet, keyed in accordance with local Code, containing required devices and signals in accordance with ASME A17.1 Standards.
6. Provide a locked service cabinet flush mounted and containing the key switches required to operate and maintain the elevator, including, but not limited to:

a. Independent service switch.
b. "Run / top" switch
c. Light switch.
d. Fan switch.
e. G. F. I. duplex receptacle.
f. Emergency light test button and indicator.
g. Inspection Service Operation key switch.
h. Dimmer for cab interior lighting.

7. Car operating panel shall incorporate:

a. An integral (no separate faceplate) digital L.E.D. floor position indicator.
b. Emergency light fixture (without a separate faceplate) and black-filled engraved unit I.D. number or other nomenclature, as approved by Owner.
c. A "No Smoking" advisory as required by the AHJ.
d. The rated passenger load capacity in pounds.
e. State of Maryland "warning in event of fire" instructions.

8. Equip the car operating panel with proximity card reader provisions:

a. Provide a 3" x 5" space behind COP for surface mounted card reader.
b. Security system shall be overridden by Phase II Firefighter's Emergency Operations in accordance with code.

9. Post Inspection Certificate behind an opening in the car operating panel service cabinet that is fitted with flush-mounted clear Plexiglas without a frame.

C. Car Position Indicator (New)

1. The position of the car in the hoistway shall be indicated by the illumination of the position indicator numeral corresponding to the floor at which the car has stopped or is passing.

a. Provide 2" high, 10-segment LED type position indicator with direction arrows, integral with the car operating panel.
b. Provide audible floor passing signal per ADA standards where not provided by the elevator signal control.
c. Flush mount fixture with cover to match selected car front or car operating panel finish as directed by the Owner.

D. Voice Annunciator (New)

1. Provide a voice annunciator in each elevator.
2. The device features shall comply with the requirements of ADAAG and local accessibility requirements.
3. Coordinate size, shape and design with Designer and other trades.
4. The system shall include, but not limited to:

a. Solid state digital speech annunciator.
b. A recording feature for customized messages.
c. Playback option.
d. Built-in voice amplifier.
e. Master volume control.
f. Audible indication for selected floor, floor status or position, direction of travel, floor stop, seismic operation, firefighter service and nudging.

5. Locate all associated equipment in a single, clearly labeled enclosure located either in the machine room and/or on car top.

E. Corridor Push Button Stations / Remove Back Boxes (New)

1. Push button signal fixtures shall be provided on each landing.
2. Hall stations shall include a satin stainless No.4 faceplate. Patch and paint existing cutouts to match existing finish.
3. Each signal fixture shall consist of:

a. Up and down illuminating push buttons measuring 3/4" at their smallest dimension as selected by the Owner.
b. A recessed mounting box, electrical conduit and wiring.

4. Intermediate landings shall be provided with fixtures containing two (2) push buttons while terminal landings shall be provided with fixtures containing a single push button.
5. Include car to lobby key switch, firefighter key switch, elevator communication failure per code requirements, in addition to emergency power jewel (as required) in the main lobby level station or other designated recall landing.
6. Where existing fixtures are located greater than 48" above the floor:

a. The existing back boxes shall be removed.

b. New back boxes shall be installed to provide a new centerline to buttons of 42" above the floor.
c. Standardize the new centerline on each floor.

7. All cutting, patching, grouting and/or plastering of masonry walls resulting from the removal or installation of corridor fixtures shall be performed by the elevator contractor so as to maintain the fire rating of the hoistway.

a. Finished painting or decorating of wall surfaces shall be by elevator contractor.

8. Provide a digital floor position indicator with 1" high numerals at all landings.

F. Hall Direction Lanterns (New)

1. Provide a visual and audible signal at each entrance to indicate the direction of travel at all landings.

a. Hall lanterns shall include a satin stainless No.4 faceplate. Patch and paint existing cutouts to match existing finish
b. Design the lantern with up and down indication at intermediate landings and a single indication at terminal landings.
c. Lanterns shall sound once for the up direction and twice for the down direction.

1) Provide an electronic chime with adjustable sound volume.

d. Provide adjustable signal time (three [3] to ten [10] seconds, with one [1] second increments) to notify passengers which car shall answer the hall call and preset per ADAAG notification standards.

2. Locate the lantern above the corridor entrance.
3. New plate shall completely cover the present cutout located on center.

G. Hoistway Access Switch (New)

1. Install a cylindrical type keyed switch at top terminal in order to permit the car to be moved at slow speed with the doors open to allow authorized persons to obtain access to the top of the car.
2. Where there is no separate pit access door, a similar switch shall be installed at the lowest landing in order to permit the car to be moved away from the landing with the doors open in order to gain access to the pit.
3. Locate the switch in a separate fixture with a flush cover plate at a height of 78" above the finished floor. Cover plate shall be of a design and style as approved by the Owner or consultant.

4. Switches may also be Located in the sight guards at the top and bottom terminal landings where required if allowed by the Authority Having Jurisdiction and/or Owner.
5. This switch is to be of the continuous pressure spring-return type and shall be operated by a cylinder type lock having not less than a five (5) pin or five (5) disc combination with the key removable only in the "OFF" position.

    a. The lock shall not be operable by any key which operates locks or devices used for other purposes in the building and shall be available to and used only by inspectors, maintenance men and repairmen in accordance with A17.1 applicable Security Group.

## 2.11 CAR ENCLOSURES

A. Elevator Car Enclosure(s) and the Five Percent (5%) Rule:

1. In accordance with A17.1, Section 8.7, as adopted and/or modified by the AHJ, entitled "Alterations", where a new or remodeled elevator car enclosure is included in the base scope of work, the Contractor shall, within thirty (30) days after execution of the contract, weigh the elevator, or one (1) elevator of each group of elevators included in the base scope of work, to determine the present deadweight of the platform/sling/cab assembly.
2. The Contractor shall, when necessary, weigh the interior materials of a single cab to better estimate the total existing weight of existing materials being removed as part of the alteration.
3. The Contractor shall make every effort to provide accurate weight measurements while taking into consideration all weights that may present themselves at the time the measurement is taken such as compensation, compensating sheave, hoist ropes and traveling cables that may affect the measurement of the assembly itself.
4. The Contractor shall evaluate the actual counterbalance percentage for each sample elevator to identify prevailing conditions.
5. Measurements of actual cab weight shall be compared to the original deadweight of the car as stamped on the crosshead data tag.
6. Where no data tag exists, the Contractor shall make every effort to determine the original weight of the platform/sling/cab through calculations based on the current weight of the counterweight assembly and the verified percent of full load counterbalance.
7. The amount of weight that may be added to the car, so as to remain within the limits of the "5% Rule", shall be calculated based on the following:

    a. (Original Deadweight + Capacity) X (0.05) = Maximum Additional Weight Allowed

8. The Contractor shall document and notify the Owner and Consultant of the results of the measurements taken and what weight, if any, can be added or needs to be removed from the cab in order to maintain compliance with the 5% Rule.

9. The Contractor shall work diligently with the Owner and/or Owner's Representative and/or Consultant as well as the manufacturer of the car enclosure to minimize additional weights of the new or remodeled car enclosure so as to maintain compliance with the 5% Rule.
10. Contractor shall be responsible for proper adjustment of the counterbalance of the system, including the static balance of the platform/sling/car enclosure, upon completion of the car interior work.
11. Costs associated with this work shall be included in the base modernization price.
12. Provide a new data tag on the crosshead of the elevator indicating the new deadweight, the current percent counterbalance and the date of the alteration.

B. Elevator Cab Remodel Allowance ($45,000.00 per passenger elevator and $25,000.00 per service elevator).

1. Include a $45,000.00 passenger elevator cab interior allowance per elevator and $25,000.00 service elevator cab interior allowance per elevator in the base lump sum pricing. It is understood that if the selected manufacturer of the cab is not the same as the Elevator Supplier, all cab material will be constructed in a manner to accommodate the elevator manufacturer's associated equipment, such as operator, hangers, interlocks, etc., as purchased by the Owner.
2. The net allowance for the elevator cabs are to be exclusive of:

    a. Handling charges.
    b. Applicable sales and/or use taxes.
    c. Owner's representative design work.
    d. Car doors.
    e. Car/cab Shell, transoms, returns/entrance columns.
    f. Car door hangers, interlocks, exit contact locks.
    g. Platform, flooring, car door sill.
    h. Ventilation and fan.
    i. Car/cab installation, cut-outs, operating equipment, and such items are to be included by the Elevator Supplier in the base contract.

3. The net allowance covering the elevator cars of a design and material as selected shall include:

    a. Ceiling/lighting.
    b. Wall Panels.
    c. Base wainscoting.
    d. Handrails.
    e. Flooring.

4. The Owner or Owner's authorized representative reserves the right to deduct the net allowances from the Elevator Contract and to purchase the elevator cabs separately.

5. The Owner retains the right to assign this purchase to the Elevator Supplier for coordination and receive the necessary credits or make the installation by an authorized representative of the Owner.
6. Contractor shall include all costs associated with coordination of cab related work in the base modernization bid including static and dynamic balance of the system.

C. Car Doors (New)

1. Standard 1" thick, 14-gauge hollow metal flush construction with satin stainless-steel No.4 finish, reinforced for power operation and insulated for sound deadening. Paint hatch side of doors black and face cab side with 16-gauge sheet steel in selected material and finish.

    a. The door panels shall have no binder angles. All welds shall be continuous, ground smooth and invisible.
    b. Drill and reinforce doors for installation of door operator hardware, door protective device, door gibs, etc.

D. Car Sill (New)

1. Elevators No.1, No2: Provide car door entrance saddle using an extruded aluminum sill. Set sill to accommodate flooring selected.
2. Elevator No.3: Provide car door entrance saddle using a nickel silver sill. Set sill to accommodate flooring selected

E. Transom (Reuse/Refurbish - Clad)

1. Reuse existing car transoms and provide new stainless-steel No.4 cladding.

F. Stationary Return and Strike Jamb (Reuse/Refurbish - Clad)

1. Reuse existing car stationary return/strike jamb and provide new stainless-steel No.4 cladding.

G. Cab Dome (Reuse/Refurbish)

1. Reuse existing elevator cab dome. Remove rust, oil, dirt and impurities and give a factory coat of paint as selected by Owner or Consultant.

H. Elevator Cab Enclosure Fan (New)

1. Provide an exhaust type two-speed fan unit with cover grill, mounting accessories and necessary cab enclosure modifications.

    a. Fan unit shall include self-lubricating motor with housing rubber mounted for sound vibration isolation.

2. Provide a key switch in the elevator service cabinet for control of fan unit.

3. Provide necessary wiring and approved conduit to properly connect fan unit with power source and control key switch.

I. Protective Pads and Button Hooks (New)

1. Provide pad button hooks at locations required to prevent sagging while protective pads are hanging. Protective pads shall cover the front return panels, and the side and rear walls. Provide cutouts in pads for access to the cab operating and signaling devices. Pads shall be fire-resistant canvas with two (2) layers of cotton batting padding.

   a. Identify each pad by elevator number and wall location.
   b. Provide one (1) set of protection pads per elevator.
   c. Color to be selected by Owner's representative.

J. Elevators Interiors / Cab Fabrication and Installation

1. Maintain accurate relation of planes and angles with hairline fit of contacting panels and/or surfaces.
2. Any shadow gaps (reveals) between panels shall be consistent and uniform.
3. Unless otherwise specified or shown on the drawings, for work exposed to view use concealed fasteners.
4. Maximum exposed edge radius at corner bends shall be 1/16". There shall be no visible grain difference at the bends.
5. Form the work to the required shapes and sizes with smooth and even curves, lines and angles. Provide necessary brackets, spacers and blocking material for assembly of the cab.
6. Interior cab surfaces shall be flat and free of bow or oil canning. The maximum overall deviation between the low and high points of 24" x 24" panel section shall not exceed 1/32".
7. Make weights of connections and accessories adequate to safely sustain and withstand stresses to which they will be subjected.
8. All steel work except stainless steel materials shall be painted with an approved coat of primer and one (1) coat of baked enamel paint.
9. Cab Finish Warranty Enhancement

   a. Contractor shall be responsible for engineering and installing interior cab finishes in a manner that will withstand all code mandated inspections and test procedures. Failure of finishes during testing shall be repaired by the contractor without expense to the owner. Any objections or qualifications to material selection or design shall be identified during the engineering of the cab interior drawings for review by the owner.

2.12 EMERGENCY LIGHTING / COMMUNICATIONS / SIGNALING

A. Battery Back Up Emergency Lighting Fixture and Alarm (New)

1. Provide a self-powered emergency light unit.

    a. The light fixture shall contain a minimum of two (2) LED lamps. Flush mount the light fixture in the main car station. The fixture shall have a milk white lens.

2. Provide a car-mounted battery unit including solid-state charger and testing means enclosed in common metal container.

    a. The battery shall be rechargeable nickel cadmium with a ten (10)-year minimum life expectancy. Mount the power pack on the top of the car.
    b. Provide a 6" diameter alarm bell mounted directly to the battery/charger unit and connected to sound when any alarm push button or stop switch in the car enclosure is operated.
    c. The bell shall be configured to operate from power supplied by the building emergency power generator. The bell shall produce a sound output of between 80-90 dBa (measured from a distance of 10') mounted on top of the elevator car.

        1) Activation of this bell shall be controlled by the stop switch and alarm button in the car operating station.
        2) The alarm button shall illuminate when pressed.

3. Where required by Code for the specific application, the unit shall provide mechanical ventilation for at least one (1) hour.
4. The operation shall be completely automatic upon failure of normal power supply.
5. Unit shall be connected to normal power supply for car lights and arranged to be energized at all times so it automatically recharges battery after use.

B. Common Alarm Bell (New)

1. Provide a common alarm bell located in the elevator pit.

    a. The bell shall be configured to operate when the alarm or stop switch of any elevator is activated, during both normal and battery back-up power conditions.

C. Emergency Voice Communication / Telephone (New)

1. A hands-free emergency voice communication system shall be furnished in each car mounted as an integral part of the car operating panel.

    a. Necessary wires shall be included in the car traveling cable and shall consist of a minimum of one shielded pair of 20AWG conductors.
    b. 120V power shall be provided to power the hands-free device.

2. The telephone shall be equipped with an auto-dialer and illuminating indicator which shall illuminate when a call has been placed and begin to flash when the call has been answered.

    a. Engraving shall be provided next to the indicator which says “When lit help is on the way".

3. In addition to the standard “Alarm” button, a separate activation button shall be provided on the car operating panel to initiate the emergency telephone and place a call.

    a. The telephone must not shut off if the activating button is pushed more than once.
    b. The telephone shall transmit a pre-recorded location message only when requested by the operator and be provided with an adjustable call time which can be extended on demand by the operator.
    c. Once two-way communication has been established, voice prompts shall be provided which instruct the operator on how to activate these functions as well as alerting the operator when a call is being attempted from another elevator in the building.

4. The system shall be compatible with ring down equipment and PBX switchboards.
5. The system shall be capable of serving as the audio output for an external voice annunciation system.

    a. Conversation levels shall measure 60 dbA or higher and measure 10 dbA above ambient noise levels.
    b. Each device shall be provided with a self-diagnostic capability in order to automatically alert building personnel should an operational problem be detected.

6. The phone shall be able to:

    a. Receive incoming calls from any On-Site Rescue Station (when provided or required).
    b. Receive incoming calls from other off-site locations via the public telephone system.
    c. Acknowledge incoming calls and automatically establishing hands-free two way communications.

        1) If no On-Site Rescue Station is provided, each hands-free device shall have built in line consolidation which will allow up to six (6) elevators to be called individually from outside the building over a single telephone line and up to eighty (80) elevators if an On-Site Rescue Station is provided.

7. The emergency elevator communication system shall require a maximum of one (1) telephone line.

    a. The system must provide line sharing capability to eliminate the need for a dedicated telephone line.
    b. The line sharing function must ensure that the emergency telephones always receive dialing priority even if the line is in use and that the emergency telephones can be called into from an off-site location.

8. The system shall provide its own four-hour backup power supply in case of a loss of regular AC power.
9. The system must provide capability for building personnel to call into elevators and determine the charge state of any backup batteries provided for the emergency telephones.
10. Pushing the activation button in any of the elevator car stations will cause any on-site Rescue Station (where provided or required) or security telephone to ring.

    a. If the on-site call is not picked up within thirty (30) seconds, the call will be automatically forwarded to a twenty-four (24)-hour off-site monitoring service.
    b. The arrangements and costs of the off-site monitoring and telephone line shall be by others.

11. All connections from the junction box to the telephone system shall be done by the Elevator Contractor where existing provisions can be reused.]
12. New telephone lines, where required, shall be provided and interfaced by others.

D. Two-Way Elevator Visual Communication System

1. Contractor to provide a complete system in compliance with Section 2.27.1.1 of ASME A17.1-2019 and local amendments by the Authority Having Jurisdiction.
2. The system shall provide audio and visual communication means, with a digital display in the elevator cab and push-buttons for registering responses.
3. System shall also provide a means of observing the elevator cab interior, with full view of floor and displaying the video at the monitoring station.
4. Instructions for use shall be located adjacent to the means of activation (e.g. “PHONE” button). All instructions shall be engraved in accordance with the requirements for fixtures herein before specified. Language shall be submitted to owner for approval during the submittal phase.
5. Systems may utilize common cab components (such as Position Indicators or Door Open/Door Close buttons) where allowed by the AHJ and approved by the Owner.
6. Contractor shall include all wiring as required to provide a complete system. Where conduit runs are provided by others, contractor shall coordinate size and routing with the construction manager.
7. Monitoring stations shall be provided in each machine room and security desk. Provide a unit price alternate for additional stations.

8. System shall have ability for connection to an external line, in accordance with code, for monitoring by campus police or third-party provider. Coordinate with owner regarding location of outside line connection and provide adapters/converters as required to complete connection. Where subscription fees are required, they shall be included within the warranty period pricing and long-term maintenance pricing.
9. Approved Vendors: RATH® with wireless gateway.

E. Central Exchange Communication System / Intercom (New)

1. Provide an ADA compatible, hands-free intercommunication system for all elevators for two-way, multi-path communication between the elevator car stations and master station in elevator machine room using a central exchange design system.
2. The communication system shall include:

    a. A car station in each elevator.
    b. A master station in each machine room to communicate with the car.

3. The car station shall have a loudspeaker and a microphone to provide hands-free communication. The station shall be installed behind the car operating panel.
4. Master stations shall include:

    a. Selector push buttons.
    b. Annunciator lights for each connected station.
    c. Speaker/microphone.
    d. Volume control and function buttons.

5. A call shall be placed from the elevator car station by pressing the emergency call or alarm button.

    a. This action shall cause the lamp in the corresponding button of all the designated master stations to flash and an intermittent tone to be heard.
    b. When the incoming call is answered, the flashing light shall go to a steady condition.
    c. Disconnection of a call is simply done by depressing the designated car button once.
    d. If a call request is placed during a conversation, it shall be indicated by a flashing light and short tone of every designated master station.
    e. When the original conversation is completed, the normal intermittent tone shall resume.

6. A master station shall be connected to any of its designated car stations by depressing the corresponding call button.

    a. The lamp in the button shall be illuminated while the button is depressed.

b. In the car station an audible tone shall be emitted and immediate communication is established.
c. The call shall be ended by depressing the button a second time, disconnecting the circuit.
d. The master station shall call any other master station by depressing the corresponding call button.
e. The button shall lock in its down position and the lamp shall be lit with a steady light.
f. At the called master station, a short tone shall be sent out and the lamp in the button corresponding to the "calling" party shall be lit.
g. After the tone, immediate communication is established.

7. On all non-called master stations, the lamps corresponding to the calling and called stations shall be illuminated as an indication that those stations are busy.
8. Provide all power supplies, wire, conduit, fittings, etc., for both systems.
9. Locate the station in the elevator machine room.
10. The intercom system shall include the following features:

a. Test button and monitoring features to verify audio circuit path.
b. All call buttons to initiate a call to all cars in the systems.
c. Priority button in the remote monitoring panel stations.
d. Visual acknowledgment and engraving for the hearing impaired.

F. Provide a battery backup power supply for the intercom capable of providing sufficient power to operate the complete system for a minimum of four (4) hours.

## PART 3 - SIDEALK LIFT

### 3.1 WORK INCLUDED

A. Complete removal of existing sidewalk lift and installation of one (1) new Sidewalk Lift.

B. Comply with Part 1, Part 3, Division 01 and the Contract Documents.

### 3.2 PRODUCTS / GENERAL DESCRIPTION

A. Sidewalk Lift (SWL)

| | | |
|---|---|---|
| 1. | Quantity | One (1) |
| 2. | Type | Gillespie PS1E-V SWL |
| 3. | Capacity (lbs.) | 5,000 |
| 4. | Speed (fpm) | 20 |
| 5. | Loading | Class A |
| 6. | Travel in Feet | Existing / 9'- 6" (field verify) |
| 7. | Roping | 2:1 |

| | | |
|---|---|---|
| 8. | Number of Landings | Two (2) |
| 9. | Number of Openings | Two (2) |
| 10. | Front Openings | One (1) B |
| 11. | Rear Openings | One (1) LD |
| 12. | Operation | Constant Pressure |
| 13. | Control | UL-labeled controller |
| 14. | Machine Type / Location | Drum / Basement |
| 15. | Platform | 6’- 0’ W x 9’ – 0” D |
| 16. | Car Frame | Structural Steel Underslung |
| 17. | Safety | Type A Instantaneous Broken Rope Car Safeties |
| 18. | Guide Rails | 15lb/ft Planed T-Rails |
| 19. | Guides | Cast Iron Guide Shoes |
| 20. | Buffers | Two (2) Rubber Bumpers |
| 21. | Car Doors / Type | Manually Operated Collapsible Steel Scissor Gates |
| 22. | Hoistway Door Size / Type | 3’- 8” W x 7’- 0” / Single Swing |
| 23. | Sidewalk Door | Water Resistant Vertically Lifting |
| 24. | Entrance Sills | Reuse / Refurbish |
| 25. | Power Supply | 230/3/60 (Field Verify) |
| 26. | Hall Operating Fixtures | Spring Loaded Up/Down Key / Constant Pressure Operation |
| 27. | Car Operating Fixtures | Car Operating Panel Including Emergency Stop, Alarm, Light Switch |
| 28. | Car Shell / Cab | As Specified Herein |

## 3.3 MANUFACTURERS

A. Pre-Approved Equipment Manufacturers

1. The following manufacturer’s equipment and materials have been pre-approved for use on this project. Other equipment not specifically mentioned shall be considered for approval on an individual basis.

    a. Gillespie Corporation – Model PS1E-V Sidewalk Lift Package.

## 3.4 MACHINE / ROPES

A. Basement mounted drum machine roped 2:1 to car, including two groove drum, shaft, gear reducer with motor and Stearns type brake, end bearing, machine base, drum slack cable switch, screw limit switch, hardware, overhead deflecting sheave with bearings, idler sheave block, mechanical equalizer with switch. Anchors for machine base. Note: Increase machine base height.

B. Two 3/8” diameter improved plow steel wire ropes with all hardware, including clips and sockets.

3.5 CAR FRAME / PLATFORM

A. Structural steel underslung car frame with cast iron guide shoes, undercar sheaves, Type A instantaneous broken rope car safeties. Telescoping sidewalk door stanchions rigidly mounted to car frame and platform to pick up vertically lifting sidewalk door.

B. Structural steel car platform with welded structural steel frame construction and 1/4” diamond pattern steel floor plate designed for Class A loading. Two steel car aprons front and rear.

3.6 CONTROLLER

A. UL-labeled controller designed for constant pressure operation through sidewalk door.

3.7 HOISTWAY / PIT

A. Two 15lb/ft planed elevator T-rails, with bolts, rail brackets and all hardware.

B. All necessary terminal weatherproof hoistway switches, traveling cable, hoistway cable.

C. Two (2) rubber pit bumpers.

3.8 HOISTWAY DOORS

A. One manually operated UL labeled insulated hollow steel 3’-8”x7’-0” single swing door with handles, latches, mechanical interlock, all hardware. Interlock operated by car mounted fixed cam.

B. One water resistant vertically lifting sidewalk door, ¼” steel diamond plate leaves, steel gutter frame, and stiffeners. Door to be picked up by car mounted telescoping stanchions. Door to be piped to sump pump in pit, PVC piping by others. Sherwin Williams Marine Industrial Enamel.

C. Doors and frames shall be painted in color as selected by Owner’s representative.

3.9 HALL / CAR FIXTURES

A. Weather resistant sidewalk station surface mounted, stainless steel faceplate, spring loaded up/down key for constant pressure operation, in-use light, and in-use bell.

B. Car operating panel including emergency stop, alarm, light switch

3.10 CAB / INTERIOR

A. One elevator cab including steel 16 ga. side wall panels 6'-0" high, incandescent light mounted in cab.

B. front and rear manually operated collapsible steel scissor gates with switches.

C. Cab interior shall be painted in color as selected by Owner's representative

3.11 PAINTING

A. All steel hardware painted The Nelson Company, 2923 Fast Dry Black Primer, ready for finish paint in field in color as selected by Owner's representative.

PART 4 - EXECUTION

4.1 EXAMINATION

A. Inspection

1. Study the Contract Documents with regard to the work as specified and required so as to ensure its completeness.
2. Examine surface and conditions to which this work is to be attached or applied and notify the Owner in writing if conditions or surfaces are detrimental to the proper and expeditious installation of the work. Starting the work shall imply acceptance of the surfaces and conditions to perform the work as specified.
3. Verify, by measurements at the job site, dimensions affecting the work. Bring field dimensions which are at variance with those on the accepted shop drawings to the attention of the Owner. Obtain the decision regarding corrective measures before the start of fabrication of items affected.
4. Cooperate in the coordination and scheduling of the work of this section with the work of other sections so as not to delay job progress.

4.2 INSTALLATION / PROJECT PHASING

A. Installation

1. Modernization work on Elevators No.1 – No.3 and installation of the sidewalk lift shall be performed consecutively. Only one (1) traction elevator can be taken out of service at any one time.
2. Modernize the elevators and install the sidewalk lift, using skilled personnel in strict accordance with the final accepted shop drawings and other submittals.
3. All work shall be performed between 6:00 a.m. to 5:00 p.m. except where otherwise specified.

4. Comply with the code, manufacturer's instructions and recommendations.
5. Coordinate work with the work of other building functions for proper time and sequence to avoid delays and to ensure right-of-way of system. Use lines and levels to ensure dimensional coordination of the work.
6. Accurately and rigidly secure supporting elements within the shaftways to the encountered construction within the tolerance established.
7. Provide and install motor, switch, control, safety and maintenance and operating devices in strict accordance with the submitted wiring diagrams and applicable codes and regulations having jurisdiction.
8. Ensure sill-to-sill running clearances do not exceed 1 ¼" at all landings served.
9. Erect guide rails plumb and parallel with a tolerance of 1/8" (plus or minus 1/16").
10. Install rails so joints do not interfere with brackets, attachment points and divider beam.
11. Set entrance plumb in hoistway and in alignment with guide rails.
12. Arrange door tracks and sheaves so that no metal-to-metal contact exists.
13. Reinforce hoistway fascias to allow not more than 1/2" of deflection.
14. Isolate cab fan from canopy to minimize vibration and noise.
15. Remove oil, dirt and impurities and give a factory coat of rust inhibitive paint to all exposed surfaces of struts, hanger supports, covers, fascias, toe guards, dust covers and other ferrous metal.
16. Prehang traveling cables for at least twenty-four (24) hours with ends suitably weighted to eliminate twisting after installation.
17. After installation, touch up in the field, surfaces of shop primed elements which have become scratched or damaged.
18. Lubricate operating parts of system as recommended by the manufacturer.

B. Project Phasing

1. Phase I - Final design development and contractors' preliminary work procedures to be completed within four (4) weeks from date of contract award.

    a. Prevailing conditions review and layout.
    b. Submittal Register for review and approval by UMB prior to uploading into eBuilder Project Management system.
    c. Selection meeting for aesthetic design and finishes with Owners' designee.
    d. Filing for required permits or other governing authorities work procedure requirements.

2. Phase II - Submittal approvals and confirmations shall be completed within sixteen (16) weeks from date of contract award.

    a. Selection confirmations.
    b. Manufacturer's shop drawings applicable, i.e., fixtures, cab, machine room layouts, doors, etc.
    c. Engineering data acknowledgment applicable, i.e., power, heat, structural loads.

d. Delivery dates for major component suppliers, i.e., controls, machinery, fixtures, cabs, etc.
e. Posting of permits or other governing agency authorizations to proceed.
f. Proposed work implementation schedule based on the aforementioned procedures/confirmations.

3. Phase III - Mobilization of Final Design Approvals

a. Revision confirmations. (Equipment, etc.)
b. Preliminary work procedures.
c. Schedule confirmations.

4. Phase IV – Implementation

a. Personnel Mobilization
b. Material Delivery
c. Modernization
d. Final Punch Out and Walk-Through

5. Phase V – Project Closeout

a. Closeout documents
b. Training

C. Removal of Elevators

1. If extenuating circumstances (i.e. separating controller interconnections, inspection, testing, etc.), require that multiple cars of a single elevator group be removed from service simultaneously, the work shall be performed outside of the normal business hours at a time mutually agreed to by the Owner and Contractor.
2. A minimum of five (5) days advance written notice shall be given to the Owner and Elevator Consultant by the Contractor detailing the reasons for the simultaneous removal of the elevators from service along with the estimated out-of-service time.
3. The request shall be subject to review by the Elevator Consultant and approved by the Owner prior to the commencement of the work.
4. Costs for this work in addition to associated expenses shall be included as part of the base bid pricing.

D. Transfer of Hall Button Risers

1. Transfer of the hall button risers to the new signal control systems shall be performed on a not-to-interfere basis and shall not interrupt building operations or inconvenience building occupants.
2. Costs for this work in addition to associated expenses shall be included as part of the base bid pricing.

## 4.3 FIELD QUALITY CONTROL

A. Inspection and Testing

1. Comply with the requirements of Division 01.
2. Upon completion of each work phase or individual elevator specified herein, the Contractor shall, at its own expense, arrange and assist with inspection and testing as may be required by the A.H.J. in order to secure a Certificate of Operation.

B. Substantial Completion

1. Comply with the requirements of Division 01.
2. The work shall be deemed "Substantially Complete" for an individual unit or group of units when, in the opinion of the Consultant, the unit is complete, such that there are no material and substantial variations from the Contract Documents, and the unit is fit for its intended purpose.
3. Governing authority testing shall be completed and approved in conjunction with inspection for operation of the unit; a certificate of operation or other required documentation issued; and remaining items mandated for final acceptance completion are limited to minor punch list work not incorporating any life safety deficiencies.
4. The issuance of a substantial completion notification shall not relieve the Contractor from its obligations hereunder to complete the work.
5. Final completion cannot be achieved until all deliverables, including but not limited to training, spare parts, diagnostic tools, manuals, and other documentation requirements, have been completed.

C. Contractor's Superintendent

1. The Contractor shall assign a competent project superintendent during the work progress and any necessary assistant, all satisfactory to the Owner. The superintendent shall represent the Contractor and all instructions given to him shall be as binding as if given to the Contractor.

## 4.4 PROTECTION / CLEANING

A. Protection and Cleaning

1. Adequately protect surfaces against accumulation of paint, mortar, mastic and disfiguration or discoloration and damage during shipment and installation.
2. Upon completion, remove protection from finished surfaces and thoroughly clean and polish surfaces with due regard to the type of material. Work shall be free from discoloration, scratches, dents and other surface defects.
3. The finished installation shall be free of defects.
4. Before final completion and acceptance, repair and/or replace defective work, to the satisfaction of the Owner, at no additional cost.

5. Remove tools, equipment and surplus materials from the site.

B. Barricades and Hoistway Screening

1. The Contractor shall provide barricades where necessary in order to maintain adequate protection of areas in which work specified by the Contract Documents is being performed, including open hoistway entrances. Fabrication and erection as all barricades shall be in compliance with applicable OSHA regulations.
2. As required, the Contractor shall provide temporary wire mesh screening in the hoistway and of any elevator undergoing work specified in the Contract Documents. This screening shall be installed in such a manner as to completely segregate the hoistway from that of adjacent elevators. Screening shall be constructed from .041" diameter wire in a pattern that rejects passage of a 1" diameter ball.

4.5 DEMONSTRATION

A. Performance and Operating Requirements

1. Passenger and Service elevators shall be adjusted to meet the following performance requirements:

a. Speed: within ±3% in both directions of travel under any loading condition.
b. Leveling: within ±1/4" as measured between the car entrance threshold and the landing sill on any given floor under any loading condition.
c. Door Operating Times and Floor-to-Floor Time: (Recorded from the doors start to close on one floor until they are 3/4 open at the next floor) under various loading conditions (based on 13'- 0" floor heights):

| Elevator | Door Type | Opening (sec) | Close (sec) | Floor to Floor Performance (sec) |
|---|---|---|---|---|
| No.1, No.2 | 3'-6" x 8'- 0" SSSO | 2.5 – 2.9 | 4.0 – 4.4 | 11.4 – 11.6 |
| No.3 | 4'- 6" x 7'- 8" 2SSO | 3.4 – 3.8 | 5.1– 5.1 | 14.9 – 15.9 |

d. Door dwell time for hall calls: 5.0 sec without Advance lantern signals.
e. Door dwell time for car calls: 3.0 seconds.
f. Reduced non-interference dwell time: 1.0 seconds.

2. Maintain the following ride quality requirements for service elevators:

a. For speeds up to 1400 fpm, the speed of the car roller guides shall not exceed 500 rpm.
b. Where pit permits, extend bottom roller guides by not less than one half the distance from the centerline of the upper roller guides to the platform.

c. Noise levels inside the car shall not exceed the following:

1) Car at rest with doors closed and fan off - 40 dba.
2) Car at rest with doors closed, fan running - 55 dba.
3) Car running at high speed, fan off - 50 dba.
4) Door in operation - 60 dba.

d. Vertical accelerations shall not exceed 14 milli-g and horizontal accelerations shall not exceed 20 milli-g.

1) The accelerometer used for this testing shall be capable of measuring and recording acceleration to nearest 0.01 $m/s^2$ (1 milli-g) in the range of 0-2 $m/s^2$ over a frequency range from 0-80 Hz with ISO 8041 filter weights applied. Accelerometer should provide contact with the floor similar to foot pressure, 60 kPA (8.7psi).

e. The amplitude of acceleration and deceleration shall not exceed 2.6 - 2.8 $ft./sec^2$ for geared and MRL traction, and 3.5 - 4 $ft./sec^2$ for gearless traction elevators.
f. The maximum jerk rate shall be 1.5 to 2.0 times the acceleration and deceleration.
g. The maximum velocity which the elevator achieves in either direction of travel while operating under load conditions that vary between empty car and full rated load shall be within ± 3% of the rated speed.

B. Acceptance Testing

1. Comply with the requirements of Division 01.
2. The Contractor shall provide at least five (5) days prior written notice to the Owner and Consultant regarding the exact date on which work specified in the Contract Documents will reach completion on any single unit of vertical transportation equipment.
3. In addition to conducting whatever testing procedures may be required by local inspecting authorities in order to gain approval of the completed work, and before seeking approval of said work by the Owner, the Contractor shall perform certain other tests in the presence of the Consultant.
4. The Contractor shall provide test instruments, test weights, and qualified field labor as required to safely operate the unit under load conditions that vary from empty to full rated load and, in so doing, to successfully demonstrate compliance with applicable performance standards set forth in the project specifications with regard to:

a. Operation of safety devices.
b. Sustained high-speed velocity of the elevator in either direction of travel.
c. Brake-to-brake running time and floor-to-floor time between adjacent floors.
d. Floor leveling accuracy.
e. Door opening/closing and dwell times.

f. Ride quality inside the elevator car.
g. Communication system.
h. Load settings at which anti-nuisance, load dispatch, and load non-stop features are activated.

5. Upon completion of work specified in the Contract Documents on the last car in any group of elevators, and in conjunction with the aforementioned testing procedures, the Contractor shall carry out additional testing of group dispatch/supervisory control features in the presence of the Consultant and the University of Maryland Baltimore.
6. The Contractor shall provide test instruments and qualified field labor as required to successfully demonstrate:

   a. The back-up operating mode for group dispatch failure.
   b. Simulated and actual emergency power operation.
   c. Firefighter, attendant and independent service operations.
   d. Restricted access security features and card reader controls, if required.
   e. Zoning operations and floor parking assignments.

7. Upon completion of the modernization of each individual elevator, emergency power testing shall be conducted by the Building Management after normal business hours and/or weekends.
8. After hour tests of systems such as emergency generators, fire service, and security systems shall be conducted at no extra cost to the Owner.

END OF SPECIFICATION

# DIVISION 210000 – FIRE PROTECTION

## PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SCOPE:

A. The fire protection contractor shall furnish all labor, material, tools, equipment and services necessary and incidental for installing all fire protection systems indicated in the specification, or necessary to provide a finished installation. The finished installation shall be in perfect working condition and be ready for continuous and satisfactory operation. The project area is located in

1. Institute of Human Virology located at 725 West Lombard Street

1.3 CODES AND REGULATIONS

A. All materials furnished and all work installed shall comply with the codes and regulations adapted by the State of Maryland and recommendations of the following bodies:

1. International Building Code (IBC)
2. National Fire Protection Association (NFPA)
3. Maryland State Fire Prevention Code

1.4 RESPONSIBILITY

A. The Construction Manager/General Contractor (GC/CM) shall be responsible for all work included in this Division. The delegation of work to other contractors shall not relieve him of this responsibility. Contractors who perform work under this Division shall be responsible to the CM/GC.

1.5 SITE VISIT

A. Prior to preparing the bid, the fire protection contractor shall visit the site and become familiar with all existing conditions. Make all necessary investigations as to locations of utilities and existing field conditions that could affect the work. No additional compensation will be made to the contractor as a result of his failure to familiarize himself with the existing conditions under which the work must be performed.

1.6 OUTAGES

A. For all work requiring an outage, the fire protection contractor shall submit an outage request to the UMB Project Manager, using the UMB Standard Request for Outage Form which is available through the UMB Design and Construction Web Site at https://www.umaryland.edu/designandconstruction/design-and-construction-documents/umb-standard-project-forms---current-editions/

B. The existing mechanical, electrical and fire protection systems shall remain operational unless turned off by University personnel during the construction of the project.

C. Unless otherwise specified, outages of any services required for the performance of this contract and affecting areas other than the immediate work area shall be scheduled at least ten business days (10) days in advance with the UMB Design and Construction Department. Outages shall be performed during normal duty hours. If necessary, some outage work may be performed outside normal hours if approved by UMB.

D. All fire protection outages which will interfere with the normal use of the building in any manner shall be done at such times as shall be mutually agreed upon by the contractor and the UMB Design and Construction Department.

E. The contractor shall include in his price the cost of all premium time required for outages and other work which interferes with the normal use of the building, which will be performed during other than normal work time and at the convenience of the University.

F. The operation of fire protection valves required to achieve an outage must be operated by University personnel only. Unauthorized operation of fire protection valves or other control devices by contractors and their personnel will result in extremely serious consequences for which the contractor will be held accountable.

1.7 DESIGNER/INSTALLER QUALIFICATIONS

A. Designer: Field survey, design, and preparation of the submittals required by the specifications shall be performed and certified by an individual who is a registered professional engineer or who is certified as a Level III or IV Technician by NICET in Water-Based Systems Layout. The designer shall have a minimum of five (5) years' experience in the preparation of sprinkler shop drawings, hydraulic calculations, and field surveying. The system designer shall sign (with certification/license number) each sheet included in the set of drawings.

B. Installer: The field sprinkler foreman shall hold a current valid certification from a nationally recognized sprinkler apprenticeship school or government agency or be recognized as "Journey Level" by a local fire sprinkler labor union. The installing contractor shall be licensed in the State of Maryland.

1.8 SUBMITTALS

A. General: For general requirements see Architectural Specification Division 01 Section "Submittal Procedures". Also comply with the following:

1. UMB requires the Fire Protection Submittal to be submitted electronically as one (1) complete submission as a “pdf” file for review. Partial Submittals will be rejected.

    a. The complete submittal must be reviewed and approved by the A/E and the UMB Fire Marshal before installation can take place.

    b. The warranty information and maintenance manuals shall be included in the Project O & M Manual.

2. Submittal approval does not relieve the contractor of their responsibility to provide a code compliant system. Any installation by the contractor that does not meet code or specification requirements shall be corrected to be in full compliance at no cost to the University.

3. Fire protection shop drawings (working plans) must be developed by computer software. Fire protection shop drawings (working plans) submitted for review that are hand drawn or have handwritten notes will be rejected.

4. The sprinkler contractor shall not deviate from the approved sprinkler layout drawings unless written approval has been obtained from the UMB Fire Marshal.

5. Where deviations are approved by the UMB Fire Marshall or as necessary by field conditions, the contractor shall record on one (1) set of prints, the installed locations, sizes, and depths of pipes, services, equipment, etc. which may differ from the approved fire protection shop drawings (working plans). When the sprinkler work has been completed and accepted by UMB and all deviations have been recorded the sprinkler contractor shall scan the prints as a color pdf file.

6. Submittal approval does not relieve the contractor of their responsibility to provide a code compliant system. Any installation by the contractor that does not meet code or specification requirements shall be corrected to be in full compliance at no cost to the University.

7. Electronic Fire Protection Submittal: Fire protection submittal shall include the product data listed in paragraphs below. The complete submittal must be reviewed and approved by the A/E and the UMB Fire Marshal before installation can take place.

8. Product data shall include the following items unless otherwise noted:

a. Article 2.3, Fire Stops & Smoke Seals for Wall and Floor Sleeve Applications
b. Article 2.4, Sprinkler System Pipe, Fittings, and Joints
c. Article 2.5, Pipe Sleeves
d. Article 2.6, Sprinklers
e. Article 2.7, Identification and Leak Testing
f. Article 2.8, Hangers and Supports
g. Article 2.9, As-Built Drawing Do not include this data in the Fire Protection Submittal.
h. Article 2.10, O & M Manuals Do not include this data in the Fire Protection Submittal.
i. Warranties and maintenance instructions shall be included in the O & M Manual only. Do not include this data in the Fire Protection Submittal.

9. Additional Data: Subject to project requirements, in addition to the product data indicated in the paragraph above the following additional data may be required:
   a. Fire Protection Shop Drawings (working plans)

10. Submittal File Format: File formats and names for each submittal shall be electronically as follows:

    a. File Formats:
       1) Product Data: “pdf” file format.
       2) Design Shop Drawings: “pdf” and “dwg” file formats.
       3) Coordinated Drawings: “pdf” or “dwg” file formats.
       4) Schedules: “xl” file format.

## ~~1.11~~1.9 IDENTIFICATION BADGES

A. Contractors must obtain photo identification cards for all employees who will be at the construction site. The University will charge the contractor $25.00 for each badge as a deposit of which $20.00 will be returned when the badge is returned. Lost photo I.D. card will cost $25.00 for another replacement card. (The above charges are subject to change without notice.)

## ~~1.12~~1.10 HAZARDOUS MATERIALS

A. Identification and removal of hazardous materials (asbestos, lead paint, PCBs) is not part of this contract. If questionable material is encountered, notify the University Project Manager and the University Environmental Health and Safety Department in writing immediately. The University shall then arrange for investigation and possible abatement of the material. Contractor shall schedule his work to accommodate hazardous material removal by the Owner.

~~1.13~~1.11 WARRANTY/GUARANTEE

A. All materials, equipment, etc. provided by the general contractor and/or his subcontractors shall be warranted and guaranteed to be free from defects in workmanship and materials for a period of two (2) years from the date of substantial of completion and acceptance of work by UMB. Any defects in workmanship, materials, or performance which appear within the guarantee period shall be corrected by the contractor without cost to the owner, within a reasonable time, to be specified by UMB. In default thereof, owner may have such work done and charge the cost of same to the contractor.

## PART 2 – PRODUCTS

2.1 LISTED MANUFACTURERS

A. Listed Manufacturers: The manufacturers indicated in Part 2 represent the basis for design and identify the minimum level of quality for materials and equipment, specified in this Division, that are acceptable to UMB. Unless “or equal” is included as an option, substitutions are not allowed, except under the following condition. During bid phase, contractors may submit material and equipment by non-listed manufacturers provided said submittals meet the requirements of these specifications. All submitted materials and equipment are subject to approval by the A/E and UMB. Reference: Division 1 Substitution Section.

2.2 GENERAL REQUIREMENTS

A. Sprinkler system design, installation and water supply requirements shall be designed to a minimum hazard classification of Ordinary Hazard (Group 1), unless otherwise approved by the UMB Fire Marshal.

B. All modifications to existing sprinkler systems shall be performed in accordance with the edition of NFPA 13 which is applicable within the State of Maryland at the time of contract execution and as approved by the UMB Fire Marshal.

C. The Contractor shall be responsible for replacing all products and material that were installed that were not included in the approved submittal.

2.3 FIRE STOPS &, SMOKE SEALS FOR WALL & FLOOR SLEEVE APPLICATIONS

A. General: Provide fire stops, and smoke sealant materials for all fire protection services penetrating through rated assemblies. See Architectural Specification Division 07, Section “Penetration Firestopping” for sealant material requirements. Services include:

1. Fire protection penetrations include piping.

B. New Construction: All new penetrations shall be provided with a pipe sleeve and sealant materials.

C. Existing Construction: All new service penetrations through existing rated assemblies shall be provided with a pipe sleeve and sealant materials. All existing unsealed penetrations for services passing through existing rated assemblies within the project area shall be provided with sealant materials.

D. Project Area: The project area shall include the finished spaces and related sections of the utility shafts within the project area footprint.

E. Wall Pipe Sleeve Applications: Pipe sleeves shall be required for all new pipe penetrations through rated wall assemblies and non-rated CMU walls. Where pipe sleeves are installed in non-rated CMU walls fire rated sealant materials are not required. Provide acoustical caulking to seal the annular spaces between the sleeve and the bare pipe or pipe insulation on each end with one half (1/2) inch caulking all around the annular space.

## 2.4 SPRINKLER SYSTEM PIPE, FITTINGS, AND JOINTS

A. General: All pipe, fillings, joints, and couplings used for standpipe and sprinkler systems shall be as follows:

1. Piping: All piping shall be the product of one (1) manufacturer. Piping one (1) inch and larger shall be provided with antimicrobial coating to limit corrosion from microbes on the interior of the pipe. Acceptable manufacturer for sprinkler piping is Wheatland Tube Company or approved domestic equal.

2. Fittings, Couplings and Gaskets: All grooved fittings, couplings and gaskets shall be the product of one (1) manufacturer. Grooving tools shall be of the same manufacturer as the grooved components. Acceptable manufacturers for grooved fittings, couplings and gaskets are Victaulic or Gruvlok with Victaulic products as the basis of design.

3. The Contractor shall be responsible for replacing all products and material that were installed and was not included in the approved submittal.

B. Pipe Material: All piping shall be Grade A or Grade B, Schedule 40 black steel pipe manufactured in the United States as follows:

1. Piping one and one half (1-1/2) inch and smaller shall conform to Type ‘F’ Grade ‘A’ Schedule 40 black steel pipe per ASTM A53 with threaded ends. Threads shall be per ANSI B.1.20.1.

2. All two (2) inch piping shall conform to Type 'E' Grade 'B' Schedule 40 black steel pipe per ASTM A53. Two (2) inch piping shall be either thread end type per paragraph 1 above or rolled grooved end type per paragraph 3 below. (Contractor Option)

3. Piping two and one half (2-1/2) inch and larger shall conform to Type 'E' Grade 'B' Schedule 40 black steel pipe per ASTM A53 with rolled grooved ends.

C. Fitting Material: Comply with the following:

1. Threaded Fittings: Fittings for piping one and one half (1-1/2) inch and smaller shall be threaded Class 125 cast iron fittings as manufactured by Anvil / ASC Engineered Solutions or approved domestic equal.

2. Fitting Options: Fittings for two (2) inch piping shall be either threaded Class 125 cast iron per paragraph 1 above or ductile iron grooved end fittings per paragraph 3 below. (Contractor Option)

3. Grooved Fittings: Fittings for piping two and one half (2-1/2) inches and larger shall be ductile iron grooved end fittings. Fittings shall be short pattern, with flow equal to standard pattern fittings.

D. Joints, Couplings, Mechanical T's and Gaskets: Comply with the following:

1. Joints:

a. Joints for piping one and one half (1-1/2) inch and smaller shall be Threaded Joints conforming to American Standard for Pipe Threads ANSI B2.1.

b. Joints for two (2) inch piping shall either be Threaded Joints per paragraph 'a' above or Rolled Groove Joints with Couplings per paragraph 'c' below. (Contractor Option)

c. Joints for piping two and one half (2-1/2) inch and larger shall be Rolled Groove Joints with Couplings.

2. Couplings:

a. Couplings for rolled grooved piping shall be Victaulic Style 009N two (2) Bolt Installation Ready Coupling with offset angled bolt pads to accomplish rigidity and provide support in accordance with NFPA 13. Couplings shall be fully installed at visual pad to pad offset contact. Couplings that require gapping of bolt pads or specific torque ratings for proper installation are not permitted.

b. Where seismic design requirements are applicable, provide Victaulic Quick Vic Flexible Coupling Style 177N.

3. Mechanical-Ts:

a. For piping smaller than 2", provide Victaulic FireLock Outlet-T Style 922.

b. For piping larger than 2", provide Victaulic Mechanical-T Bolded Branch Outlet Style 920.

c. For 2" piping, either the Victaulic FireLock Outlet-T Style 922 or Victaulic Mechanical-T Bolded Branch Outlet Style 920 is acceptable.

4. Gaskets: Gasket Material shall be as follows:

a. Wet Systems: Grade 'EHP' EPDM.
b. Dry Systems: Grade 'E' Type 'A' EPDM.

2.5 PIPE SLEEVES

A. Steel Pipe Sleeves: Steel pipe sleeves shall be standard black steel pipe Type E, Grade B, with plain ends conforming to ASTM A53/A53M.

B. Cast Iron Pipe Sleeves: Cast iron pipe sleeves shall be standard weight cast iron pipe with plain ends conforming to ASTM A74 and CISPI – 301.

2.6 SPRINKLERS

A. General: Sprinklers shall be listed by UL and only new sprinklers shall be installed. Sprinklers shall be located and installed in accordance with NFPA 13 and properly coordinated with all other work.

B. Damage to Sprinklers: Any sprinkler that incurs damage, is painted, sprayed, caulked, or covered with any material before the system is accepted by the University shall be replaced by the contractor at no cost to the Owner. Protective sprinkler caps cannot be removed until after the ceiling is in place, or sprinklers will be subject to replacement.

C. Basis of Design: Basis of design shall be sprinklers manufactured by Viking or others as permitted below.

D. Temperature Ratings: The temperature rating of every sprinkler shall be in accordance with NFPA 13 and based upon the maximum anticipated ceiling temperature.

E. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler. Guards shall be specifically listed for the sprinkler on which they are being installed.

Guards shall be installed wherever sprinklers are potentially subject to damage. Guards shall be installed on all upright sprinklers located at the base of stairwells, on all sprinklers under ductwork, and on all sprinklers installed less than six (6) feet – eight (8) inches above the finished floor.

F. Coverage: Except for high hazard areas, all sprinklers shall be quick response standard coverage type sprinklers with a 'K' Factor of 5.6, unless prohibited by Code or otherwise directed by the UMB Fire Marshal. Only the listed sprinklers below may be installed, unless specific project requirements dictate a different type of sprinkler:

1. Pendant Sprinklers: Where pendant sprinklers are required, provide Viking VK3021 - Horizon Quick Response Flush Pendent Sprinkler and push on escutcheon with a white polyester finish to match ceiling.

2. Upright Sprinklers: Where upright sprinklers are required, provide Viking VK3001 – Microfast Quick Response Upright sprinkler with a chrome finish.

3. Side Wall Sprinklers: Where sidewall sprinklers are required, provide Viking VK305 - Microfast Quick Response Horizontal Sidewall Sprinkler and escutcheon with a white polyester finish to match walls.

## 2.7 IDENTIFICATION, & PIPE HYDROSTATIC/LEAK TESTING

A. General: Provide all supports, identification, and hydrostatically leak testing for all piping systems indicated on the drawings, details and as specified below.

B. Identification Products for Fire Protection Systems: Identification products for fire protection systems shall include pipe labels and ceiling markers from one (1) of the following manufacturers or approved equivalent: as follows:

1. Seton Fire Protection Signage
2. Craft Mark Fire Protection Signage
3. Reliable
4. Tyco
5. Kroy
6. Pipe Labels: Provide printed plastic self-adhesive pipe labels with contact-type, permanent-adhesive backing with a directional flow arrow and pipe service.

    a. Flow Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
    b. Lettering Size:

1) Pipe Size Less Than One and One Half (1-1/2) Inch in Diameter: Label shall be at least three quarter (3/4) inches high.
2) Pipe Size One and One Half (1-1/2) Inch to Two Inch (2) in Diameter: Label shall be at least one and one half (1-1/2) inches high.
3) Pipe Size Two and One Half (2-1/2) Inch in Diameter and Larger: Label shall be at least two and one quarter (2-1/4) inches high.

c. Pipe-Label Colors:

1) Background Color: Red.
2) Letter Color: White.
3) Lettering: (Wording for items B & C may need to be custom ordered)

a) "Fire Sprinkler"
b) "Dry Fire Sprinkler"
c) "Pre-Action Fire Sprinkler"
d) "Drain"
e) "Standpipe"

C. Ceiling Grid and Access Panel Markers: Provide Kroy type clear adhesive printed labels with three sixteenth (3/16) inch high letters to identify the location and type of concealed valves and sprinkler system components.

1. Ceiling Marker Data: For Fire Protection printed data shall be as follows:

a. FP Valve – Low Point Drain.

D. Pipe System Hydrostatic/Leak Test:

1. Perform hydrostatic testing in accordance with NFPA 13.

2.8 HANGERS AND SUPPORTS

A. Provide hangers and supports in compliance with NFPA 13.

2.9 AS BUILT DRAWINGS

A. For requirements see Part 3.

2.10 PROJECT OPERATION AND MAINTENANCE MANUAL ELECTRONIC FILES

A. Project O & M Manual File: The project OM Manual shall include one (1) electronic copy of each approved submittal and any manufacturer's maintenance manuals, and all

warranty certificates included in this Division. Also include the address, phone number and contact person for each supplier. Using the UMB Standard O&M Manual Template referenced in Division 01 Closeout Procedures insert the submittal files include both a book mark and tree structure for accessing each submittal file in the manual.

## PART 3 - EXECUTION

### 3.1 GENERAL REQUIREMENTS

A. In no case shall the existing fire protection system be placed out of service for more than eight (8) hours in a twenty four (24) hour period without the written approval of the UMB Fire Marshal. Contractor shall be responsible for performing a fire watch for outages greater than eight (8) hours.

B. Install all pipe, fittings, valves, controls, hangers and other components in accordance with NFPA 13.

C. The work under this contract shall be coordinated with that of all trades so that all work may be installed in the most direct and workmanlike manner, and so that interference between piping, ducts, equipment, architectural and structural features will be avoided.

D. All construction work that creates excessive noise will not be permitted during normal business hours. See Division 01 Specification Section “Cutting and Patching” for requirements.

### 3.2 CONNECTIONS AND ALTERATIONS TO EXISTING WORK

A. When existing fire protection work is removed, all pipes, valves, fittings, etc. shall be removed back to the active mains and capped. Plug and remove existing piping at the last active sprinkler.

B. Removal and/or relocation of existing services shall be closely coordinated with Facilities Management if they impact adjacent areas which shall remain operational.

C. While performing connections and alterations to existing fire protection work, the contractor shall take extreme care to protect all existing materials, equipment, casework etc. from dirt, debris, and damage. Any damage caused by the contractor to existing materials, equipment, casework, etc. shall be repaired to UMB's satisfaction and specifications at the contractor's expense.

### 3.3 CUTTING AND PATCHING

A. Cutting and patching associated with the work in the existing structure shall be performed a neat and workmanlike manner. Existing surfaces that are damaged by the contractor shall be repaired or provided with new materials to match existing.

B. Structural members shall not be cut or penetrated. Holes cut through concrete and/or masonry to accommodate new work shall be cut by reciprocating or rotary, non-percussive methods.

C. Patching of areas disturbed by installation of new work and/or required demolition shall match existing adjacent surfaces as to material, texture and color.

3.4 CUTTING, WELDING, BURNING

A. Before the contractor and/or any sub-contractor commences any cutting, welding, burning or other type of hot work at UMB, the contractor shall obtain a hot work permit. Hot work permits can be obtained online using https://www.umaryland.edu/fire-marshal/hot-work-permits/ and must be requested at least one business day prior to beginning hot work.

B. The hot work permit copy shall remain on the job site at the hot work location until such work is completed at which time the permit may be removed.

3.5 PIPE SLEEVE INSTALLATIONS

A. Fire Rated Walls: Where new and/or existing fire protection piping passes through rated walls provide pipe sleeves with required fire sealant materials to maintain the rating of the wall assembly.

1. Use standard weight steel pipe or service weight cast iron pipe for pipe sleeves. Where sleeves are installed in floors and load bearing walls, use only standard weight steel pipe for pipe sleeves.
2. Provide a minimum of one half (1/2) inch annular space clearance around the entire circumference of the pipe passing through the sleeve and between the pipe sleeve and the surface of the core drilled hole.
3. Center pipe passing through sleeve.
4. The entire annular spaces must be sealed with fire and waterproof sealant.
5. Sleeves in walls must be installed flush with both finished wall surfaces.
6. In finished areas provide an escutcheon plate around the bare pipe passing through the assemblies to conceal the sleeve and sealant.

B. Fire Rated Floors: Where new and/or existing fire protection piping passes through rated walls provide pipe sleeves with required fire sealant materials to maintain the rating of the wall assembly.

1. Use standard weight steel pipe for pipe sleeves.

2. Provide a minimum of one half (1/2) inch annular space clearance around the entire circumference of the pipe passing through the sleeve and between the pipe sleeve and the surface of the core drilled hole.
3. Center pipe passing through sleeve.
4. The entire annular spaces must be sealed with fire and waterproof sealant.
5. Sleeves must be installed with top of sleeve one (1) inch above the finished floor surface. The bottom of the sleeve must be flush with the finished surface of the underside of the floor assembly.
6. In finished areas provide an escutcheon plate around the bare pipe passing through the assemblies to conceal the sleeve and sealant. If a riser clamp is in place, omit the escutcheon.

C. Sealant Requirements: Comply with requirements for sealants specified in Part 2.

D. Fire-Barrier Penetrations: Comply with requirements for firestopping specified in Part 2.

## 3.6 INSTALLATION – SPRINKLER PIPING

A. In areas with suspended ceilings all sprinkler piping shall be concealed. Piping shall be installed and arranged to protect it from freezing and corrosion and shall be pitched for drainage.

B. All sprinkler piping shall be substantially supported from the building structure which must support the added load of water filled pipe plus a minimum of two hundred fifty (250) pounds applied at the point of hanging in accordance with NFPA 13.

C. Install all vertical sprinkler piping systems level and parallel to the building walls, ceilings, and partitions.

D. Where horizontal sprinkler piping offsets to clear obstructions such as ductwork, structural members and work installed by other trades provide low point drain valves in locations where they can be accessed.

## 3.7 PIPE JOINTS

A. Grooved Joints: Install in accordance with the manufacturer's latest published installation instructions. Pipe ends shall be clean and free from indentations, projections and roll marks in the area from pipe end to (and including) groove. Gasket shall be manufactured by the coupling manufacturer and verified as suitable for the intended service. A factory trained representative (direct employee) of the coupling manufacturer shall provide on-site training for contractor's field personnel in the use of grooving tools, application of groove, and product installation. The representative shall periodically visit the job site and review installation to ensure best practices in grooved joint installation are being followed. Contractor shall remove and replace any improperly installed products.

3.8 INSTALLATION – SPRINKLERS

A. Center sprinklers in ceiling tiles and coordinate location with all other trades, including but not limited to ceilings, lights, diffusers, grilles etc.

B. Sprinklers shall be installed using rigid pipe offsets or return bends for the sprinkler drops. Where rigid pipe offsets, return bends are used for the sprinkler drop, the connection to the drop must be off of the top of the pipe.

C. In finished areas where more than two (2) sprinklers are installed, the deflectors of all sprinklers shall be installed at the same elevation from the finished floor.

3.9 INSTALLATION – PIPE LABELS

A. Install or permanently fasten labels on each major item of sprinkler equipment. All piping shall be labeled but not necessarily require color coding. Color coding is on applicable where existing pipe is 'coated'.

B. Clean piping and equipment surface of substances that could impair bond of identification devices which may include dirt, oil, grease, release agents, incompatible primers, paints, and encapsulants.

C. Pipe Labels: Provide pipe labels for all exposed and concealed piping. Locate pipe labels as follows:

1. In spaces without ceilings position pipe labels so they are visible from the floor.
2. In concealed spaces above suspended ceilings and in utility shafts position pipe labels so they are visible from an access point.
3. Spaced at maximum intervals of twenty-five (25) feet along each run of the sprinkler main.
4. Near the midpoint of each branch pipe serving more than one (1) sprinkler.

D. Piping Color Coding: Match Existing with high performance coatings where applicable.

3.10 INSTALLATION, TEST AND ACCEPTANCE

A. Installation, Tests, And Acceptance:

1. Installation, testing, and final acceptance shall be in accordance with all applicable codes, and the requirements of the University and the UMB Fire Marshal.

2. All required test shall be performed by the fire protection contractor as part of this contract. The fire protection contractor shall see that proper representatives of the

Owner, the Engineer, UMB Fire Marshal, Design and Construction Department and any other personnel desiring to witness the tests shall be notified at least five (5) days prior to the scheduled test time.

3.11 CONSTRUCTION RECORD DOCUMENTS

A. Upon completion of the work, the sprinkler contractor shall transmit to the A/E one (1) set of marked up prints as a colored pdf file and one (1) electronic CAD file in the latest Auto Cad Release edition used by UMB with All "As Built Drawing" information neatly recorded thereon in red. The A/E shall verify that all “Record Drawing” information has been recorded on the electronic CAD file. The electronic CAD file and mark up pdf file shall be transmitted to UMB by the A/E.

B. At a minimum, the following installed conditions shall be recorded:

1. Location of all low point drain valves with assigned valve tag numbers.

3.12 CLEAN – UP

A. Excessive debris and dirt, such as occurs from cutting through masonry or plaster walls shall be cleaned up from the equipment and removed immediately after the work of cutting through the walls.

B. Debris shall be removed from UMB property.

C. Ceiling Tiles: Ceiling tiles in finished areas shall not be installed/replaced until all inspections have been completed and accepted.

D. All areas shall be left broom-clean at the end of the work period.

END OF DIVISION 210000

# DIVISION 220000 – PLUMBING

## PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SCOPE:

A. The plumbing contractor shall furnish all labor, material, tools, equipment and services necessary and incidental for installing all plumbing systems shown on the drawings, indicated in the specification, or necessary to provide a finished installation. The finished installation shall be in perfect working condition and be ready for continuous and satisfactory operation. The project area is located in Pratt Street Garage at 646 West Pratt Street.

1.3 CODES AND REGULATIONS

A. All materials furnished and all work installed shall comply with the codes and regulations adapted by the State of Maryland and recommendations of the following bodies:

1. International Building Code (IBC)
2. International Mechanical Code (IMC)
3. International Plumbing Code (IPC)
4. International Fuel Gas Code (IFGC)
5. National Electric Code (NEC)
6. Maryland State Health Department
7. Underwriters Laboratories (UL)

1.4 RESPONSIBILITY

A. The Construction Manager/General Contractor (CM/GC) shall be responsible for all work included in this Division. The delegation of work to the contractors shall not relieve him of this responsibility. Contractors who perform work under this Division shall be responsible to the CM/GC.

1.5 SITE VISIT

A. Prior to preparing the bid, the mechanical subcontractor shall visit the site and become familiar with all existing conditions. Make all necessary investigations as to locations of utilities and existing field conditions that could affect the work. No additional compensation will be made to the contractor as a result of his failure to familiarize himself with the existing conditions under which the work must be performed.

1.6 OUTAGES

A. For all work requiring an outage, the plumbing contractor shall submit an outage request to the UMB Project Manager, using the UMB Standard Request for Outage Form which is available through the UMB Design and Construction Web Site at https://www.umaryland.edu/designandconstruction/design-and-construction-documents/umb-standard-project-forms---current-editions/

B. The existing mechanical/electrical/fire protection systems shall remain operational unless turned off by University personnel during the construction of the project.

C. Unless otherwise specified, outages of any services required for the performance of this contract and affecting areas other than the immediate work area shall be scheduled at least ten business days (10) days in advance with the UMB Design and Construction Department. Outages shall be performed during normal duty hours. If necessary some outage work may be performed outside normal hours if approved by UMB.

D. All plumbing outages which will interfere with the normal use of the building in any manner shall be done at such times as shall be mutually agreed upon by the contractor and the UMB Design and Construction Department.

E. The plumbing contractor shall include in his price the cost of all premium time required for outages and other work which interferes with the normal use of the building, which will be performed, in most cases, during other than normal work time and at the convenience of the University.

F. The operation of plumbing valves or switches; required to achieve an outage must be operated by University personnel only. Unauthorized operation of plumbing valves, power switches, or other control devices by contractors and their personnel will result in extremely serious consequences for which the contractor will be held accountable.

1.7 SUBMITTALS

A. General: For general requirements see Architectural Specification Division 01 Section "Submittal Procedures". Also comply with the following:

1. UMB requires all that all submittals, which includes shop drawings, product data, related equipment maintenance manuals, warranty documentation and all other pertinent information be submitted electronically by the manufacturer, trade contractors, and construction manager as a “pdf” file for review as required by Division 01. Partial submittals are not acceptable and will be returned without review.

2. After contract award and before material is ordered submit electrically all product data, shop drawings and other such descriptive data as the Engineer may require to demonstrate compliance with the contract documents as required by the contract clauses for review and approval.

3. Submittals shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable publication references, years of satisfactory service, and other information necessary to establish contract compliance of each item the Contractor proposes to furnish.

4. Plumbing shop drawings must be developed by computer software. Any hand drawn shop drawings will be rejected and will not be reviewed.

5. Submittals will be reviewed for general compliance with design concept in accordance with contract documents, but dimensions, quantities, or other details will not be verified.

6. Product Submittals shall include the following items unless otherwise noted:
   a. Article 2.2, Fire Stops & Smoke Seals for Wall and Floor Sleeve Applications
   b. Article 2.3, Plumbing Piping Systems
   c. Article 2.4, Pipe Sleeves
   d. Article 2.5, Piping Specialties
   e. Article 2.6, Plumbing Valves
   f. Article 2.7, Hangers and Supports
   g. Article 2.8, Identification System
   h. Article 2.9, Plumbing Fixtures
   i. Article 2.10, Plumbing Specialties
   j. Article 2.11, Plumbing Equipment
   k. Article 2.12, Pipe Insulation
   l. Article 2.13, Flushing and Disinfecting
   m. Article 2.14, O&M Manual
   n. Article 2.15, Housekeeping Pad
   o. Article 2.16, Grout
   p. Warranties and maintenance instructions shall be included in the O & M Manual only. Do not include this data in the Product Submittals.

7. Submittal File Format: File formats and names for each submittal shall be electronically as follows:

   a. File Formats:
      1) Product Data: “pdf” file format.
      2) Design Shop Drawings: “pdf” and “dwg” file formats.

3) Coordinated Drawings: “pdf” or “dwg” file formats.
4) Schedules: “xl” file format.

1.8 SAMPLES

A. Samples of materials to be used on the work shall be submitted when requested and shall be subject to approval by the A/E and the UMB Design and Construction Department.

1.9 IDENTIFICATION BADGES

A. Contractors must obtain photo identification cards for all employees who will be at the construction site. The University will charge the contractor $25.00 for each badge as a deposit of which $20.00 will be returned when the badge is returned. Lost photo I.D. card will cost $25.00 for another replacement card. (The above charges are subject to change without notice.)

1.10 HAZARDOUS MATERIALS

A. Identification and removal of hazardous materials (asbestos, lead paint, PCBs) is not part of this contract. If questionable material is encountered, notify the University Project Manager and the University Environmental Health and Safety in writing immediately. The University shall then arrange for investigation and possible abatement of the material. Contractor shall schedule his work to accommodate hazardous material removal by the Owner.

1.11 COMMISSIONING NEW PLUMBING SYSTEMS

A. Summary: This article includes the requirements for commissioning new Plumbing Systems, assemblies and equipment related to the project area.

B. Commissioning Agent (CxA): The CxA for the project shall be a UMB Representative

C. Description: The following equipment and/or accessories shall be commissioned as part of this project:

1. Plumbing Systems:

a. Plumbing Fixtures:
1) Sump Pump w/ oil separator
2) Sump Pump

1.12 MOTOR REQUIREMENTS

A. General Requirements:

1. Compliance: Comply with NEMA MG 1 unless otherwise indicated.

2. Motor Requirements: Requirements below apply to motors covered by this Division except as otherwise indicated.

a. Motors 1/2 HP and Larger: Three phase.
b. Motors smaller than 1/2 HP: Single phase.
c. Frequency Rating: 60 Hz.
d. Voltage Rating: Determined by voltage of circuit to which motor is connected for the following motor voltage ratings (utilization voltages):

1) 120 V Circuit: 115 V - motor rating.
2) 208 V Circuit: 200 V - motor rating.
3) 240 V Circuit: 230 V - motor rating.

B. Single Phase Motors:

1. Motors larger than 1/20 hp shall be one (1) of the following, to suit starting torque and requirements of specific motor application:

a. Permanent-split capacitor.
b. Split phase.
c. Capacitor start, inductor run.
d. Capacitor start, capacitor run.

2. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
3. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
4. Motors 1/20 HP and Smaller: Shaded-pole type.
5. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

1.13 WARRANTY/GUARANTEE

A. All materials, equipment, etc. provided by the general contractor and/or his subcontractors shall be warranted and guaranteed to be free from defects in workmanship and materials for a period of two (2) years from the date of substantial of completion and acceptance of work by UMB. Any defects in workmanship, materials, or performance which appear within the guarantee period shall be corrected by the contractor without cost to the owner, within a reasonable time, to be specified by UMB. In default thereof, owner may have such work done and charge the cost of same to the contractor. In

addition to the above statement the Warranty/Guarantee Period shall also include all labor cost related to all warranty work. For compressorized equipment include an additional three (3) year Warranty/Guarantee Period.

## PART 2 – PRODUCTS

### 2.1 LISTED MANUFACTURERS

A. Listed Manufacturers: The manufacturers indicated in Part 2 represent the basis for design and identify the minimum level of quality for materials and equipment, specified in this Division, that are acceptable to UMB. Unless "or equal" is included as an option, substitutions are not allowed, except under the following condition. During bid phase, contractors may submit material and equipment by non-listed manufacturers provided said submittals meet the requirements of these specifications. All submitted materials and equipment are subject to approval by the A/E and UMB. Reference: Division 1 Substitution Section.

### 2.2 FIRE STOPS & SMOKE SEALS FOR WALL & FLOOR SLEEVE APPLICATIONS

A. General: Provide fire stops, and smoke sealant materials for all plumbing services penetrating through rated assemblies. See Architectural Specification Division 07, Section "Penetration Firestopping" for sealant material requirements. Services include:

1. Plumbing penetrations include all plumbing piping systems.

B. New Construction: All new penetrations shall be provided with a pipe sleeve and sealant materials.

C. Existing Construction: All new service penetrations through existing rated assemblies shall be provided with a pipe sleeve and sealant materials. All existing unsealed penetrations for services passing through existing rated assemblies within the project area shall be provided with sealant materials.

D. Project Area: The project area shall include the finished spaces and related sections of the utility shafts within the project area footprint.

E. Wall Pipe Sleeve Applications: Pipe sleeves shall be required for all new pipe penetrations through rated wall assemblies and non-rated CMU walls. Where pipe sleeves are installed in non-rated CMU walls fire rated sealant materials are not required. Provide acoustical caulking to seal the annular spaces between the sleeve and the bare pipe or pipe insulation on each end with one half (1/2) inch caulking all around the annular space.

F. Floor Pipe Sleeves Applications: Pipe sleeves are required for all new pipe risers passing through floor slabs.

2.3 PLUMBING PIPING SYSTEMS

A. General: Provide all piping systems indicated on the drawings and as specified below, including all labor materials and equipment necessary for a complete installation.

B. Plumbing Piping Systems: Plumbing piping systems includes non laboratory sanitary and vent, laboratory acid waste sanitary and vent, domestic water, laboratory water, laboratory natural gas, and laboratory specialty gas piping systems as follows:

1. Non - Laboratory Sanitary & Vent Piping System: Pipe, fittings and couplings shall be as follows:

a. Sanitary Piping Below Grade in the Building: Sanitary piping below the floor slab shall be cast iron service weight hub and spigot pipe, fittings and joints with compression gaskets. Pipe and fittings shall conform to ASTM A74. Gaskets shall conform to ASTM C 564. All Cast Iron Soil Pipe and Fittings shall be marked with the Collective Trade Mark of the Cast Iron Soil Pipe Institute (CISPI) and listed by NSF International.

b. Sanitary & Vent Piping Above Ground Inside the Building: Pipe and Fittings: Sanitary & vent piping shall be Schedule 40 cast iron no hub pipe and fittings, serving Non-Laboratory areas only. All Cast Iron Soil Pipe and Fittings shall be marked with the Collective Trade mark of the Cast Iron Soil Pipe Institute (CISPI) and listed by NSF International.

c. Pipe Couplings: comply with the following:

1) Husky SD 4000 Couplings: All couplings shall be a heavy-duty, all stainless steel coupling to join No-Hub pipe and fittings as engineered by Anaco. Each coupling shall include a super-duty corrugated shield of sufficient width to accommodate additional surface-bearing sealing clamps. All SD 4000 couplings shall be designed to be installed with a pre-set torque wrench calibrated at eighty (80) inch pounds to accommodate the 305 stainless steel three eights (3/8) inch Hex Head screws.

2) Waste and Vent Pipe Sizes One and One Half (1-1/2) Inch Through Four (4) Inch: The one and one half (1-1/2) inch through four (4) inch diameter couplings shall consist of three (3) inch wide corrugated 304 stainless steel shield in conjunction with four (4) stainless steel clamps, secured in place by means of an affixed and “floating” eyelet to allow clamp “travel” during tightening.

3) Waste and Vent Pipe Sizes Five (5) Inch Through Ten (10) Inch: The five (5) inch through ten (10) inch diameter couplings shall consist of four (4) inch wide corrugated 304 stainless steel shield in conjunction with six (6) stainless steel clamps, secured in place by means of an affixed and "floating" eyelet to allow clamp "travel" during tightening.

d. Material Specifications:
1) Clamp: Type 304 AISI stainless steel
2) Screw: Type 305 AISI stainless steel 3/8 inch screws
3) Shield: Type 304 AISI stainless steel, corrugated. Shield thickness 0.015
4) Gasket: The gasket shall be manufactured from a properly vulcanized virgin compound in which the primary elastomer is polychloroprene (neoprene) conforming to ASTM C 564. Oil Immersion test: 80% max. Volume Change after immersion in IRM 903 for seventy (70) hours at 212° F.

e. Certifications & Standards: Tested & Certified to:
1) ASTM C1540
2) ASTM C564
3) FM 1680 Class 1

2.4 PIPING SPECIALTIES

A. General: Provide all piping specialties where indicated on the drawings, details, and as specified below complete with all supports, fittings, etc. for Plumbing Piping Systems.

1. Pipe Anchors: Anchors shall be constructed of steel sections and plates, assembled by bolting or welding and secured to building structure.

2. Dielectric Connections: Provide dielectric connections where nonferrous metal is joined to ferrous metal as follows:

a. Piping Two (2) Inch and Smaller: Provide Schedule 40 unlined type 316 stainless steel nipples, four (4) inched long with thread ends.

b. Piping Two and One Half (2-1/2) Inch and Larger: Provide Type 'E' Full Flanged Isolation Gasket Kits with Dialectic Insulators for the pipe flanges.

A. Check Valves:

1. Swing Check Valves, two and one half (2-1/2) inches (DN65) and Smaller: MSS SP-80; Class 125, 200-psi (1380-kPa) CWP, or Class 150, 300-psi (2070-kPa)

CWP; horizontal swing, Y-pattern, ASTM B 62 cast-bronze body and cap, rotating bronze disc with rubber seat or composition seat, threaded connections for 60 psig steam condensate service.

## 2.5 HANGERS & SUPPORTS

A. General: Provide all supports, identification, and testing for all piping systems indicated on the drawings, details and as specified below.

B. Interior Pipe System Hangers & Supports:

1. Hangers and supports shall be provided for all piping systems, as recommended by the hanger manufacturers for the existing structural elements. On piping systems requiring insulation, hangers and supports shall be installed external to the insulation material, and sheet metal saddles shall be provided. Hangers and supports shall be provided at all changes of direction and elevations on piping system. Spacing shall be as recommended by manufacturer, for each pipe size and material.

2. Hangers, Supports, and Components: Provide factory fabricated products according to MSS SP-58 as manufactured by B-Line, Fee and Mason, ITT Grinnel, Pipe Shields, Inc., Michigan Hanger, and Unistrutt. Unless otherwise indicated, specified model numbers are manufactured by B-Line.

3. Horizontal Non-Insulated Waste, Vent and Storm Water Piping Hangers:

   a. Two (2) inch and smaller: Figure No. B3170.
   b. Two and one-half (2-1/2) inch and larger: Figure No. B3100.

## 2.6 IDENTIFICATION SYSTEM

A. Identification Products for Mechanical Systems: Identification products for mechanical systems shall include pipe markers, duct markers, valve tags and schedule, and ceiling markers as follows:

1. Pipe Labels: Provide factory fabricated flexible, preformed semi-rigid plastic pipe labels to fit around pipe and/or pipe coverings, with fluid being conveyed and flow direction arrow. Pipe labels shall be SETMARK System as manufactured by Seton Name Plate Corporation or approved equal.

   a. Plumbing: Text with Field/Letters color as noted below
      1) “SANITARY” – Green/White

2. Valve Tags:
   a. Description: Stamped or engraved with one quarter (1/4) inch letters for piping system abbreviation and one half (1/2) inch numbers with:

      1) Brass Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
      2) Fasteners: Brass wire-link chain.
      3) Astric ((*): Indicates the valve is part of a renovation project in the building.

## 2.7 PLUMBING FIXTURES

A. General:

1. Provide all plumbing fixtures and specialties indicated on the drawings and as specified below, complete with all trim, hangers, fittings etc. for a complete installation. All exposed metal parts shall be polished chrome plated brass unless otherwise specified below.

2. All plumbing fixtures & trim shall be as specified or approval equal.

## 2.8 PLUMBING EQUIPMENT

A. Sump pump
   1. Zoller

## 2.9 PROJECT OPERATION AND MAINTENANCE MANUAL ELECTRONIC FILES

A. Project O & M Manual File: The project OM Manual shall include one (1) electronic copy of each approved submittal and any manufacturer's maintenance manuals, and all warranty certificates included this Division. Also include the address, phone number and contact person for each supplier. Using the UMB Standard O&M Manual Template referenced in Division 01 Closeout Procedures insert the submittal files include both a book mark and tree structure for accessing each submittal file in the manual.

A. Systems using Pro-Press piping connectors shall perform a pre-test at 30 psi for 10 minutes. After the hydrostatic test pressure has been applied for ten (10) minutes and with no allowable drop in pressure, the tested system or segment has passed the Pro-Press leak pretest. If after the ten (10) minute test period there is a loss in pressure below the initial test pressure, the test has failed and the contractor shall examine piping, joints, and connections for leakage. After all leaks have been corrected by tightening, repairing, and/or replacing components as appropriate, the hydrostatic test shall be rescheduled with

the University. The test procedure shall be repeated as specified above until there are no leaks and there is no loss in pressure.

2.2 COMMISSIONING PLUMBING SYSTEMS:

A. Test Equipment: Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to testing equipment.

**PART 3 – EXECUTION**

3.1 GENERAL REQUIREMENTS – EXECUTION

A. All construction work that creates excessive noise will not be permitted during normal business hours. See Division 01 Specification Section "Cutting and Patching" for requirements.

3.2 CONNECTIONS AND ALTERATIONS TO EXISTING WORK

A. When existing plumbing work is removed, all pipes, valves, hangers etc. shall be removed back to the active pipe mains and capped.

B. Removal and/or relocation of existing services shall be closely coordinated with Facilities Management if they impact adjacent areas which shall remain operational.

C. While performing connections and alterations to existing plumbing work, the contractor shall take extreme care to protect all existing materials, equipment, casework etc. from dirt, debris, and damage. Any damage caused by the contractor to existing materials, equipment, casework, etc. shall be repaired to UMB's satisfaction and specifications at the contractor's expense.

3.3 CUTTING AND PATCHING

A. Cutting and patching associated with the work in the existing structure shall be performed a neat and workmanlike manner. Existing surfaces that are damaged by the contractor shall be repaired or provided with new materials to match existing.

B. Structural members shall not be cut or penetrated. Holes cut through concrete and/or masonry to accommodate new work shall be cut by reciprocating or rotary, non-percussive methods.

C. Patching of areas disturbed by installation of new work and/or required demolition shall match existing adjacent surfaces as to material, texture and color.

3.4 CUTTING, WELDING, BURNING

A. Before the contractor and/or any sub-contractor commences any cutting, welding, burning or other type of hot work at UMB, the contractor shall obtain a hot work permit. Hot work permits can be obtained online using https://www.umaryland.edu/fire marshal/hot work-permits/ and must be requested at least one business day prior to beginning hot work

B. The hot work permit copy shall remain on the job site at the hot work location until such work is completed at which time the permit may be removed.

3.5 INSTALLATION – PLUMBING PIPING SYSTEMS

A. Waste and Vent and Storm Water Piping Systems:

1. Install all, horizontal and vertical, non waste and storm water piping systems level and parallel to the building walls, and partitions.

2. Install all, horizontal waste, vent and storm water piping systems parallel to the building walls, and partitions with the required minimum slope required by code to provide gravity drainage to the vertical waste, vent and rainwater leaders.

3. Install all, vertical waste, vent and storm water (rain water leader) piping systems parallel to the building walls, and partitions with the required minimum slope required by code to provide gravity drainage to the vertical waste, vent and rainwater leaders.

1. Pipe Joint Construction:

a. Threaded Joints: Refer to NFPA 54, for guide for number and length of threads for field threading steel pipe.

3.6 PIPING SPECIALTIES

A. Dielectric Connections:

1. Install dielectric connections when piping of dissimilar metals piping and tubing are joined.

2. Dielectric Connections for NPS 2 and Smaller: Use stainless steel threaded nipples.

3. Dielectric Connections for NPS 2-1/2 and Larger: Use dielectric flange kits.

3.7 INSTALLATION – PIPE SLEEVES

A. Fire Rated Walls: Where new and/or existing plumbing piping passes through rated walls provide pipe sleeves with required fire sealant materials to maintain the rating of the wall assembly.

1. Use standard weight steel pipe or service weight cast iron pipe for pipe sleeves. Where sleeves are installed in floors and load bearing walls, use only standard weight steel pipe for pipe sleeves.
2. Provide a minimum of one half (1/2) inch annular space clearance around the entire circumference of the pipe and/or insulation on cold piping passing through the sleeve and between the pipe sleeve and the surface of the core drilled hole.
3. Center pipe passing through sleeve.
4. Except for cold piping, do not continue insulation through sleeve.
5. The entire annular spaces must be sealed with fire and waterproof sealant Seal ends of pipe insulation and butt insulation ends up to fire stopping sealant in sleeve.
6. Sleeves in walls must be installed flush with both finished wall surfaces.
7. In finished areas provide an escutcheon plate around the bare pipe or insulated pipe passing through the assemblies to conceal the sleeve and sealant.

B. Fire Rated Floors: Where new and/or existing plumbing piping passes through rated walls provide pipe sleeves with required fire sealant materials to maintain the rating of the wall assembly.

1. Use standard weight steel pipe or service weight cast iron pipe for pipe sleeves.
2. Provide a minimum of one half (1/2) inch annular space clearance around the entire circumference of the pipe and/or insulation on cold piping passing through the sleeve and between the pipe sleeve and the surface of the core drilled hole.
3. Center pipe passing through sleeve.
4. Except for cold piping, do not continue insulation through sleeve.
5. The entire annular spaces must be sealed with fire and waterproof sealant.
6. Seal ends of pipe insulation and butt insulation ends up to waterproof sealant in sleeve.
7. Sleeves must be installed with top of sleeve one (1) inch above the finished floor surface. The bottom of the sleeve must be flush with the finished surface of the underside of the floor assembly.
8. In finished areas provide an escutcheon plate around the bare pipe or insulated pipe passing through the assemblies to conceal the sleeve and sealant. If a riser clamp is in place, omit the escutcheon.

C. Sealant Requirements: Comply with requirements for sealants specified in Part 2.

D. Fire-Barrier Penetrations: Comply with requirements for firestopping specified in Part 2.

3.8 INSTALLATION – VALVES

A. Valves shall be placed in such manner as to be easily accessible for smooth and easy hand wheel operation and packing maintenance.

B. On valves, strainers, etc., installed in copper piping, provide a union on the discharge side of each valve, and threaded adapters where copper piping connects to valves, strainers, etc.

## 3.9 INSTALLATION – HANGERS AND SUPPORTS

A. Piping Systems: Hangers and supports shall be provided for all piping systems, as recommended by the hanger manufacturers for the existing structural elements. Additional requirements are as follows:

1. On piping systems requiring insulation, hangers and supports shall be installed external to the insulation material, and sheet metal saddles shall be provided.

2. Hangers and supports shall be provided at all changes of direction and elevations on piping system.

3. Spacing shall be as recommended by manufacturer, for each pipe size and material type.

## 3.10 INSTALLATION – PIPE LABELS

A. General: Provide pipe labels with directional arrows every twenty five (25) feet on straight runs of horizontal and vertical pipes exposed in equipment rooms, utility shafts and above ceilings. In addition to the referenced spacing above comply with the following:

1. Where pipes pass through floors, walls and partitions provide pipe labels on each side of the penetration.

B. Exposed Piping: Install pipe labels in accessible locations on the piping systems so they are visible from the floor. Do not install pipe labels on sections of pipe that are not in a person’s sight line.

C. Concealed Piping: Install pipe labels in accessible locations on the piping systems so they are visible from the point of access through the ceiling tile or ceiling access door.

D. Directional Arrows: Install directional arrows to indicate the correct flow direction.

E. All pipe labels and flow arrows that are found to be incorrectly installed shall be replaced and corrected at no additional cost to the project.

3.11 CONCRETE HOUSEKEEPING PADS

A. General: Construct concrete housekeeping pads to support mechanical equipment were indicated and as detailed on the drawings and as specified herein. Engage the services of the Structural or General Contractor, and pay for them, to provide the concrete housekeeping pads. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations.

B. Housekeeping Pads: Set all floor-mounted equipment on four (4) inch high concrete housekeeping pads, unless otherwise shown or specified.

1. Housekeeping Pads: Pads shall be a minimum of four (4) inches wider and longer than vibration isolation base or structural base of equipment being set on pad.
2. Housekeeping pads: Pads border shall be painted with high visibility yellow paint

3.12 CLEAN – UP

A. Excessive debris and dirt, such as occurs from cutting through masonry or plaster walls shall be cleaned up from the equipment and removed immediately after the work of cutting through the walls.

B. Debris shall be removed from UMB property.

C. Ceiling panels shall be replaced as soon as work is finished in the area, and shall be kept free of dirty finger prints. Where work is being done in corridors used by patients and visitors, ceiling panels shall be replaced at the close of the day’s work even if work is at the particular location is incomplete.

D. All areas shall be left broom-clean at the end of the work period.

E. Remove all mechanical clipping, wiring, nuts, bolts, etc. left on top of ceilings and ceiling tiles.

3.13 COMMISSIONING PLUMBING SYSTEMS

A. Testing Preparation:

1. Certify in writing to the CxA that new plumbing systems, subsystems, and equipment have been installed, and are operating according to the Contract Documents.

2. Certify in writing to the CxA that new plumbing systems have been leak tested according to the Contract Documents.

3. Certify in writing to the CxA that new plumbing systems have been flushed and disinfected according to the Contract Documents.

B. New Plumbing Systems, Subsystems, and Equipment Testing Procedures:

1. Procedures: Where applicable follow manufacturer's written procedures. If no procedures are prescribed by the manufacturer, proceed as indicated.

**UMB STANDARD PIPE SYSTEM HYDROSTATIC/LEAK TEST SUMMARY FORM**

**TEST DATA:**

Date: _____ Project Number: _____

Location: _____

Pipe System Tested (Service): _____

Location and Description: _____

Pipe Materials: _____

Operating Pressure: _____

Specified Test Pressure: _____

Actual Test Pressure: _____

Pressure Test Type: _____

Test Start Time: _____ Recorded Test Pressure: _____

Test Completion Time: _____ Recorded Test Pressure: _____

Test Duration: _____ Pressure Drop or Rise: _____

Test Result (Pass/Fail): _____

**SIGNATURES:**

Construction Manager: _____

Construction Manager Representative: _____

Mechanical Contractor: _____

Mechanical Contractor Forman: _____

UMB Division: _____

UMB Witness: _____

Remarks: _____

END OF DIVISION 220000

# DIVISION 260000 – ELECTRICAL

## PART 1 – GENERAL REQUIREMENTS:

1.1 RELATED DOCUMENTS:

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

1.2 SCOPE:

A. The electrical contractor shall furnish all labor, material, tools, equipment and services necessary and incidental for installing all electrical systems shown on the drawings, indicated in the specifications, or necessary to provide a finished installation. The finished installation shall be in perfect working condition and be ready for continuous and satisfactory operation. The project area is located in Pratt Street Garage at 646 West Pratt Garage.

1.3 CODES & REGULATIONS:

A. All materials furnished and all work installed shall comply with the latest rules, regulations, and recommendations of the following bodies:

1. International Building Code
2. International Mechanical Code
3. National Electric Code
4. Maryland State Health Department
5. National Fire Protection Association
6. Fire Prevention Bureau Baltimore City
7. Fire Protection Bureau State of Maryland
8. Underwriters Laboratories
9. National Electrical Manufacturer Association
10. National Electrical Testing Agency
11. Insulated Power Cable Engineers Association

1.4 RESPONSIBILITY

A. The construction manager/general contractor (CM/GC) shall be responsible for all work included in Division 26. The delegation of work to contractors shall not relieve him of this responsibility. Contractors who perform work under these sections shall be responsible to the CM/GC.

1.5 SITE EXAMINATION:

A. Failure to visit the site and become familiar with existing project conditions prior to bidding will not relieve the Contractor of responsibility for complying with the Contract Documents.

1.6 OUTAGES:

A. For all work requiring an outage, the electrical contractor shall submit an outage request to the UMB Project Manager, using the UMB Standard Request for Outage Form which is available through the UMB Design and Construction Web Site at https://www.umaryland.edu/designandconstruction/design-and-construction-documents/umb-standard-project-forms---current-editions/

B. The existing electrical systems shall remain operational unless turned off by University personnel during the construction of the project. For each electrical outage request include a photograph of the panel index schedule for each panel affected by the outage.

C. Unless otherwise specified, outages of any services required for the performance of this contract and affecting areas other than the immediate work area shall be scheduled at least ten business (10) days in advance with the UMB Design and Construction Department. Outages shall be performed during normal duty hours. If necessary some outage work may be performed outside normal hours if approved by UMB.

D. The electrical contractor shall include in his price the cost of all premium time required for outages and other work which interferes with the normal use of the building, which will be performed, in most cases, during other than normal work time and at the convenience of the University.

E. The operation of electrical panels or power switches; required to achieve an outage must be accomplished by University personnel only. Unauthorized operation of electric panels, power switches, by contractors their personnel will result in extremely serious consequences for which the contractor will be held accountable.

1.7 SUBMITTALS:

A. General Requirements: For general requirements see Architectural Specification Division 01 Section "Submittal Procedures".

1. After contract award and before material is ordered submit electrically all shop drawings, drawings and such other descriptive data as the Engineer may require to demonstrate compliance with the contract documents as required by the contract clauses, plus the number required for himself and his subcontractors, for review and approval.

2. Submittals shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification

and paragraph reference, applicable publication references, years of satisfactory service, and other information necessary to establish contract compliance of each item the Contractor proposes to furnish.

3. All electrical equipment shall be approved and listed by Underwriters' Laboratories (UL) and shall bear nameplate indicating same.

4. Submittals will be reviewed for general compliance with design concept in accordance with contract documents, but dimensions, quantities, or other details will not be verified.

   Submittals shall include the following items:

   a. Article 2.2, Fire Stops & Smoke Seals for Wall & Floor Sleeve Applications
   b. Article 2.3, Sleeves
   c. Article 2.4, Raceway
   d. Article 2.6, Boxes and Enclosures
   e. Article 2.7, Wire and Cable
   f. Article 2.8, Grounding
   g. Article 2.9, Enclosed Switches and Disconnects
   h. Article 2.10, Devices
   i. Article 2.11, Identification
   j. Article 2.12, Transformers
   k. Article 2.13, Panelboards
   l. Article 2.14, Motor Controllers
   m. Article 2.15, Lighting
   n. Article 2.16, Indoor Occupancy / Vacancy Sensors
   o. Article 2.17, O & M Manual
   p. Warranties and maintenance instructions shall be included in the O & M Manual only. Do not include this data in the Submittals.

5. Additional Submittals: Subject to project requirements, in addition to the submittals indicated above the following submittals may also be required:

6. Submittal File Format: File formats and names for each submittal shall be electronically as follows:

   a. File Formats:
      1) Product Data: “pdf” file format.
      2) Design Shop Drawings: “pdf” and “dwg” file formats.
      3) Coordinated Drawings: “pdf” or “dwg” file formats.
      4) Schedules: “xl” file format.

1.8 SAMPLES:

A. Samples of materials to be used on the work shall be submitted when requested and shall be subject to approval by the A/E and the UMB Design and Construction Department.

1.9 REGULATIONS AND PERMITS:

A. The Contractor shall obtain and pay for all permits, certificates of inspection, etc., required by the authorities having jurisdiction over this work. The certificates shall be delivered to the Engineer before the date of final acceptance of the project.

B. Obtain applicable permits from Baltimore City to do work in City Streets. The City charges a compensatory fee when parking meters are required to be out of service.

C. Manhole Permit – Obtain permit from Baltimore City for manhole. Copy permit to UMB Environmental Health & Safety (EH&S) Group for UMB approval.

1.10 WORK PERFORMANCE

A. All electrical work must comply with the requirements of NFPA 70 (NEC), NFPA 70B, NFPA 70E, OSHA Part 1910 subpart J, OSHA Part 1910 subpart S and OSHA Part 1910 subpart K in addition to other references required by the contract.

B. Before initiating any work, a job specific work plan must be developed by the contractor. The work plan must include procedures to be used on and near the live electrical equipment, barriers to be installed, and safety equipment to be used and exit pathways.

C. Job site and worker safety are the responsibility of the contractor. Compliance with the requirements of NFPA 70E is subject to ongoing inspection by University personnel and failure to comply will result in an immediate Stop Work order being issued and enforced at the contractor's expense.

D. Energized electrical conductors and circuit parts to which an employee might be exposed shall be put into an electrically safe work condition before an employee performs work any time the employee is within the limited approach boundary or, where an increased risk of injury from an exposure to an arc flash hazard exists.

E. Mandatory Requirements: The following requirements are mandatory:

1. Protective Equipment: Electricians must use full protective equipment (i.e., certified and tested insulating material to cover exposed energized electrical components, certified and tested insulated tools, etc.) while working on energized systems in accordance with NFPA 70E.

2. UMB Energized Work Permit: A UMB Energized Work Permit is required for any work on energized circuits or equipment. Permit must be approved by UMB

Department of Operations and Maintenance prior to performing energized work. Submit the work permit with the outage request.

1.11 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of electrical products, of types and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

B. Installer's Qualifications: Electrical Installer shall submit the following evidence:

1. Five (5) comparable completed projects.
2. Copy of Maryland Master Electrician's License.
3. Local or State license where required.
4. BICSI and NICET certification, where required by these specifications.

1.12 IDENTIFICATION BADGES:

A. Contractors must obtain photo identification cards for all employees who will be at the construction site. The University will charge the contractor twenty five dollars ($25.00) for each badge as a deposit of which twenty dollars ($20.00) will be returned when the badge is returned. Lost photo I.D. card will cost twenty five dollars ($25.00) for another replacement card. (The above charges are subject to change without notice.)

1.13 HAZARDOUS MATERIALS:

A. Identification and removal of hazardous materials (asbestos, lead paint, PCBs) is not part of this contract. If questionable material is encountered, notify the University Project Manager and the University Environmental Health and Safety in writing immediately. The University shall then arrange for investigation and possible abatement of the material. Contractor shall schedule his work to accommodate hazardous material removal by the Owner.

1.14 COMMISSIONING NEW ELECTRICAL SYSTEMS

A. Summary: This section includes the requirements for commissioning electrical systems, assemblies and equipment related to the project area.

B. Commissioning Agent (CxA): The CxA for the project shall be a UMB Represntative

C. Description: The following equipment and/or accessories shall be commissioned as part of this project:

1. Distribution and branch panels.
2. Lighting fixtures.
3. Uninterruptible power systems.

4. AC motors.
5. Motor control centers/Controllers for new fans.
6. Lighting Controls.
7. Emergency Generator & ATS.
8. Elevator Equipment (see Division 14 for more information)

1.15 GUARANTEE/WARRANTEE:

A. All materials, equipment, etc. provided by the general contractor and/or his subcontractors shall be guaranteed and warranted to be free from defects in workmanship and materials for a period of two (2) years from the date of substantial completion and acceptance of work by UMB. Any defects in workmanship, materials, or performance which appear within the guarantee period shall be corrected by the contractor without cost to the owner, within a reasonable time, to be specified by UMB. In default thereof, owner may have such work done and charge the cost of same to the contractor. In addition to the above statement the Guarantee/Warranty Period shall include all labor cost related to all warranty work. For compressorized equipment include an additional three (3) year Guarantee/Warranty Period. LED lighting fixtures and equipment include an additional five (5) year Guarantee/Warranty Period.

B. The above shall not in any way void or abrogate equipment manufacturer's guarantee or warranty. Certificates of guarantee shall be delivered to the Owner.

**PART 2 – PRODUCTS:**

2.1 LISTED MANUFACTURERS:

A. The manufacturers indicated in Part 2 represent the basis for design and identify the minimum level of quality for materials and equipment, specified in this section, that are acceptable to UMB. Unless otherwise indicated in this Section, contractors may submit material and equipment by non listed manufacturers provided said submittals meet the requirements of these specifications. All submitted materials and equipment are subject to approval by the A/E and UMB.

2.2 FIRE STOPS & SMOKE SEALS FOR WALL & FLOOR SLEEVE APPLICATIONS

A. General: Provide fire stops, and smoke sealant materials for all electrical services penetrating through rated assemblies. See Architectural Specification Division 07, Section “Penetration Firestopping” for sealant material requirements. Services include:

1. Electrical penetrations include conduits and cables.

B. New Construction: All new penetrations shall be provided with a pipe sleeve and sealant materials.

C. Existing Construction: All new service penetrations through existing rated assemblies shall be provided with a pipe sleeve and sealant materials. All existing unsealed penetrations for services passing through existing rated assemblies within the project area shall be provided with sealant materials.

D. Project Area: The project area shall include the finished spaces and related sections of the utility shafts within the project area footprint.

E. Wall Pipe Sleeve Applications: Pipe sleeves shall be required for all new conduit penetrations through rated wall assemblies and non-rated CMU walls. Where pipe sleeves are installed in non-rated CMU walls fire rated sealant materials are not required. Provide acoustical caulking to seal the annular spaces between the sleeve and the bare pipe or pipe insulation on each end with one half (1/2) inch caulking all around the annular space.

F. Floor Pipe Sleeves Applications: Pipe sleeves are required for all new conduit risers passing through floor slabs.

2.3 SLEEVES

A. Steel Pipe Sleeves: Steel pipe sleeves shall be standard black steel pipe Type E, Grade B, with plain ends conforming to ASTM A53/A53M.

2.4 RACEWAY:

A. All raceway should be assumed EMT. Any use of MC Cable shall be approved by UMB

B. For indoors above floor slab, use EMT conduit with compression fittings with a minimum size of three quarter (3/4) inch (regardless of function/purpose) and maximum size of two (2) inches. Above two (2) inches, conduit shall be rigid steel conduit, zinc coated with threaded type fittings.

1. For low-voltage, special systems provide the following color-coated EMT raceway:

a. Fire Alarm - Red.
b. Telecommunications - Green.
c. Security - White.

C. Non-Metallic Raceway: Provide expansion joints in every twenty (20) foot of run and at least once in every run in all outdoor, rooftop, and garage locations. Provide PVC 40 pipe, non-metallic NEMA 4X boxes and non-metallic NEMA 4X enclosures supported via non-metallic fiberglass strut and/or pipe clamps at the following locations:

1. All outdoor locations including, but not limited to, inside garages and on rooftops.

2. Embedded in concrete, brick, CMU or other structural material.
3. Below-slab and –grade.
4. All unconditioned-air spaces/rooms in Parking Garages.

D. Flexible Metal Conduit: Provide flexible metal conduit (liquidtight in outdoor or underfloor locations) for the following installations (consult the UMB Project Manager prior to using flexible metal conduit for any other locations):

1. Vibrating Equipment (motors, transformers, etc.) – Limited to the last thirty six (36) inches prior to termination.
2. Embedded in CMU walls.
3. Flexible connections to motors shall contain a 90 degree bend.

E. Supports: For all indoor, conditioned-space locations utilize conduit clamps, conduit straps, bean clamps, etc. and/or channel strut supports. For all outdoor applications (as specified above for PVC 40) and where non-metallic raceway is provided, provide only non-metallic fiberglass (or other non-metallic material) or PVC-Coated Galvanized Steel conduit supports and/or channel strut. Support conduits at a minimum of two (2) times per ten (10) foot length and at a frequency rate as directed by the NEC.

F. Bushings: Provide only threaded type for IMC, RGS and PVC-RGS raceway. Provide only steel compression type for all EMT raceway systems. Provide insulated-throat, threaded type bushings for all tel/data raceway systems.

G. All new raceways in finished areas shall be concealed unless specifically noted otherwise.

H. Grout around all conduits at ceiling, floor, and wall penetrations to provide airtight seal. All floor slab and fire-rated wall penetrations shall be sealed with a rated system/installation that is pre-approved by the UMB Fire Marshal. Submit manufacturer’s engineering drawing of the proposed fire-proofing system to the UMB Project Manager for approval.

I. Group together exposed conduit insofar as possible. Install all conduits parallel or perpendicular to the building surfaces. Maintain minimum six (6) inch spacing from parallel flues, steam pipes, or hot water pipes and two (2) inches from perpendicular flues, steam or hot water pipes.

J. All conduits shall be rigidly supported to building structure. Conduits shall not be supported from suspended ceiling support wires.

K. All conduit bends shall be made with an approved conduit bender and no bend shall have a centerline radius less than six times the diameter of the conduit.

L. Core Drilling/Floor Penetrations: Coordinate with the UMB Project Manager prior to making any core drills for floor penetrations. Prior to core drilling/floor penetrations provide X-ray examination/GPD of the floor structure to locate structural steel for avoidance. The contractor is responsible for maintaining structural integrity of all floors and walls after core drills for conduits are made.

2.5 BOXES AND ENCLOSURES:

A. Indoor Applications: Provide NEMA 250 interior galvanized steel, minimum 14 gauge, outlet boxes, no less than four (4) inches square with extension rings and mounting brackets at the following locations:

1. Dry and Clean Locations: NEMA Type 1.
2. Locations with Dust, Falling Dirt and Dripping Noncorrosive Liquids: NEMA Type 12.
3. Mechanical and Electrical Rooms: NEMA Type 12.

B. Outdoor Applications: Provide NEMA 4X non-metallic weatherproof boxes and enclosures supported via non-metallic fiberglass strut at the following locations:

1. All outdoor locations including, but not limited to, inside garages and on rooftops
2. Where raceway is embedded in concrete, brick, CMU or other structural material
3. Below slab and grade.
4. All unconditioned air spaces/rooms in Parking Garages.

C. Outlet boxes shall be rigidly and securely fastened in place. Outlet boxes in finished areas shall be flush mounted unless otherwise noted.

D. Boxes shall be sized in accordance with NEC Article 370.

E. All conduit connectors and entry hubs shall be insulated or have insulated bushings.

F. Outlets shown adjacent to one another on the plans at the same mounting height shall be ganged except where noted.

G. Outlets shown adjacent to one another on the plans at different mounting heights shall be located with the upper outlet centered directly over the lower outlet.

2.6 WIRE AND CABLE:

A. All wire shall be copper with insulation rated at 600 volts, 75ºC minimum. **Aluminum wire is strictly prohibited.**

B. All raceway should be assumed EMT. Any use of MC Cable shall be approved by UMB

C. Minimum wire sizes shall be #12 for power wiring, #14 for control wiring and as specially noted for systems wiring.

D. Wire shall be solid type THHN or THWN up to size 10 AWG and stranded type THWN, XHHW, or THHN for size 8 AWG and larger. (Unless noted otherwise.) Do not use "BX" type cable (unless directed otherwise in writing by UMB Project Manager). For high temperature equipment connections use type TFE wire. Unless directed otherwise, do not exceed 40% conduit fill.

E. MC Cable - Type steel-clad MC cable with separate, isolated ground conductor (i.e. do not use the jacket for the ground conductor) may be used in concealed locations for lighting and receptacle circuits or as otherwise directed on the contract drawings. Individual conductor color-coding scheme must follow color-code scheme described below. For renovation projects, the application of MC Cable shall mirror the standards followed for the building's original electrical raceway system fit-out. Do NOT run MC Cable in exposed locations (e.g. all open ceiling locations, Mechanical and Electrical Equipment Rooms, IT Rooms, etc.).

F. Type MC cable for branch circuit applications

1. Interlocking galvanized steel armor, steel strip.
2. Conductor insulation – THHN/THWN solid copper, 90 degree rated.
3. Copper insulated green grounding conductor.
4. Polyester assembly tape.
5. Neutral conductor.
6. Rated for use in plenums.
7. Rated for through penetration of 1, 2, and 3-hour fire walls.
8. UL 83, 1479, 1569, 1581, and 2556 listed.
9. NEC 230.43, 250.118, 300.22, 392, 396, 330, 501, 502, 503, 530, 504, 505, 518, 530, 645, 725, 760, 760.154(A) compliant
10. AFC Type MC , MC-Tuff Lightweight Steel

G. Fire Alarm Control Cable Type MC

1. For use on fire alarm circuits as required and as recommended by the manufacturer.
2. Interlocking galvanized steel armor, steel strip (painted red).
3. Conductor insulation – TFN/THHN solid copper.
4. Copper grounding conductor.

5. Polyester assembly tape.
6. Neutral conductor.
7. UL Listed Fire Alarm Cable.
8. Rated for use in plenums.
9. Rated for through penetration of 1, 2, and 3-hour fire walls.
10. Individual twisted pairs and shielding, as required per fire alarm system manufacturer.
11. UL 66, 83, 1424, 1569, 1581, and 2556 listed.
12. NEC 300.22, 362, 330, 430.2, 501, 502, 503, 530, 504, 505, 518, 530, 645, 725, 760, 760.154(A) compliant
13. AFC Type MC Fire Alarm/Control Cable.

H. MC Cable Installation Requirements:

1. Install in compliance with NFPA 70.
2. Locations: In dry wall partitions and above accessible ceilings. Do not install in masonry partitions or walls.
3. Independently support all MC Cable runs; do not piggy-back on plumbing/HVAC, lighting fixture, and/or ceiling grid supports.
4. Do not bundle more than three (3) runs together for supporting purposes.
5. MC cable shall be installed in a neat and orderly fashion using batwings type supports.
6. Minimum bend radius shall be as recommended by the manufacturer.
7. MC cable run to switches shall have a neutral conductor.
8. Cable larger than #8AWG shall not be permitted.
9. All acceptable homeruns from panels in electrical rooms shall be installed in EMT conduit to a junction box/wire trough outside electrical rooms in accessible ceiling of corridor.
10. Homeruns from panelboard to junction box outside of electrical room: wire in EMT or IMC raceway.
11. Do NOT run MC Cable in exposed locations (e.g. all open ceiling locations, Mechanical and Electrical Equipment Rooms, IT Rooms, etc.).
12. MC cable shall be secured at intervals not exceeding six (6) feet and within twelve (12) inches of every outlet box or fitting. Luminaire whips may be six (6) feet maximum without support.

I. Molded connectors (wire nuts) may be used for splicing size 10 AWG or smaller wires on lighting and receptacle circuits only. “Scotch Blocks” must be submitted for prior approval. All other wiring shall be spliced only with lugs and/or terminal blocks.

J. Terminal lugs shall be mechanical clamp or compression type unless part of a circuit breaker or switch assembly.

K. Special lugs may be required to accommodate conductor sizes shown on the drawings. Contractor shall verify lug requirements for all circuit breakers and equipment terminals and shall provide correct lugs as required.

L. Pre-insulated crimp connectors and terminals shall be used on alarm wiring.

M. Under no circumstances shall feeders be spliced and/or tapped.

N. Lighting and receptacle branch circuit homeruns over one hundred (100) feet long shall be size 10 AWG minimum.

O. Color code the entire power wiring system as follows:

1. 120/208 Volt System
   a. Phase A - black
   b. Phase B - red
   c. Phase C - blue
   d. Neutral - white
   e. Ground - green

2. 277/480 Volt System
   a. Phase A - brown
   b. Phase B - orange
   c. Phase C – yellow
   d. Neutral - gray
   e. Ground - green

2.7 GROUNDING:

A. Provide a complete equipment safety ground system ("greenwire" ground) for the entire electrical system as required by Article 250 of the NEC, and as specified herein.

B. Provide additional grounding as indicated on the plans.

C. All grounding wire, lugs, jumpers and bus shall be copper.

D. All feeder and branch circuits shall contain an equipment ground wire. No conduit or raceway of any kind or length shall be used as the equipment grounding conductor.

E. Equipment grounding conductors and straps shall be sized in accordance with the NEC. Refer to feeder schedules for ground wire requirements which may exceed the NEC. All equipment grounding conductors shall be provided with green insulation equivalent to the insulation on the associated phase conductors.

F. The equipment grounding system shall be installed so all metallic structures, enclosures, raceways, piping, systems, junction boxes, outlet boxes, cabinets, machine frames and portable equipment frames operate continuously at ground potential and provide a low impedance path for ground fault currents.

G. Where parallel feeders are used, each raceway shall contain an equipment ground conductor sized in accordance with NEC 250 for the combined parallel circuit amperage.

H. Grounding conductors shall be continuous and no splicing shall be allowed.

I. Receptacles shall be bonded to their outlet boxes with #12 copper straps.

J. Exceptions:

1. Isolated ground receptacles shall have a dedicated equipment grounding conductor connected at the point where the grounded circuit conductor is connected to the grounding electrode system.
2. Straps may be omitted if self-grounding devices are utilized.

K. Bond all separately derived power sources in accordance with NEC 250. Only bond water service at no more than five (5) feet upon entering building and only to building's underground grid (i.e. do not interconnect separately derived system grounded conductor with building's water piping). For separately-derived systems/services, interconnect the grounded conductor with the building's grounding electrode via one of the following means:

1. Structural Steel Structures: Interconnect with structural steel member or with common grounding electrode riser (typically in stacked electric closets).
2. Poured-Concrete, Wood Framing, etc. Type Structures – Interconnect with common grounding electrode riser. If riser does not exist, provide dedicated grounding electrode conductor to electrical service entrance ground bus.

L. Provide flexible grounding jumpers between each piece of computer equipment and the raised floor. Provide two grounding jumpers per cabinet, attached at opposite corners. If several cabinets are bolted together in a string, only one jumper at each end of the string is required. Solidly bolt each end of the grounding jumper. At the computer cabinets end, bolt to a metal frame member. At the raised floor end, bolt to a pedestal. Do not use stringer bolt for attaching grounding jumper. Grounding jumper shall be #8 stranded copper.

2.8 ENCLOSED SWITCHES AND DISCONNECTS:

A. The Contractor is responsible for the complete installation of all equipment shown on the drawings. All manufacturers' specifications shall be followed in regard to the installation of all equipment. Any special manufacturers' requirements necessary for proper or safe

installation of equipment regardless of whether the aforementioned special requirements are indicated on the drawings shall be at the expense and responsibility of the Contractor.

B. The Contractor is responsible for the purchase, rigging, erection, installation, and functional operation of all electrical equipment except where noted. All materials and equipment shall, when a listing is normal for the particular class of material or equipment, be listed and labeled by UL or a NRTL.

C. Make final electrical connections to all items of mechanical equipment.

D. All locations of equipment and fixtures are approximate and may require minor adjustment to suit field conditions. All adjustments shall be submitted to the UMB Project Manager for approval.

E. Provide disconnects at all locations required by code and/or by the equipment manufacturer the electric service will support whether or not they are accounted for on the contract drawings. When required, each motor shall be equipped with a two or three pole fused (or non-fused load-break), heavy-duty disconnect switch as directed on the contract drawings.

F. Exception: Fractional HP motors shall be equipped with toggle-type disconnect switches. Equipment with integral disconnecting means that satisfy NEC and local authority requirements for motor safety disconnects shall not require a separate disconnect switch.

G. Disconnect switches shall be heavy-duty, horsepower rated, quick-make, quick-break type with spring reinforced wire grips and self-aligning switch contacts. Switches shall be enclosed in a heavy sheet metal enclosure with hinged interlocking cover which shall prevent the cover being opened when switch is "on".

H. Indoor Enclosure Locations and Ratings: Provide NEMA 250 switch and disconnect enclosures where only EMT, IMC and/or RGS conduit and galvanized steel support systems are utilized at the following locations:

1. Dry and Clean Locations: NEMA Type 1.
2. Locations with Dust, Falling Dirt and Dripping Noncorrosive Liquids: NEMA Type 12.
3. Mechanical and Electrical Rooms: NEMA Type 12

I. Outdoor Enclosure Locations and Ratings: Provide non-metallic NEMA 4X weatherproof switch and disconnect enclosures supported via non-metallic fiberglass strut at the following locations:

1. All outdoor locations including, but not limited to, inside garages and on rooftops
2. Where raceway is embedded in concrete, brick, CMU or other structural material
3. Below-slab and grade.

4. All unconditioned-air spaces/rooms in Parking Garages.

J. Coordinate all receptacles, plugs, wiring and locations with the equipment provided prior to rough-in.

K. Only provide disconnects that are sized appropriately for the application. Disconnects with spare or unused poles are strictly prohibited.

2.9 DEVICES:

A. All wiring devices shall be Specification Grade.

B. The Contractor shall verify color, location and mounting height of all devices prior to installation.

C. Receptacles shall be flush, duplex, grounding type, 20A, 2P, 3W, 125VAC, NEMA 5-20R straight blade, ivory nylon or high-strength thermoplastic material unless indicated as special purpose outlet. Receptacles shall be designed to accept standard two-wire parallel connector caps and shall grip both sides of the connector wire.

D. Single throw lighting switches shall be quiet type, 20A, 1P, 120/277VAC, ivory handle able to accommodate up to #10 conductors and designed for inductive lighting loads. For renovation projects, match existing switches.

E. Three (3) way and four (4) way toggle switches shall be quiet type, 20A, 120/277VAC, ivory handle. Switches shall be positive action type and shall not permit a maintained neutral position. For renovation projects, match existing switches.

F. Convenience receptacles serving bathrooms, toilets, outdoor and wet locations and construction sites shall be ground fault (where required by the NEC) interrupter type, 20A, 2P, 3W, 125VAC, NEMA 5-20R, straight blade, ivory handle or high-strength thermoplastic material.

G. Provide 0.04 inch thick satin finish, Type 302, stainless steel plates at all receptacle and switch outlets unless otherwise specified. Provide galvanized steel plates in unfinished spaces.

H. LED Dimmer Switch shall be compatible with LED lighting fixture dimming driver.

1. Switch Type as indicated on the drawings.
2. Dimming Control: 0-10VDC: 200mA Sink, Sink Dimming.
3. Electrical Ratings: 120 VAC, Maximum Load: 10 amps, 1200W, 60 Hz – 277VAC, Maximum Load: 6 amps, 1660W, 60 Hz.
4. Light Intensity Control: Full-range, continuously variable dimming. Adjustable High-level trim setting.

5. Power Failure Memory: Light returns to same level prior to power interruption.
6. Wiring Type: As recommended by manufacturer.
7. Flammability: Meets UL 94 requirements, V2 rated.
8. Temperature: -4ºF to 158ºF.

I. Receptacles shall be mounted with the bottom of the receptacle 18 inches above the finished floor unless otherwise noted. Gang multiple outlets at one location under a single multi-gang cover plate.

J. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

K. Switches shall be vertically aligned with Thermostats, other wall switches, fire alarm devices with the top of the switch 48 inches above the finished floor unless otherwise indicated. Notify engineer of any discrepancies before roughing in outlet and obtain a new location. Gang multiple switches at one location under a single multi-gang plate. Locate switches on strike side of door between six (6) inches and twelve (12) inches from edge of door frame.

L. Device plates shall be fitted tight to the wall.

M. Delay installation of device plates until painting is complete.

N. Provide RED devices when supplied by emergency power. Coordinate with UMB Project Manager to confirm. For special type receptacles on emergency power, provide RED cover plate.

2.10 IDENTIFICATION:

A. Coordinate names, abbreviations and other designations used in electrical work with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as recommended by manufacturers or as required for proper identification and operation/maintenance of electrical systems and equipment.

B. Delay installation of identification until painting is complete.

C. Comply with governing regulations and requests of governing authorities for identification of electrical work.

D. Install engraved plastic-laminate nameplates on all switchboards, motor control centers, starters, panelboards, telephone cabinets, disconnect switches and other electrical boxes and cabinets installed under this contract (black letters on white background).

E. Install engraved plastic-laminate nameplates at each protective device in all switchboards identifying circuit service (black letters on white background).

F. Where electrical conduit is exposed, apply identification (e.g. noting voltage, service/signal type, emergency power, etc.) on conduit. Except as otherwise indicated, use permanent vinyl, self-adhering markers with black letters on orange background.

G. Apply self-adhering vinyl or heat-shrink plastic cable/conductor identification markers on each cable and conductor in each box, enclosure or cabinet where wires of more than one circuit are present, except where another form of identification (such as color-coded conductors) is provided. Match identification with marking system used in panelboards, shop drawings and contract documents.

H. Wherever reasonably required to ensure safe and efficient operation and maintenance of electrical systems and electrically connected mechanical systems, install self-adhesive plastic signs with appropriate instructions or warnings. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for intended purposes.

I. Install warning signs at the entrances to all rooms and spaces in which electrical conductors or equipment are installed (white letters on red background).

J. All field installed control circuits shall have tubular sleeve-type wire markers at each end of the circuit and at all splice points. Wire markers shall be permanently stamped with a numbering system selected by the Contractor. The numbering system shall be thoroughly documented and provided to the Engineer.

K. Each receptacle shall be neatly marked on the inside cover with indelible marker identifying the panel and breaker from which it is fed and durable markers or tag inside outlet box. This to ensure the correct covers are restored after room renovations and/or painting. In addition to marking circuit identification inside the cover, also provide laminated label with circuit number on device cover plates.

L. Dymo (or equivalent) labels shall not be used.

M. Ceiling Markers: Provide labels on ceiling grid for accessible electrical equipment that is installed above the ceiling.

2.11 TRANSFORMERS:

A. Transformers shall be general purpose self-cooled dry-type in indoor enclosures unless otherwise noted. Transformers installed outdoors shall be in weatherproof enclosures.

B. 600V Class Energy Efficiency Standards - Per MD COMAR Rule #14.26.03, “the efficiencies of all low-voltage, dry-type distribution transformers may not be less than the

values shown in table 4-2 NEMA Standard TP-1-2002…" This rule applies only to 600V class, 'general purpose' type transformers and sets efficiency performance standards for transformers when operating at 35% rated load. Provide the following 600V transformers for the associated applications:

1. Receptacle and Lighting Loads (Cyclical): Energy Efficient Type 'EE' - Contains extra "compensation" windings to enable the transformer to be at its' most efficient level when loaded at 35% (i.e. the load level most transformers see when put in service and user diversity is taken into account). Designed to operate most efficiently under light and no-load conditions. Aluminum windings are pre-approved.

2. HVAC and Mechanical Loads (Continuous Duty): Low Temperature Rise - Slightly oversized; much less heat loss and 50% less coil loss (during 35% to 100% load conditions) than general purpose and energy efficient type 'EE' transformers but higher coil loss (70% to 100%) during no-load conditions. Best suited for loads in which no-load conditions rarely exist. Aluminum windings are pre-approved.

C. Wall Mounting: Only 30kVA and smaller transformers are pre-approved for wall or ceiling mounting. Consult the UMB project manager for any exceptions.

D. Housekeeping Pad: For all floor-mounted transformers, provide a minimum six (6) inch high concrete, poured-in-place (i.e. not prefab) housekeeping pad with a minimum three (3) inch flange or overhang and paint a yellow border.

E. Transformers of the size and type covered in UL Standard 506 or UL Standard 1561 shall be so listed and labeled (i.e. Up to and including 250 kVA single phase and up to and including 500 kVA three phase, 600V Class).

F. All transformers, 30 kVA and larger, shall incorporate a UL recognized class 220ºC insulation system. Transformer temperature rise shall not exceed 150ºC. Refer to drawings for lower temperature rise requirements.

G. All cores are to be fabricated with high grade electrical steel. The core volume shall allow operation at 10% above rated primary voltage at no load without exceeding the temperature rise of the unit. All laminations and cores must be plated or annealed, free of burrs and properly assembled to reduce noise and ensure efficient operation of the transformer.

H. Coil conductors must be continuous with terminations brazed or welded without auxiliary flux material. The entire core and coil assembly must be pre-dried by heat, impregnated with varnish and cured at a minimum of 350ºF to reduce hot spots and seal out moisture. Coils must be protected with an outer layer of glass tape or similar quality insulation.

Coils of shielded transformers must incorporate an electrostatic shield located between the primary and secondary windings.

I. Transformers 30 kVA and larger shall be provided with NEMA standard taps (minimum of 2 FCAN and 2 FCBN). Smaller transformers shall have taps as indicated on the drawings. When not indicated, provide minimum as previously specified.

J. All transformers must be of the quiet type, which operate at levels substantially below ANSI Standard C89.2. Sound levels shall not exceed the following:

| | | |
|---|---|---|
| 1. | Up to 9 kVA | 40 dB |
| 2. | 10 - 50 kVA | 45 dB |
| 3. | 51 - 150 kVA | 50 dB |
| 4. | 151 - 300 kVA | 55 dB |
| 5. | 301 - 500 kVA | 60 dB |

K. Core and coil assemblies 30 kVA and larger are to be mounted on rubber vibration isolators designed specifically to reduce 120 HZ sound and multiple harmonics.

L. Prior to painting, the enclosures must be cleaned and degreased, paint bond treated, primed and finished with scratch and weather resistant final coats.

M. Transformers must be warranted against defects in materials, workmanship and performance for five years from the date of manufacture. In the event that the transformers furnished do not meet specifications, they must be removed from the job site and replaced at the supplier's expense.

N. All transformers must be constructed and rated in accordance with applicable ANSI, NEMA, OSHA, IEEE and UL standards and must meet National Electrical Code requirements.

O. Mount transformers on pad-type vibration isolators selected for unit weight.

P. Transformers shall not be in physical contact with walls, ductwork, piping and other building elements except for base and flexible conduit connection. Locate transformers to ensure adequate ventilation is provided to all sides.

Q. Grounding: Unless directed otherwise on contract drawings, bond the low-voltage ‘X0’ terminal to the high-voltage side ground connection.

R. Suitable Operating Environments: For projects where the transformer locations are not identified in electrical closets, coordinate with the UMB Project Manager for pre-approval on the most suitable location. Do not install transformers in mechanical equipment shafts, exposed on rooftops, outdoors, etc due to the exposure to high-humidity conditions and/or moisture.

2.12 PANELBOARDS:

A. Branch Circuit Panelboard Sizing and Capacity: Regardless of purpose/function, provide minimum 225amp (208V) and minimum 250amp (480V) rated panels with minimum forty two (42) poles. For panels that are greater than forty two (42) poles, provide a minimum eighty four (84) pole panel. De-rated 85, 100, or 150amp panels are prohibited.

B. Wall-mounted Distribution Panels/Boards: Provide distribution panels with a minimum 99" of breaker mounting space (i.e. the combined vertical mounting space on both left and right sides) and with the minimum breaker capacity or prepared spaces for installing 400A and/or 600A branch circuit breakers in the future.

C. Branch Circuit Breakers: Provide only bolt-on type branch circuit breakers of the ambient-compensated, thermal-magnetic type, which will provide inverse time delay overload and instantaneous short circuit protection. Voltage and current ratings asappropriate . Plug-in and/or tandem breakers are prohibited.

D. Bus Bars, Sub-Feed Lugs and Grounding: Only copper bus bars are permitted with a minimum 225amp (208V) rating and 250amp (480V) rating. Each panel shall be equipped with a ground lug. All branch circuit panels designated on the contract drawings as "emergency power receptacle" panels must include sub-feed lugs for future expansion/addition of a second tub.

E. Cabinet and Trim and Optional Wireway Capacities: Mount panels in steel cabinets arranged for flush or surface mounting as shown on contract drawings. Cabinet and trim shall be of code gauge steel (minimum) with wiring gutter all around. Both the Inner and Outer Door Covers/Panels must be hinged. All lag-screw/self-tapping screw anchored covers will be rejected. For those branch circuit panels with 80amp and larger breakers, include the manufacturer's optional over-sized wireway.

F. Where panels occur adjacent to one another, the tops of the panels shall be mounted at the same height.

G. Panelboards shall be painted with gray lacquer over rust preventative primer. Sides and top of surface mounted panels shall be painted to match fronts.

H. Provide a typewritten directory for each panel, placed inside the panel door. The directory shall list all rooms served by each breaker, using the "Owner's" room numbers. Directories shall be installed in a metal directory frame with clear protective cover. Spares and spaces shall be written in pencil.

I. Panels sixty eight (68) inches or less in height shall be installed with the top of the panel six (6) feet above the finished floor. All panels shall be installed in accordance with NEC 380 and 384.

J. Each panel and cabinet and the units comprising same shall bear the manufacturer's nameplate and the UL label.

K. Mount panels in locations shown, making sure that code required clearances exist.

L. Where cabinets cannot be set fully flush due to shallowness of wall or partition, trim protruding sides with approved metal or hardwood molding fastened to cabinet so as to conceal intersection of wall and cabinet.

M. If paint is damaged during shipping or installation, damaged portion shall be sanded smooth and entire panel repainted.

N. Approved Manufacturer's:

1. Square D/Schneider Electric:

a. 'NQOD' – 225amp, 208V, minimum 42pole – Branch Circuit Panel.
b. 'NF' – 250amp, 480V, minimum 42pole – Branch Circuit Panel.
c. 'I-Line' – minimum 99" breaker mounting space – Distribution Panel.

2. Cutler-Hammer/Emerson:

a. 'Pow-R-Line 2a' – 225amp, 208V and 250amp, 480V, minimum 42pole – Both 208V and 480V Branch Circuit Panel.
b. 'Pow-R-Line 4B' – minimum 99" breaker mounting space – Distribution Panel.

2.13 MOTOR CONTROLLERS:

A. Install motor starters and controllers as indicated on the Drawings, in strict accordance with the manufacturer's written instructions, and in compliance with recognized industry practices.

B. Install fuses or current limiters when required by the equipment specifications.

C. Tighten connections and terminations in accordance with the manufacturer's published torque tightening values or in accordance with UL Standard 486A and B when manufacturer's values are not indicated.

D. Prior to energizing equipment, check power and control wiring for correct installation. After energizing equipment, check each motor for proper phase rotation, correct where necessary, and demonstrate operation of starter and accessories.

E. Set all MCPs in accordance with the motor manufacturer's instructions. Set all overloads in accordance with motor manufacturer instructions.

F. Indoor Enclosure Locations and Ratings: Provide NEMA 250 enclosures where only EMT, IMC and/or RGS conduit and galvanized steel support systems are utilized at the following locations:

1. Dry and Clean Locations: NEMA Type 1.
2. Locations with Dust, Falling Dirt and Dripping Noncorrosive Liquids: NEMA Type 12.
3. Mechanical and Electrical Rooms: NEMA Type 12.

G. Outdoor Enclosure Locations and Ratings: Provide non-metallic NEMA 4X weatherproof boxes and enclosures supported via non-metallic fiberglass strut at the following locations:

1. All outdoor locations including, but not limited to, inside garages and on rooftops
2. Where raceway is embedded in concrete, brick, CMU or other structural material
3. Below slab and grade.
4. All unconditioned-air spaces/rooms in Parking Garages.

H. Fractional Horsepower Starters:

1. Fractional horsepower manual starters shall be used for single phase motors except where otherwise indicated. Single phase starters shall provide across the line starting and overload protection. Single pole and double pole starters shall be used as required and shall be rated not less than one (1) horsepower.

2. Single phase manual starters shall feature snap action double-break contacts, motor running indicating light and trip free melting alloy overload elements selected for the specific motor application.

3. Starters located in finished areas shall be installed in a flush outlet box and furnished with a stainless steel plate.

4. Manual motor starters shall be toggle-type and shall be arranged so they may be locked with a padlock in the "OFF" position.

5. Oil-tight hand-off-auto selector switches shall be provided where starters are controlled by automatic devices.

I. Magnetic Type Motor Starters:

1. Overload Protection: As required by the NEC, all motors 1hp and over must be provided with overload protection. Starters shall utilize protection that

individually monitors all phases and is factory set for the specific motor application. Overload relays shall be field adjustable plus or minus 15% of the rated trip current. Solid state overload relays are acceptable.

2. Starters shall be furnished with the following accessories:

   a. Hand-off-auto selector switch.
   b. Green pilot light to indicate power available to the starter but motor not on.
   c. Red pilot light to indicate motor running.
   d. Transformer for 120 volt control power.
   e. Overload trip indicator and reset.
   f. Undervoltage monitor and release.
   g. Coils rated 120 volts A.C.
   h. Two (2) normally open and two (2) normally closed auxiliary contacts for customer use.

3. Starters shall be capable of withstanding the let-through short-circuit current of the protective device. Current limiters shall be provided when required to achieve adequate protection from high short-circuit currents.

J. Combination Starters:

1. Combination motor starters shall be provided with an integral motor circuit protector specifically designed for motor applications. The MCP shall have a continuous current rating in accordance with NEC Article 430 and shall provide adjustable short-circuit trip settings. The MCP shall have a minimum short-circuit rating of 42,000 amperes at 480 volts.

2. An external operating handle for the MCP shall be provided. The handle shall clearly indicate the position of the MCP and shall be padlockable in the “OFF” or OPEN position. Interlocks shall be provided to prevent opening the door when the external operating handle is in the “ON” or “CLOSED” position. An interlock defeater shall be provided for use by authorized personnel.

2.14 LIGHTING:

A. Provide LED lighting fixtures of the sizes, types and ratings indicated on the drawings and in the schedules. Fixtures shall be complete with housings, energy efficient lamps, lamps/drivers, lenses, louvers and reflectors. LED lighting fixtures scheduled on the drawings are found to offer products similar to the basis of design product, including performance, appearance, and quality. Listed equals must comply with minimum performance criteria. Additional documentation and calculations for LED lighting fixtures compliance should be made available upon request.

B. Provide footcandle plot diagrams for exterior areas indicating foot candles on grade resulting from the light sources at the locations indicated on the drawings. Indicate locations, spacing and height of fixtures.

C. Exit Signs:

1. General Requirements for Exit Signs: Comply with UL 924; for, visibility, luminance, and lettering size, comply with authorities having jurisdiction. Provide RED color sign.

D. LED Lighting Products:

1. Luminaires:

a. Refer to UMB Standard Lighting Fixtures 2024 attached as a separate document for lights to provide for Elevator machine rooms secondaries and pits.
b. All lobbies will be evaluated on a case-by-case basis and shall match existing.

2. Acceptable Manufacturers:

a. Refer to UMB Standard Lighting Fixtures 2024 attached as a separate document

E. Fixtures shall be secured to structural supports and shall not rely on ceiling systems for support. Pendant fixtures shall be plumb and level. Pendant mounted fixtures, larger than two (2) feet shall be installed with two (2) stem hangers. Stem hangers shall have ball aligners and provisions for minimum one (1) inch vertical adjustment. Plaster frames shall be provided for all recessed fixtures, installed in other than a suspended access ceiling system.

F. Surface mounted fixtures greater than two (2) feet in length shall be supported from at least one point in addition to the fixture outlet box stud.

G. Set, aim and adjust adjustable fixtures in accordance with instruction and guidelines provided by the Architect. Adjust light level of photo control relays in accordance with instructions from the Architect.

**PART 3 – EXECUTION:**

3.1 GENERAL REQUIREMENTS – EXECUTION

A. All construction work that creates excessive noise will not be permitted during normal business hours. See Division 01 Specification Section “Cutting and Patching” for requirements.

B. General provisions of the contract apply. All work performed and materials provided shall conform to all applicable codes and standards and the National Electrical Code (NEC).

C. Prior to starting work, 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.

D. Avoid interference with structure and with work of other trades, preserving adequate headroom and clearing all doors and passageways.

E. Confirm the locations of all existing utilities. Repair any damage to existing utilities caused by construction forces.

F. Leave all areas broom clean daily. Remove all construction debris and trash from the site daily.

G. Before ordering any materials or equipment, submit to the engineer data for all materials and equipment. Check equipment dimensions of proposed substitute equipment. The cost of any redesigning caused by a substitution shall be borne by the Contractor.

H. Contractor shall do all cutting, drilling and patching required by this work. All repairs to finish shall be of like kind, color and quality as existing. Structural members shall not be cut without approval from the architect.

I. Provide temporary power as may be required for construction or as may be required to maintain critical operations during changeover of feeders or services. Provide all equipment, make all arrangements, and make all connections required for temporary power. Remove all provisions for temporary power upon completion of the project.

J. Schedule in advance all outages of building utilities. Outages shall be as short as possible. All services shall be restored and placed in operation when Contractor's personnel leave the site each day.

K. Take necessary precautions to protect building's occupants and contents, and prevent the spread of dust and dirt into occupied areas.

L. Electrical contractor shall identify existing circuits and existing panels for the renovation area and trace and identify existing circuits. Identifying and tracing of the circuits shall be done with machinery and appropriate safety gear. Should an outage become necessary, it will need to be requested a minimum of ten (10) working days in advance through the UMB Project Manager.

M. Contractor shall update panel board circuit directory cards. Contractor shall also provide an electronic copy of new and/or revised schedule in excel or word format to Operations & Maintenance work management system thru Director of Operations & Maintenance.

3.2 SLEEVES

A. Non-Fire-Rated Sound Proof Partition Penetrations: Where new and existing conduits pass through interior partitions with sound proofing provide a pipe sleeves. Seal the annular spaces between construction openings, the sleeves, and conduits with sound proof insulation material equal to the width of the opening. The sound proof insulation shall match the insulation in the partition.

3.3 CONTRACT DOCUMENTS:

A. Contract documents for electrical work are in narrative form and intend to convey scope and general arrangement.

B. Correction of faulty work due to resolving discrepancies without authorization shall be the responsibility of the Contractor.

C. Should the Contractor discover any discrepancies or omissions on the drawings or in the specifications, he shall notify the Engineer of such conditions prior to the bid date. Otherwise, it will be understood that the drawings and specifications are clear as to what is intended and shall be as interpreted by the Engineer.

3.4 COORDINATION:

A. Coordinate all work and cooperate with all other trades to facilitate execution of work.

3.5 FIELD INSTRUCTION:

A. Upon completion of work, instruct Owner's representative in the proper operation and maintenance of the electrical systems.

3.6 DEMOLITION:

A. The electrical demolition in the renovation areas informed by the contract documents and applicable codesshall be complete and include all electrical work in the area unless noted otherwise.

B. Existing electrical systems passing through areas of demolition to serve equipment beyond the demolition areas shall remain in service, or be suitably relocated and restored to normal operation, throughout the demolition and reconstruction of the area. The Contractor shall investigate and identify such equipment prior to demolition.

C. Provide temporary electrical service to equipment disturbed by the demolition until such time as the permanent service can be restored.

D. Where conduit and wiring to remain are inadvertently damaged or disturbed, cut out and remove damaged portion and all damaged wiring from the source switchboard, panelboard or pull box to the destination connection point. Provide new wiring of equal capacity.

E. Exposed conduit to be demolished shall be removed in its entirety. Concealed conduit, abandoned in place, shall be cut out approximately two (2) inches beyond the face of adjacent construction, plugged, and the adjacent surface patched to match existing.

F. Wiring to be demolished shall be removed from both concealed and exposed conduit. No wiring which becomes unused as a result of the contract shall be abandoned in place.

G. Equipment specified or indicated to be demolished, shall be removed from the project site and shall not be reused.

3.7 TESTING:

A. Thoroughly clean the electrical equipment and associated electrical materials before energization of any part of the electrical system. It is the Contractor's responsibility to have all the electrical equipment, raceways, cabling, cable insulation and other related electrical systems tested. All test results shall be recorded, dated and submitted to the Engineer and Owner for record. Test procedures and results shall be per NETA standards. In the absence of relevant NETA standards, the Contractor shall substitute appropriate test procedures from IEEE or ANSI. The substitute test procedures shall be submitted to the engineer for approval before conducting the tests.

B. During the course of and after completion of installation, the Engineer shall:

1. Inspect the installation, workmanship, testing and operation of key electrical systems.

2. Key electrical systems include:

a. Panels and switchboards
b. Emergency power off system
c. UPS system
d. Power distribution units
e. Emergency generator system

C. The Contractor shall verify that each key system interfaces correctly with all related systems. The Contractor shall furnish all test data to the Engineer verifying that all

systems have been installed correctly and work together to provide a completely operational electrical power system as designed.

D. The Engineer reserves the right to accept or reject test data which does not conform to the manufacturer's data or is not obtained in accordance with these specifications.

3.8 COMMISSIONING NEW ELECTRICAL SYSTEMS

A. Testing Preparation:

1. Certify in writing to the CxA that electrical systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

2. Place systems, subsystems, and equipment into operating mode to be tested.

3. Inspect and verify the position of each device and interlock identified on checklists.

4. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

B. General Testing Requirements:

1. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

2. Scope of electrical testing shall include transfer and pretransfer of generators, proper rotation, lighting levels and lighting controls

3. Test all operating modes and verify proper response of controllers and sensors.

4. The CxA along with the lighting contractor shall prepare detailed testing plans, procedures, and checklists for applicable new lighting systems, subsystems, and equipment.

5. Tests will be performed using design conditions whenever possible.

C. Electrical Systems, Subsystems, And Equipment Testing Procedures:

1. Procedures: Where applicable follow manufacturer’s written procedures. If no procedures are prescribed by the manufacturer, proceed as follows:

a. Electrical Distribution Systems: Includes existing and/or new panels and circuit breakers for power and lighting.

b. Verify that all new panels and components have been installed correctly, are accessible and operate as intended.
c. Where existing panel spares are used for new circuits verify the installation is correct and the panel index has been revised.
d. Verify that specified tests are complete.

2. Electrical Equipment: Includes new lighting, new uninterrupted power supplies (UPS) and new variable frequency drives (VFD) where indicated.

a. Verify that all new equipment has been installed in accordance with the manufactures recommendations and all equipment can be easily accessed for maintenance and operates as intended.
b. Verify that all new connections, controls, and accessories have been installed correctly and operates as intended.
c. Verify that all new equipment test, training, and startup procedures have been completed per the specifications.
d. Verify that all required new interfaces with for Life Safety the BAS have been installed correctly and operates as intended.
e. Operate new equipment as intended to ensure the design conditions can be obtained.

3.9 CUTTING AND PATCHING:

A. Cutting and patching associated with the work in the existing structure shall be performed a neat and workmanlike manner. Existing surfaces that are damaged by the contractor shall be repaired or provided with new materials to match existing.

B. Structural members shall not be cut or penetrated. Holes cut through concrete and/or masonry to accommodate new work shall be cut by reciprocating or rotary, non-percussive methods.

C. Patching of areas disturbed by installation of new work and/or required demolition shall match existing adjacent surfaces as to material, texture and color.

3.10 CUTTING, WELDING, BURNING

A. Before the contractor and/or any sub-contractor commences any cutting, welding, burning or other type of hot work at UMB, the contractor shall obtain a hot work permit. Hot work permits can be obtained online using https://www.umaryland.edu/fire marshal/hot-work-permits/ and must be requested at least one business day prior to beginning hot work. B.

B. The hot work permit copy shall remain on the job site at the hot work location until such work is completed at which time the permit may be removed.

3.11 CLEAN – UP:

A. Excessive debris and dirt, such as occurs from cutting through masonry or plaster walls shall be cleaned up from the equipment and removed immediately after the work of cutting through the walls.

B. Debris shall be removed from UMB property.

C. Ceiling panels shall be replaced as soon as work is finished in the area, and shall be kept free of dirty fingerprints. Where work is being done in corridors used by patients and visitors, ceiling panels shall be replaced at the close of the day's work even if work is at the location is incomplete.

D. All areas shall be left broom-clean at the end of the work period.

END OF DIVISION 260000

# DIVISION 280000 – FIRE ALARM, SAFETY AND SECURITY

## PART 1 – GENERAL REQUIREMENTS

1.1 RELATED DOCUMENTS

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

B. Division 26 Electrical Specifications and Division 27 Communications Specifications.

1.2 SCOPE:

A. The contractor shall furnish all labor, material, tools, equipment and services necessary and incidental for installing all Fire Alarm, Safety and Security system(s) indicated in the bid documents, or necessary to provide a code compliant finished installation. The finished installation shall be in perfect working condition and be ready for continuous and satisfactory operation. The project area is located in Pratt Street Garage at 646 West Pratt Street.

This section includes Fire Alarm devices and programming to be connected to fire alarm system, access control devices to be connected to Access Control System and video surveillance system (VSS) which consists of cameras, data transmission wiring, storage, software, and a control station with its associated equipment. The VSS shall be integrated with monitoring and control system.

1.3 CODES & REGULATIONS

A. All materials furnished and all work installed shall comply with the latest rules, regulations, and recommendations of the following bodies:

1. International Building Code
2. International Mechanical Code
3. National Electric Code
4. Maryland State Health Department
5. National Fire Protection Association
6. Fire Prevention Bureau Baltimore City
7. Fire Protection Bureau State of Maryland
8. Underwriters Laboratories
9. National Electrical Manufacturer Association
10. National Electrical Testing Agency
11. Insulated Power Cable Engineers Association
12. American National Standard Institute (ANSI)
13. ASTM
14. Electronics Industries Association (EIA)
15. IEEE
16. Telecommunication Industry Association (TIA)

17. Federal Communication Commission (FCC)

1.4 RESPONSIBILITY

A. The construction manager/general contractor (CM/GC) shall be responsible for all work included in Division 28. The delegation of work to contractors shall not relieve him of this responsibility. Contractors who perform work under these sections shall be responsible to the CM/GC.

1.5 SITE EXAMINATION

A. Failure to visit the site and become familiar with existing project conditions prior to bidding will not relieve the Contractor of responsibility for complying with the Contract Documents.

1.6 OUTAGES

A. For all work requiring an outage, the contractor shall submit an outage request to the UMB Project Manager, using the UMB Standard Request for Outage Form which is available through the UMB Design and Construction Web Site at https://www.umaryland.edu/designandconstruction/design-and-construction-documents/umb-standard-project-forms---current-editions/

B. The existing systems shall remain operational unless turned off by University personnel during the construction of the project. For each outage request include a photograph or description of the area affected by the outage.

C. Unless otherwise specified, outages of any services required for the performance of this contract and affecting areas other than the immediate work area shall be scheduled at least ten business days (10) days in advance with the UMB Design and Construction Department. Outages shall be performed during normal duty hours. If necessary, some outage work may be performed outside normal hours if approved by UMB.

D. The contractor shall include in his price the cost of all premium time required for outages and other work which interferes with the normal use of the building, which will be performed, in most cases, during other than normal work time and at the convenience of the UMB Design and Construction Department.

E. The operation of electrical, fire alarm, safety and security panels or power switches; required to achieve an outage must be accomplished by University personnel only. Unauthorized operation of electrical/fire alarm/safety/security panels and power switches, by contractors their personnel will result in extremely serious consequences for which the contractor will be held accountable.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions:

1. Notify UMB Project Manager no fewer than ten (10) days in advance of proposed interruption of fire-alarm service.
2. Do not proceed with fire-alarm outage without UMB Project Manager's written permission.
3. Where a required existing fire protection system is out of service or during system Outage, the contractor shall provide fire watch as required by the UMB Fire Marshal until the existing system is restored. http://www.umaryland.edu/media/umb/af/ehs/firesafety/FireWatchProcedures.pdf

1.8 SUBMITTALS

A. General Requirements: For general requirements see Architectural Specification Division 01 Section "Submittal Procedures" and the following:

1. After contract award and before material is ordered submit electrically all product data, shop drawings, drawings and other such descriptive data as the Engineer may require to demonstrate compliance with the contract documents as required by the contract clauses for review and approval.

2. Submittals shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable publication references, years of satisfactory service, and other information necessary to establish contract compliance of each item the Contractor proposes to furnish.

3. All equipment shall be approved and listed by Underwriters' Laboratories (UL) and shall bear nameplate indicating same.

4. Submittals will be reviewed for general compliance with design concept in accordance with contract documents, but dimensions, quantities, or other details will not be verified.

5. Submittals shall include the following items:
   a. Article 2.2, Fire Stops, Smoke Seals and Rated Wall/Floor Penetrations
   b. Article 2.3, Sleeves
   c. Article 2.4, Fire Alarm System
   d. Article 2.5, Interface Connections to Existing Campus Fire Alarm System Central Network Stations
   e. Article 2.6, Access Control System
   f. Article 2.7, Video Surveillance System
   g. Article 2.8, Raceway
   h. Article 2.9, Boxes and Enclosures
   i. Article 2.10, Wire and Cable

j. Article 2.11, General Wire and Cable Requirements
k. Article 2.12, Identification
l. Article 2.13, O & M Manual Do not include this data in the Fire Alarm Submittal.
m. Warranties and maintenance instructions shall be included in the O & M Manual only. Do not include this data in the Fire Alarm Submittal.

6. Submittal File Format: File formats and names for each submittal shall be electronically as follows:

a. File Formats:
1) Product Data: “pdf” file format.
2) Design Shop Drawings: “pdf” and “dwg” file formats.
3) Coordinated Drawings: “pdf” or “dwg” file formats.
4) Schedules: “xl” file format.

B. Fire Alarm Submittal: In addition to the requirements identified in paragraph 1.8.A the fire alarm contractor shall also comply with the following:

1. UMB requires the Fire Alarm Submittal to be submitted electronically as one (1) complete submission as a “pdf” file for review. Partial Submittals will be rejected.

a. The complete submittal must be reviewed and approved by the A/E and the UMB Fire Marshal before installation can take place. The submission shall include the following:

1) Product data for each type of product specified.
2) Shop drawings (See Paragraph ‘2’ below for requirements)
3) Installers qualifications

b. The warranty information and maintenance manuals shall be included in the Division 28 Project O & M Manual. Do not include this data in the Fire Alarm Submittal.

2. Shop Drawings shall be prepared by persons trained and certified by the manufacturer in fire-alarm system design. Shop drawings shall be signed or stamped by an individual with one of the following qualifications:

a. NICET fire-alarm technician, Level IV minimum.
b. Professional Engineer registered in the State of Maryland.
c. The qualified individual signing the shop drawings must attend any and all review comment resolution meetings requested by the University.

3. Submittal drawings must include the following:

a. Provide floor plans with all new and existing device locations and their associated addresses. Floor plans must be drawn to scale. Provide graphic scales on the drawings.
   1) For new building construction projects or replacement of existing building entire fire alarm system projects, use NFPA 170 symbols.
   2) For renovation projects match the symbols used on As-Builts.
   3) Wiring Diagrams: Provide the following:
      a) Detail wiring and differentiate between manufacturer-installed and field-installed wiring.
      b) Include diagrams for equipment and for system with all terminals and interconnections identified.
      c) Include all internal network cards and boards in FACP and Transponder Panels.

b. Device Address List shall include the following:

   1) Coordinate with final system programming.
   2) Floor plans shall include address numbers for all devices.

c. System Sequence of Operation: Detailed description for this Project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer's standard descriptions for generic systems are not acceptable.

d. Details of graphic and alphanumeric annunciators.

4. Renovation Projects: For projects involving only modifications to the existing FAS, the University will provide electronic copies to the FAS manufacturer of their latest version of the FAS As-Builts. The FAS manufacturer will make all necessary revisions to the FAS as-builts and submit them for review/approval. Once the project is completed, the FAS manufacturer will update the copies for forwarding electronically to the University for archiving. In revising the electronic copies of the University's as-builts, please perform the changes in the following format:

   a. CAD Dwg Format: Show all new wiring and equipment in BOLD so it is convenient to differentiate between new and existing.

5. Submissions to UMB Fire Marshal:

   a. Include copies of annotated Contract Drawings as needed to depict component locations to facilitate review. Resubmit if required to make clarifications or revisions to obtain approval.

C. Security System (SEC) Submittals: In addition to the requirements identified in paragraph 1.8.A the security system contractor shall also comply with the following:

1. UMB requires the Security System Submittal to be submitted electronically as one (1) complete submission as a "pdf" file for review. Partial Submittals will be rejected.

    a. The complete submittal must be reviewed and approved by the A/E and UMB before installation can take place. The submission shall include the following:

        1) Product data for each type of product specified.
        2) Shop drawings (See Paragraph '2' below for requirements
        3) Installers qualifications

    b. The warranty information and maintenance manuals shall be included in the Division 28 Project O & M Manual. Do not include this data in the Security System Submittal.

2. Submittal drawings must include the following:
    a. Provide floor plans with all device locations and their associated addresses. Floor plans must be drawn to scale. Provide graphic scales on the drawings.

        1) Provide a riser diagram regardless of system size.
        2) Wiring Diagrams: Provide the following:
            a) Detail wiring and differentiate between manufacturer-installed and field-installed wiring.
            b) Include diagrams for equipment and for system with all terminals and interconnections identified.
            c) Include all internal network cards and boards in the Control Panels.
    b. Device Address List shall include the following:

        1) Coordinate with final system programming.
        2) Floor plans shall include address numbers for all devices.

D. Informational Submittals: Submit following:

1. Operating Instructions: For mounting at FACP.
2. Product Certificates: Signed by manufacturers of system components certifying that products furnished comply with requirements.
3. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.
4. Field Test Reports: Indicate and interpret test results for compliance with performance requirements. Comply with NFPA 72.

E. Project Closeout Submittals: Submit the following in accordance with the UMB General Conditions.

1. Electronic Copies of Each System Program: Provide a minimum of two (2) electronic copies of the system program on USB Flash Drive. Store one (1) USB Flash Drive copy of the program at the FACP and hand the other copy over to the Project Manager. Besides being required by NFPA 72, the purpose for this requirement is to ensure the owner always has on hand a "bug free" copy of the original.

2. Manufacturer's As-Built Drawings: Upon successful testing and commissioning of the FAS and approval by the University's Fire Marshal, the FAS manufacturer shall provide the following:

   a. As-Built Drawings: The [FAS] Manufacturer shall revise/update the [FAS] Shop Drawings to accurately reflect the following field installation data/conditions:

      1) All individual device addresses on the floor plans.
      2) Conduit/SLC & NAC Loop Wiring Layout - Show routing of all FAS wiring and raceway including riser runs and while noting all FAS device and panel locations. Identify all panels with their respective ID numbers/lettering as entered in the FAS programming software. Where multiple FAS circuits are run in parallel and/or grouped together, attach drawing notes to the runs to identify the individual FAS circuits in the grouped or parallel run. Delineate overhead versus underground runs by using dashed lines for underground.
      3) Riser and/or connection diagram.
      4) Equipment Data - Provide Manufacturer's catalog information on all internal network cards/option modules in the system.
      5) Provide both paper copies and electronic files in AutoCAD 2018 or latest edition used by UMB in "dwg" and "PDF" file formats. Provide two (2) full-size paper copies (24 inches x 36 inches) and three (3) half-size copies for UMB review personnel only. Provide graphic scales on the drawings.

   b. Updated copies of load calculations, System Program and Sequence of Operation as submitted during in the shop drawing phase.
   c. Maintenance Data: For fire alarm systems. Comply with NFPA 72.
   d. Certificate of Completion: Comply with NFPA 72.

1.9 WORK PERFORMANCE

A. All electrical work must comply with the requirements of NFPA 70 (NEC), NFPA 70B, NFPA 70E, OSHA Part 1910 subpart J, OSHA Part 1910 subpart S and OSHA Part 1910 subpart K in addition to other references required by the contract.

B. Before initiating any work, a job specific work plan must be developed by the contractor.

The work plan must include procedures to be used on and near the live electrical equipment, barriers to be installed, and safety equipment to be used and exit pathways.

C. Job site and worker safety are the responsibility of the contractor. Compliance with the requirements of NFPA 70E is subject to ongoing inspection by University personnel and failure to comply will result in an immediate Stop Work order being issued and enforced at the contractor's expense.

D. Energized electrical conductors and circuit parts to which an employee might be exposed shall be put into an electrically safe work condition before an employee performs work any time the employee is within the limited approach boundary or, where an increased risk of injury from an exposure to an arc flash hazard exists.

E. Outages should be scheduled a minimum of ten (10) days in advance.

F. Mandatory Requirements: The following requirements are mandatory:

1. Protective Equipment: Electricians must use full protective equipment (i.e., certified and tested insulating material to cover exposed energized electrical components, certified and tested insulated tools, etc.) while working on energized systems in accordance with NFPA 70E.

2. UMB Energized Work Permit: A UMB Energized Work Permit is required for any work on energized circuits or equipment. Permit must be approved by UMB Department of Operations and Maintenance prior to performing energized work. Submit the work permit with the outage request.

1.10 QUALITY ASSURANCE

A. Installer's Qualifications:

1. The Contractor or security sub-contractor shall be a licensed security Contractor with a minimum of five (5) years' experience installing and servicing systems of similar scope and complexity. The Contractor shall be an authorized regional representative of the Electronics Safety and Security manufacturers.

2. The Contractor shall only utilize factory-trained technicians to install, program, and service the Electronic Safety and Security systems. The technicians shall have a minimum of five (5) continuous years of technical experience in electronic security systems. Upon request the Contractor shall provide copies of system manufacturer certification for all technicians.

3. Copy of Maryland Master Electrician's License.

4. Local of State license where required.

5. BICSI and NICET certification, where required by these specifications.

6. A NICET Level II or higher Fire Alarm Technician or a Fire Alarm Technician with minimum of two (2) years' experience shall install and terminate fire alarm devices, cabinets and panels. The Fire Alarm technicians installing the equipment shall be factory trained in the installation, adjustment, testing, and operation of the equipment specified herein and, on the drawings.

7. An electrician or NICET Level II Fire Alarm Technician shall install conduit for the fire alarm system.

1.11 SYSTEM DESCRIPTION

A. Fire Alarm System Non-coded, UL-certified addressable system, with multiplexed signal transmission, dedicated to fire-alarm service only.

B. Fire Alarm System Non-coded addressable system, with automatic sensitivity control of certain smoke detectors and multiplexed signal transmission, dedicated to fire-alarm service only.

C. Presently, UMB has a contract to upgrade the existing buildings FACP and Network Stations with the latest version of Software/Firmware. Under this project, the contractor shall coordinate with the UMB Project Manager for the programming of the building panel and the correct version of Software/Firmware must be provided prior to programming.

D. Security system is an existing campus wide enterprise security system consisting of Lenel Access Control and Pelco video systems. All components shall match existing system components.

E. Programming and interface connection to communications link for the Access Control shall only be done by Stanley Security Solutions. Prior to programming the contractor shall coordinate with UMB Project Manager and Campus Police.

F. Programming and interface connections to communications link for video system shall only be done by S3 Integration. Prior to programming the contractor shall coordinate with UMB Project Manager and Campus Police.

1.12 IDENTIFICATION BADGES

A. Contractors must obtain photo identification cards for all employees who will be at the construction site. The University will charge the contractor twenty five ($25.00) dollars for each badge as a deposit of which twenty ($20.00) dollars will be returned when the badge is returned. Lost photo I.D. card will cost twenty five ($25.00) dollars for another replacement card. (The above charges are subject to change without notice.)

1.13 HAZARDOUS MATERIALS

A. Identification and removal of hazardous materials (asbestos, lead paint, PCBs) is not part of this contract. If questionable material is encountered, notify the University Project Manager and the University Environmental Health and Safety in writing immediately. The University shall then arrange for investigation and possible abatement of the material. Contractor shall schedule his work to accommodate hazardous material removal by the Owner.

1.14 COMMISSIONING NEW FIRE ALARM, SAFETY AND SECURITY SYSTEMS

A. Summary: This section includes the requirements for commissioning electrical systems, assemblies and equipment related to the project area.

B. Commissioning Agent (CxA): The CxA for the project shall be a UMB Representative.

C. Description: The following equipment and/or accessories shall be commissioned as part of this project:

1. Access Control.
2. Card Readers.
3. Communications Link interface.
4. Video Surveillance.
5. Fire Alarm System.

1.15 GUARANTEE/WARRANTEE:

A. All materials, equipment, etc. provided by the general contractor and/or his subcontractors shall be guaranteed and warranted to be free from defects in workmanship and materials for a period of two (2) years from the date of substantial completion and acceptance of work by UMB. Any defects in workmanship, materials, or performance which appear within the guarantee period shall be corrected by the contractor without cost to the owner, within a reasonable time, to be specified by UMB. In default thereof, owner may have such work done and charge the cost of same to the contractor. In addition to the above statement the Guarantee/Warranty Period shall include all labor cost related to all warranty work.

B. The above shall not in any way void or abrogate equipment manufacturer's guarantee or warranty. Certificates of guarantee shall be delivered to the Owner.

**PART 2 – PRODUCTS:**

2.1 LISTED MANUFACTURERS

A. The manufacturers indicated in Part 2 represent the design and identify the minimum level of quality for materials and equipment, specified in this section, that are acceptable to UMB. All submitted materials and equipment are subject to approval by the A/E and UMB.

2.2 FIRE STOPS & SMOKE SEALS FOR WALL & FLOOR SLEEVE APPLICATIONS

A. General: Provide fire stops, and smoke sealant materials for all electrical services penetrating through rated assemblies. See Architectural Specification Division 07, Section "Penetration Firestopping" for sealant material requirements. Services include:

1. Electrical penetrations include conduits and cables.

B. New Construction: All new penetrations shall be provided with a pipe sleeve and sealant materials.

C. Existing Construction: All new service penetrations through existing rated assemblies shall be provided with a pipe sleeve and sealant materials. All existing unsealed penetrations for services passing through existing rated assemblies within the project area shall be provided with sealant materials.

D. Project Area: The project area shall include the finished spaces and related sections of the utility shafts within the project area footprint.

E. Wall Pipe Sleeve Applications: Pipe sleeves shall be required for all new conduit penetrations through rated wall assemblies and non-rated CMU walls. Where pipe sleeves are installed in non-rated CMU walls fire rated sealant materials are not required. Provide acoustical caulking to seal the annular spaces between the sleeve and the bare pipe or pipe insulation on each end with one half (1/2) inch caulking all around the annular space.

F. Floor Pipe Sleeves Applications: Pipe sleeves are required for all new conduit risers passing through floor slabs.

2.3 SLEEVES

A. Steel Pipe Sleeves: Steel pipe sleeves shall be standard black steel pipe Type E, Grade B, with plain ends conforming to ASTM A53/A53M.

2.4 FIRE ALARM SYSTEM

A. General Requirements:
1. UMB does not have a service contract with any other company to work on the existing fire alarm system. Any certified Notifier Fire Alarm System distributor can work on the existing system. Upon request the contractor shall provide proof of their Notifier Engineered System Distributor Agreement to the University.

2. The existing UMB Campus Notifier Network System is under warranty with MC Dean. Any required work with the Network System must be coordinated with the UMB Project Manager.

B. Existing Fire Alarm System NOTIFIER**:**

1. Fire Alarm Control Panel Model NFS2-640 with display.
2. Digital Voice Command (DVC), Voice Evacuation Control System.

C. System Expansion: Confirm existing Signaling Line Circuit (SLC) and Notification Appliance Circuit(s) (NAC) will support the additional fire alarm devices shown on the contract drawings. Provide additional circuits and/or amplifier boards where necessary.

D. Prior to programming of the new/existing FACP, the contractor shall verify in field exact room numbers and names for all initiating devices, elevator numbers and stair numbers to program the correct device address.

E. Analog smoke detectors shall be addressable photoelectric where indicated on the Drawings, plug-in type with base. The detector base shall be of the twist/lock type with screw terminals for field wiring. An automatic gain control circuit shall be provided to compensate for detector aging and dirt accumulation and maintain the detector within the correct sensitivity range. A critical reduction of sensitivity caused by dirt accumulation shall initiate a trouble signal. Detector sensitivity shall be capable of being read and adjusted from the control panel.

F. Interface monitor modules shall be addressable, mounted in standard four (4) inch x four (4) inch square or octagonal electrical boxes with covers. Cover shall be labeled or embossed with fire alarm system interface module designation. A solid state LED indicator lamps shall be visible in the cover. These modules are to be used for connection of conventional alarm devices such as water flow switches, valve tamper switches, fire pump alarms and other non-addressable devices. Connections between devices and modules shall be integrally supervised for open and ground faults. Monitor and control functions may be integrated in a single interface module if listed and approved for this purpose.

G. Heat detectors shall be addressable, plug-in type with base. The detector base shall be of the twist lock type with screw terminals for field wiring. Detectors shall be rate compensation, fixed temperature type, rated at 135ºF. Detector element shall be self-restoring after operation.

2.5 INTERFACE CONNECTIONS TO EXISTING CAMPUS FIRE ALARM SYSTEM CENTRAL NETWORK STATIONS

A. General:

The existing Campus – wide Central Fire Alarm Monitoring & Control (FAMC) and Mass Notification System (MNS) is Class A, dedicated campus fiber network. The FAMC system consist of four (4) Network Command Centers (NCC) with PC based head-end work stations with graphical user interfaces that allow for centralized alarm annunciation, monitoring and control at each NCC of all building fire alarm systems, their respective individual signaling line circuits, notification appliance circuit loops and associated individual devices. The

NCC's also has the capability to remotely broadcast real-time and pre-recorded voice messages via a microphone at Campus Police. The four (4) NCC's are located at Campus Police, UMB Fire Marshal's Office, Pearl Street Garage Electronics Shop and Pearl Street Garage Work Control Center.

B. The existing FAMC, MNS & NCC is Notifier ONYX WORKS – NW Work Stations with NFN wire PC Card, Graphic User Interface software and hardware for NOTI-FIRE NET (NFN) with Gateway.

1. For building renovation projects existing NCC's must be upgraded with new and latest floor plans with device locations. These modifications only applies to where initiating devices are added or being replaced.

C. The existing four (4) Network Command Centers (NCC) have been upgraded under a separate contract and are still under warranty with M.C. Dean, Inc. All work associated with the connections, programming, and modifications to the existing NCC's must be performed by M.C. Dean, Inc. UMB will hire M.C. Dean, Inc. under a separate service contract to perform all work. This contractor will be responsible for coordinating all work with M.C. Dean, Inc to perform all work related to upgrading/modifications to four (4) NCC's. M.C. Dean, Inc. will provide the work as follows:

1. Programming of the NCC's to communicate with building Fire Alarm Control Unit/Fire Alarm Control Panel.
2. Convert CADD files to META files for Graphic User Interface and upload on to NCC's.
3. Provide complete Point ID descriptions and locations of devices for new graphic screen shots.
4. Program and test all new Point ID's.
5. Program and test Mass Notification Message Broadcast.
6. Provide all hardware, software, programming tools and documentation necessary to modify the system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site.

D. Before M.C. Dean, Inc. can perform the work on the existing NCC's, the contractor shall provide M.C. Dean, Inc. updated and approved as-built fire alarm system shop drawings hard copy and CADD files, with exact device locations and addresses, as well as the updated building FACP program.

2.6 ACCESS CONTROL SYSTEM

A. Approved Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

1. Access Control System Software:

a. Existing Lenel System.

2. Access Control System Field Hardware
   a. Lenel, no exceptions.

3. Access Control System Field Power Supplies
   a. Lenel or approved equivalent.
   b. Altronix or approved equivalent

B. Access Control – Data Gathering Panel (DGP)/Reader Module (RM) Enclosure:

1. The enclosure shall be a wall mounted unit and shall meet the following requirements:
   a. Capable of accommodating 6 access control boards (1 DGP and 5 RMs or 6 RMs)
   b. Includes a 12VDC Power Supply meeting the specifications outlined in the power supply specification section
   c. 115VAC input power
   d. Lockable enclosure
   e. Approved Equipment:
      1) Lenel LNL-AL600ULX-4CB6 or approved equivalent.

C. Access Control - DGP/RM Power Supply:

1. Each DGP and supporting network equipment; including but not limited to hubs, routers, switches, data converters, and other data transmission media, shall be provided with a minimum of eight (8) hours of backup battery power. The battery backup power shall maintain the DGP and supporting network equipment fully operational during any power outage or period of degraded normal power (brown out). The DGP power supply shall have an integral battery charger. The charger shall maintain the battery in the fully charged state and supervise its condition at all times. The charger shall be capable of restoring the battery from the fully discharged to the fully charged state in forty eight (48) hours. The DGP shall switch to backup power and back to normal power without any loss of DGP operations or functions including receipt and processing of alarms, issuing Commands, processing access card activity, and all supervisory and monitoring functions. The Contractor shall provide all support hardware necessary for the battery backup including cables, charger, cooling and heating as necessary for outdoor operation. The Contractor shall provide battery calculations for each DGP. The power supply shall report AC fail, battery low, and battery fail.

D. Access Control - Data Gathering Panel (Security Control Panel):

1. The Data Gathering Panel (DGP) shall be capable of integrating with the existing access control system and shall meet the following requirements:
   a. 12/24VDC Input.

b. Eight (8) Inputs.
c. Four (4) Form C relay outputs.
d. Support for two (2) card readers.
e. Support for thirty two (32) downstream devices by RS-485 connection.
f. Support for up to sixty four (64) doors using downstream devices.
g. Support for specified card reader communication protocol.
h. Approved Equipment:
1) The DGP shall be Lenel LNL-2220 or approved equivalent.

E. Access Control - Dual Reader Modules (RM):

1. The RM shall be capable of integrating with the owner's existing access control system and shall meet the following requirements:
a. 12/24VDC Input.
b. Ten (10) Input six (6) Form C relay outputs.
c. Support for two (2) card readers.
d. Support for specified card reader communication protocol.
e. Approved Equipment:
1) The RM shall be Lenel LNL-1320 or approved equivalent.

F. Access Control - Card Reader:

1. Proximity technology card readers shall meet the following specifications.
a. Proximity RF technology
b. Suitable for surface, semi-flush, pedestal, or weatherproof mounting as required
c. Read range minimum two (2) inches (51 mm (two (2) inches)) with ISO Prox card
d. Read time maximum ninety four (94) milliseconds for twenty six (26) bit card
e. Integral multicolor LED and beeper
f. Operating temperature -30C to 65C
g. Wiegand format output
h. Powered from the Power Supply 6-12 VDC plus or minus ten percent (±10%) as shown and shall not dissipate more than 150 watts.
i. Color beige
j. Approved Equipment:
1) HID 5355.

G. Access Control - REX PIR Motion Detector:

1. The REX PIR motion detector shall be used as a mean to allow egress from the secure side to the unsecure side of an access controlled door and shall meet the following requirements:
a. 12VDC Input.
b. Two (2) Form C Relay outputs.

c. Installable over single gang back box with use of trim ring.
d. Adjustable and maskable coverage pattern.
e. Light Gray or Beige in color.
f. Approved equipment:
1) Bosch DS160 or approved equivalent.

H. Access Control - Line Supervision:

1. Communications between the host computer and the data gathering panels shall be protected against compromise. The system shall detect substitution of resistance or electrical potential, substitution of like equipment, and introduction of synthesized signals. Protective circuits (alarm inputs) shall be protected between the data gathering panel and the sensing devices (door contacts, motion detectors, etc.). Each circuit shall be supervised by end or line resistors located at the sensing device. The contractor must receive written approval from SI to locate the resistor elsewhere unless the drawings require this. The system shall detect resistance changes and report alarm and trouble signals at designated values defined by the system manufacturer. The system shall register a minimum of four (4) states: normal, alarm, trouble open (cut), and trouble closed (shorted). Trouble signals shall be displayed to the operator in a format readily identifiable by the operator as a supervisory condition.

## 2.7 VIDEO SURVEILLANCE SYSTEM (VSS)

A. Approved Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

1. Pelco, no exceptions.

## 2.8 RACEWAY

A. For indoors above floor slab, use EMT conduit with compression fittings with a minimum size of three quarter (3/4) inch (regardless of function/purpose) and maximum size of two (2) inches. Above two (2) inches, conduit shall be rigid steel conduit, zinc coated with threaded type fittings.

1. For low-voltage, special systems provide the following color-coated EMT raceway:
a. Security - White.
b. Fire Alarm System – Red.

B. Non-Metallic Raceway: Provide expansion joints in every twenty (20) foot of run and at least once in every run in all outdoor, rooftop, and garage locations. Provide PVC 40 pipe, non-metallic NEMA 4X boxes and non-metallic NEMA 4X enclosures supported via non-metallic fiberglass strut and/or pipe clamps at the following locations:

1. All outdoor locations including, but not limited to, inside garages and on rooftops.
2. Embedded in concrete, brick, CMU or other structural material.
3. Below-slab and –grade.

All unconditioned-air spaces/rooms in Parking Garages

C. Supports: For all indoor, conditioned-space locations utilize conduit clamps, conduit straps, bean clamps, etc. and/or channel strut supports. For all outdoor applications (as specified above for PVC 40) and where non-metallic raceway is provided, provide only non-metallic fiberglass (or other non-metallic material) or PVC-Coated Galvanized Steel conduit supports and/or channel strut. Support conduits at a minimum of two (2) times per ten (10) ft. length and at a frequency rate as directed by the NEC.

D. Bushings: Provide only threaded type for IMC, RGS and PVC-RGS raceway. Provide only steel compression type for all EMT raceway systems. Provide insulated-throat, threaded type bushings for all tel/data raceway systems.

E. Surface metal raceways shall be used only in finished areas and only where specifically noted on the drawings. Surface mounted raceways shall be Wiremold 500, 700, 1000, or 4000 series or pre-approved equivalent with buff finish used as follows:

1. # 500: 2-#10 or 3-#12 wires maximum.
2. # 700: 3-#10 or 4-#12 wires maximum.
3. #1000: 9-#10 or 12-#12 wires maximum.
4. Other combinations of conductors shall be in accordance with the manufacturer's published data and the National Electrical Code.
5. All elbows, boxes fittings supports, etc., shall be by the raceways manufacturer. Finish shall match that of the raceway.
6. Wire trough shall be steel enclosed wireway meeting all UL requirements.

F. All new raceways in finished areas shall be concealed unless specifically noted otherwise.

G. Grout around all conduits at ceiling, floor, and wall penetrations to provide airtight seal. All floor slab and fire-rated wall penetrations shall be sealed with a rated system/installation that is pre-approved by the UMB Fire Marshal. Submit manufacturer’s engineering drawing of the proposed fire-proofing system to the UMB Project Manager for approval.

H. Group together exposed conduit insofar as possible. Install all conduits parallel or perpendicular to the building surfaces. Maintain minimum six (6) inch spacing from parallel flues, steam pipes, or hot water pipes and two (2) inches from perpendicular flues, steam or hot water pipes.

I. All conduits shall be rigidly supported to building structure. Conduits shall not be supported from suspended ceiling support wires.

J. All conduit bends shall be made with an approved conduit bender and no bend shall have a centerline radius less than six times the diameter of the conduit.

K. Core Drilling/Floor Penetrations: Coordinate with the UMB Project Manager prior to making any core drills for floor penetrations. Prior to core drilling/floor penetrations provide X-ray examination/GPD of the floor structure to locate structural steel for avoidance. The contractor is responsible for maintaining structural integrity of all floors and walls after core drills for conduits are made.

2.9 BOXES AND ENCLOSURES

A. Indoor Applications: Provide NEMA 250 interior galvanized steel, minimum 14 gauge, outlet boxes, no less than four (4) inches square with extension rings and mounting brackets at the following locations:

1. Dry and Clean Locations: NEMA Type 1.
2. Locations with Dust, Falling Dirt and Dripping Noncorrosive Liquids: NEMA Type 12.
3. Mechanical and Electrical Rooms: NEMA Type 12.

B. Outlet boxes shall be rigidly and securely fastened in place. Outlet boxes in finished areas shall be flush mounted unless otherwise noted.

C. Boxes shall be sized in accordance with NEC Article 370.

D. All conduit connectors and entry hubs shall be insulated or have insulated bushings.

E. Outlets shown adjacent to one another on the plans at the same mounting height shall be ganged except where noted.

F. Outlets shown adjacent to one another on the plans at different mounting heights shall be located with the upper outlet centered directly over the lower outlet.

G. GEM Boxes – Recessed GEM Boxes are prohibited.

2.10 WIRE AND CABLE

A. All wire shall be copper with insulation rated at 600 volts, 75ºC minimum. Aluminum wire is strictly prohibited.

B. Minimum wire sizes shall be #12 for power wiring, #14 for control wiring and as specially noted for systems wiring.

C. Molded connectors (wire nuts) may be used for splicing size 10 AWG or smaller wires on lighting and receptacle circuits only. “Scotch Blocks” must be submitted for prior approval. All other wiring shall be spliced only with lugs and/or terminal blocks.

D. Terminal lugs shall be mechanical clamp or compression type.

E. Pre-insulated crimp connectors and terminals shall be used on low voltage wiring.

F. UTP Cable:

1. Four (4) pair unshielded twisted pair (22-24AWG), solid copper conductors, 100 ohms nominal impedance +/- 15%, minimum bandwidth 500 MHz, green CMP Plenum jacket. Complies with EIA/TIA 568 Category 6 performance specifications.

2. Manufacturer: CommScope, BerkTek (LAN Mark-1000), General Cable, Superior Essex

G. UTP Cable Hardware:

1. Eight (8) pin modular outlet, non-keyed, flat front. Complies with EIA/TIA 568-B.2 Category 6 performance. Outlet wired standards compliant 568B pinning. Outlets must be white.

2. Manufacturer: The Siemon Company, Ortronics

H. Fiber Optic Cable:

1. Shall be a hybrid cable containing multimode under a single plenum jacket, orange color unless otherwise noted.
Multimode - 62.5/125 µm tight buffer construction with aramid yarn strength member (ie Kevlar™), plenum jacket, indoor/outdoor rated
(-20°C to +85°C). 900µm buffer diameter, numerical aperture .29 +/- .02, minimum bandwidth of 200 MHz at 850 nm, 500 MHz at 1300 nm, maximum attenuation 3.5 dB/km at 850 nm and 1.5 dB/km at 1300 nm

2. Manufacturer: OCC or approved equivalent, Part # DX012KSLX9RP16.

I. Fiber Optic Termination Hardware:

1. Wall mounted optical fiber patch panel with hinged front door, mounting guides, and designation panels. Populate panels complete with coupler panels and LC couplers.

2. Manufacturer: Siecor/Corning or approved equivalent
Part Number: Wall mounted Panel Housing # WCH-049
Connector Panels # (2) – CCH-CP12-A9

2.11 GENERAL WIRE AND CABLE REQUIREMENTS

A. Fire Alarm System:

B. Fire Alarm Control Cable Type MC

1. For use on fire alarm circuits as required and as recommended by the manufacturer.
2. Interlocking galvanized steel armor, steel strip (painted red).
3. Conductor insulation – TFN/THHN solid copper.
4. Copper grounding conductor.
5. Polyester assembly tape.
6. Neutral conductor.
7. UL Listed Fire Alarm Cable.
8. Rated for use in plenums.
9. Rated for through penetration of 1, 2, and 3-hour fire walls.
10. Individual twisted pairs and shielding, as required per fire alarm system manufacturer.
11. UL 66, 83, 1424, 1569, 1581, and 2556 listed.
12. NEC 300.22, 362, 330, 430.2, 501, 502, 503, 530, 504, 505, 518, 530, 645, 725, 760, 760.154(A) compliant
13. AFC Type MC Fire Alarm/Control Cable.

C. Non-Power –Limited Circuits: Solid copper conductors with 600v rated, 75ºC, color coded insulation.

1. Low-Voltage Circuits: No. 16 AWG, minimum.
2. Line-Voltage Circuits: No. 12 AWG, minimum.

D. Security and Access Control Systems:

1. General: All wire and cable components shall be able to withstand the conditions under which the wire or cable is installed in for a minimum of twenty (20) years without degradation. All wiring shall meet or exceed manufacturers recommended wire specifications and be listed for intended operation. Provide distinct color coding system for all wiring. Each cable shall be numbered at each end with permanent labels.
   a. Primary transmission media used for the CCTV System shall be coaxial cable.
   b. The use of coaxial cable is for switcher interconnection, monitor and interface at cameras.
   c. The Contractor shall furnish all wire conductors, cables, interfaces, and connectors as required by the system.
   d. Any sensor wire run in wire ducts or troughs where other wiring is present shall be shielded with the shield grounded only at the panel end.
   e. All cabling in racks, cabinets and junction boxes shall be neatly strapped, dressed and adequately supported. Cable installation shall conform to good engineering practices and to the standards of the current NFPA 70.
   f. In all cases, wire conductors and all cables utilized for the connection of the various components as specified herein, including those components provided by others, shall comply with or exceed the recommendations of the

component manufacturers.

g. All wire and cable provided by the Security Contractor shall comply with all applicable codes and ordinances.

h. It shall be the Security Contractor's responsibility to perform all engineering calculations required to ensure the proper cable sizes are provided, so the specified equipment will perform as shown in the manufacturer's specifications. All engineering calculations shall be provided with the prefabrication submittals. It shall be the Security Contractor’s responsibility to obtain and verify the power requirement of NIC electrified locksets, electrified panic device, egress magnet locks before carrying out any engineering calculations.

i. Independent of manufacturer's recommendations, cables utilized for signal circuits shall incorporate stranded conductors of not less than 22 AWG. Conductor sizes shall be increased as required to accommodate specific applications and unusual distances.

j. Independent of manufacturer's recommendations, cables utilized for low voltage power circuits shall incorporate stranded conductors of not less than 18 AWG with red and black colored insulation. The red conductor shall be connected as the positive (+) polarity and the black conductor shall be connected as the negative (-) polarity. Conductor sizes shall be increased as required to accommodate specific applications.

2. Specific Requirements:

a. Wire and cable shall be Belden Corporation, Alpha Wire Company, West Penn Wire or equivalent

b. Wire and cable jacket color shall comply with the facility standard.

c. Minimum wire and cable requirements for selected equipment and devices are per manufacture recommendation.

E. VSS and Access Control Systems:

1. Digital Data Wiring:

a. Cables serving interconnects of digital data between components at the security center or at remote control/monitoring station shall comply with manufacturers requirements and be standard copper wire for each conductor. The hardwire cable shall contain a 100 percent shielding when shielding is specified. Wires with a single overall shield shall have a tinned copper shield drain wire. Shields shall be grounded at the connecting panel end only and in accordance with manufacturer’s recommendations.

1) Twist-on connectors are prohibited.

2) The BNC Connectors shall be appropriately sized to fit the cable.

3) The Contractor is to use the proper crimping tool that fits the wire and connector and recommended by the wire and connector manufacturer.

2. RS-232 Cable:

a. Standard Cable: NFPA 70, Type CM.
   1) Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
b. Polypropylene insulation.
c. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
d. PVC jacket.
e. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
f. Flame Resistance: Comply with UL 1581.

3. Plenum-Rated Cable: NFPA 70, Type CMP.
   a. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
   b. Plastic insulation.
   c. Individual aluminum foil-polyester tape shielded pairs with 100% shield coverage.
   d. Plastic jacket.
   e. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
   f. Flame Resistance: Comply with NFPA 262.

4. RS-485 Cable:
   a. Standard Cable: NFPA 70, Type CM or CMG.
      1) Paired, 2 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors.
      2) PVC insulation.
      3) Unshielded.
      4) PVC jacket.
      5) Flame Resistance: Comply with UL 1581.
   b. Plenum-Rated Cable: NFPA 70, Type CMP.
      1) Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
      2) Fluorinated ethylene propylene insulation.
      3) Unshielded.
      4) Fluorinated ethylene propylene jacket.
      5) Flame Resistance: NFPA 262, Flame Test.

5. Low-Voltage Control Cable:
   a. Card Reader Cable: NFPA 70, CM (2 Cables).
      1) RS485: one (1) pair, twisted shielded, No. 22 AWG, Stranded tinned copper conductors.
      2) 12VDC Power: one (1) pair, twisted, No 18 AWG, Stranded tinned copper conductors,
      3) PVC Insulation.
      4) Flame Resistance: Comply with UL 1581.

b. Paired Lock Power Cable: NFPA 70, Type CMG.
   1) One (1) pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors.
   2) PVC insulation.
   3) Unshielded.
   4) PVC jacket.
   5) Flame Resistance: Comply with UL 1581.

c. Plenum-Rated, Paired Lock Power Cable: NFPA 70, Type CMP.
   1) One (1) pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors.
   2) PVC insulation.
   3) Unshielded.
   4) PVC jacket.
   5) Flame Resistance: Comply with NFPA 262.

d. Paired Lock Power Cable: NFPA 70, Type CMG.
   1) One (1) pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors.
   2) PVC insulation.
   3) Unshielded.
   4) PVC jacket.
   5) Flame Resistance: Comply with UL 1581.

e. Plenum-Rated, Paired Lock Power Cable: NFPA 70, Type CMP.
   1) One (1) pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors.
   2) Fluorinated ethylene propylene insulation.
   3) Unshielded.
   4) Plastic jacket.
   5) Flame Resistance: NFPA 262, Flame Test.

6. Control-Circuit Conductors:
   a. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, in raceway complying with UL 83.
   b. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, in raceway or conduit complying with UL 83.
   c. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or TF, complying with UL 83.

7. Cable Identification Products:

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

2) HellermannTyton.
3) Kroy LLC.
4) Panduit Corp.
5) EZ Label.
6) Or equivalent.

b. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
c. Comply with requirements in Division 26.

8. Source Quality Control:
a. Testing Agency: Engage a qualified testing agency to evaluate cables.
b. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.
c. Factory test UTP cables according to TIA/EIA-568-B.2.
d. Factory test multimode optical fiber cables according to TIA/EIA-526-14-A and TIA/EIA-568-B.3.
e. Factory sweep test coaxial cables at frequencies from 5 MHz to 1 GHz. Sweep test shall test the frequency response or attenuation over frequency, of a cable by generating a voltage whose frequency is varied through the specified frequency range and graphing the results.
f. Cable will be considered defective if it does not pass tests and inspections.
g. Prepare test and inspection reports.

2.12 IDENTIFICATION

A. Coordinate names, abbreviations and other designations used with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as recommended by manufacturers or as required for proper identification and operation/maintenance of electrical systems and equipment.

B. Delay installation of identification until painting is complete.

C. Comply with governing regulations and requests of governing authorities for identification of work.

D. Install engraved plastic-laminate nameplates on all electrical boxes and cabinets installed under this contract (black letters on white background).

E. Where conduit is exposed, apply identification on conduit. Except as otherwise indicated, use permanent vinyl, self-adhering markers with black letters on orange background.

F. Apply self-adhering vinyl or heat-shrink plastic cable/conductor identification markers on each cable and conductor in each box, enclosure or cabinet where wires of more than one circuit are present, except where another form of identification (such as color-coded conductors) is provided. Match identification with marking system used in panelboards,

shop drawings and contract documents.

G. All field installed control circuits shall have tubular sleeve-type wire markers at each end of the circuit and at all splice points. Wire markers shall be permanently stamped with a numbering system selected by the Contractor. The numbering system shall be thoroughly documented and provided to the Engineer.

H. Dymo (or equivalent) labels shall not be used.

I. Ceiling Markers: Provide labels on ceiling grid for accessible electrical equipment that is installed above the ceiling.

2.13 PROJECT OPERATION AND MAINTENANCE MANUAL – ELECTRONIC FILES

A. Project O & M Manual File: The project OM Manual shall include one (1) electronic copy of each approved submittal and any manufacturer's maintenance manuals, and all warranty certificates included in Division 28. Also include the address, phone number and contact person for each supplier. Using the current UMB Standard O&M Manual Template referenced in Division 01 Closeout Procedures insert the submittal files include bookmark and tree structure for accessing each submittal file in the manual.

2.14 COMMISSIONING NEW FIRE ALARM, SAFETY AND SECURITY SYSTEMS

A. Test Equipment: Refer to Division 01 Section 019113 "General Commissioning Requirements" for requirements pertaining to testing equipment.

**PART 3 – EXECUTION:**

3.1 GENERAL REQUIREMENTS – EXECUTION

A. All construction work that creates excessive noise will not be permitted during normal business hours. See Division 01 Specification Section "Cutting and Patching" for requirements.

B. General provisions of the contract apply. All work performed and materials provided shall conform to all applicable codes and standards and the National Electrical Code (NEC).

C. Prior to starting work, 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.

D. Avoid interference with structure and with work of other trades, preserving adequate headroom and clearing all doors and passageways.

E. Confirm the locations of all existing utilities. Repair any damage to existing utilities caused by construction forces.

F. Leave all areas broom clean daily. Remove all construction debris and trash from the site daily.

G. Before ordering any materials or equipment, submit to the engineer data for all materials and equipment. Check equipment dimensions of proposed substitute equipment. The cost of any redesigning caused by a substitution shall be borne by the Contractor.

H. Contractor shall do all cutting, drilling and patching required by his work. All repairs to finish shall be of like kind, color and quality as existing. Structural members shall not be cut without approval from the architect.

I. Take necessary precautions to protect building's occupants and contents, and prevent the spread of dust and dirt into occupied areas.

3.2 SLEEVES

A. Non-Fire-Rated Sound Proof Partition Penetrations: Where new and existing conduits pass through interior partitions with sound proofing provide a pipe sleeves. Seal the annular spaces between construction openings, the sleeves, and conduits with sound proof insulation material equal to the width of the opening. The sound proof insulation shall match the insulation in the partition.

3.3 CONTRACT DOCUMENTS:

A. Contract documents for the work are in narrative form and intend to convey scope and general arrangement.

B. Correction of faulty work due to resolving discrepancies without authorization shall be the responsibility of the Contractor.

C. Should the Contractor discover any discrepancies or omissions on the drawings or in the specifications, he shall notify the Engineer of such conditions prior to the bid date. Otherwise, it will be understood that the drawings and specifications are clear as to what is intended and shall be as interpreted by the Engineer.

3.4 COORDINATION:

A. Coordinate all work and cooperate with all other trades to facilitate execution of work.

3.5 GENERAL WIRING REQUIREMENTS

A. Wire: The following security provisions apply to systemizing requirements:
   1. All security system wiring must be new. All existing wiring not noted for reused and replaced shall be removed.
   2. Wiring shall be in accordance with local, state and national codes (e.g., NEC

Article 760) and as recommended by the manufacturer and compatible with the security system. Number and size and type of conductors shall be as recommended by the security system manufacturer, but not less than 22 AWG twisted shield pair. Network and computer devices may require 24 AWG solid copper conductors for video/data transmission (e.g., TCP/IP, VGA Video) as recommended by the equipment manufacturer.

3. All wire and cable shall be listed and/or approved by a recognized testing agency for intended application and use with a protective signaling system. Provide 300 VAC/60º C rated insulated conductors unless noted otherwise.
4. Wire and cable in air circulation areas which is not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR).
5. Wiring used for the multiplex communication loop shall be twisted and shielded and installed in conduit unless specifically accepted by the security equipment manufacturer.
6. All field wiring shall be completely supervised. In the event of a primary power failure, disconnected standby battery, removal of any internal modules, or any open circuits in the field wiring, a trouble signal will be activated until the system and its associated field wiring are restored to normal condition.
7. Wiring conductors provided in elevator hoist ways and traveling cables shall be listed and approved for elevator use. Conductor insulation shall be TFN, TFFN, THWN, THHN or other insulation designated as Flame Retardant. Insulation rating shall equal or exceed the maximum normal circuit voltage applied to any conductor within the cable or raceway.

B. Fiber Optic Cable
1. The Contractor shall utilize BICSI certified personnel for fiber optic installation and terminations. The OWNER shall be provided with evidence of certification. The Fiber Optic installation shall meet or exceed all minimal requirements of State, National, and manufacturer codes as applicable. The Contractor shall furnish and install all necessary appurtenances to make a complete and operating installation in accordance with the plans, standard sheets, standard specifications, special provisions, and accepted good practice of the industry.
    a. For Cable Installed in Ducts and Conduits: A suitable cable feeder guide shall be used between the cable reel and the face of the duct and conduit to protect the cable and guide it into the duct from the reel. It shall be carefully inspected for jacket defects. If defects are noticed, the pulling operation shall be stopped immediately and the OWNER notified. Precautions shall be taken during installation to prevent the cable from being kinked or crushed. A pulling eye shall be attached to the cable and used to pull the cable through the duct and conduit system. A pulling swivel shall be used to eliminate twisting of the cable. As the cable is played off the reel into the cable feeder guide, it shall be sufficiently lubricated with a type of lubricant recommended by the cable manufacturer. A dynamometer or break away pulling swing shall be used to ensure the pulling line tension does not

exceed the installation tension value specified by the cable manufacturer. The mechanical stress placed on a cable during installation shall not be such that the cable is twisted or stretched. The pulling of cable shall be hand assisted at each controller cabinet. The cable shall not be crushed, kinked or forced around a sharp corner. If a lubricant is used it shall be of water based type and approved by the cable manufacturer. Sufficient slack shall be left at each end of the cable to allow proper cable termination.

b. Placement of Cable into Conduit Risers: The Contractor shall provide conduit risers as indicated on the plans. Kellum grips and/or other hanger devices shall be used to support the vertical drop of cable and prevent any possible kinking of the cable after installation.

c. Minimum Bend Radius: For static storage, the cable shall not be bent at any location to less than ten times the outside diameter of the cable or as recommended by the manufacturer. During installation, the cable shall not be bent at any location to less than twenty times the outside diameter of the cable or as recommended by the manufacturer.

d. Prior to the Fiber Optic Cable Installation: Prior to the installation of the cable, the manufacturer shall submit to the Contractor a factory-performed Optical Time Domain Reflectometer (OTDR) trace result for each reel of cable. The Contractor shall in turn submit the trace results to the OWNER for approval.

C. Method of Wiring

1. General: Wire each alarm, trouble, and supervisory signal, initiating circuit, communication circuit, and each security notifying appliance circuit for supervised operation.

2. Wiring within Cabinets: Provide wiring within cabinets installed parallel with or at right angles to the sides and back of the enclosure. All conductors which are terminated, spliced, or otherwise interrupted in any enclosure associated with the security system shall be connected to terminal blocks. Mark each terminal in accordance with the wiring diagrams of the system. Make all connections with either crimp-on terminal spade lugs or approved pressure type terminal blocks. Terminal blocks shall be secured in each junction box to the junction box cover plate.

3. Interior Work: Cables installed in plenums shall meet UL 910, and cables to be installed in risers shall meet UL 1666.

4. Installation in Ducts or Conduits: A cable lubricant compatible with the cable sheathing material shall be used on all cables pulled. Pulling fixtures shall be attached to the cable strength members. If indirect attachments are used, the grip diameter and length shall be matched to the cable diameter and characteristics. If indirect attachment is used on cables having only central strength members, the pulling forces shall be reduced to ensure the fibers are not damaged from forces being transmitted to the strength member. During pulling the cable pull line tension shall be continuously monitored and not exceed the maximum tension as given by the cable manufacturer. The mechanical stress placed upon a cable during installation shall not twist or stretch the cable.

a. A cable feeder guide shall be used between the cable reel and the face of the duct or conduit to protect the cable and guide it into the duct or conduit as it is played off the reel. As the cable is played off the reel, it shall be carefully inspected for jacket defects. Precautions shall be taken during installation to prevent the cable from being kinked or crushed and the minimum bend radius of the cable is not exceeded at any time. Cable shall be hand fed and guided through each manhole and additional lubricant shall be applied at all intermediate manholes.

b. When practicable, the center pulling techniques shall be used to lower pulling tension. That is, the cable shall be pulled from the center point of the cable run towards the end termination points. The method may require the cable to be pulled in successive pulls. If the cable is pulled out of a junction box or manhole the cable shall be protected from dirt and moisture by laying the cable on a ground covering.

5. Vertically Run Cable: When possible, use gravity to assist in cable pulling; pull cable from top of run to bottom of run. Hand-pull cables if possible; if machine assistance is required, monitor tension and do not exceed the specific cable tension limits. After installation, the vertical tension on the cable shall be relieved at maximum intervals of 30.48 m (100 ft) using a split support grip.

6. Cable Taps: The Contractor shall provide a terminal cabinet where any circuit tap is made.

7. Color Coding: The Contractor shall distinctively color code all wiring differently from the normal building wiring. Identify conductors by plastic-coated, self-sticking, printed markers or by heat-shrink type sleeves. Wire the alarm initiating and notification signal devices so removal will cause the system trouble device to sound. Each conductor used for the same specific function shall be distinctively color coded. Use two (2) different color codes for each interior alarm circuit; one (1) for each loop. Each circuit color code wire shall remain uniform throughout the circuit.

8. Termination: End-of-line supervisory resistors or devices are to be provided at the sensor device location. The end of line resistor network shall be per manufacturer's recommendations; in the absence of such, it shall consist of two (2) 1k resistors, one (1) across the normally closed contact of the device and the other in series with the normally closed circuit. See drawing details for further information. Use of GRI Resistor Packs is preferred.

9. No "stick-on" cable ties shall be used within the enclosure.

D. Cable Installation

1. All field wiring required for interconnection of the various security system components shall be installed within conduit.

2. All circuits shall be protected to avoid interruption of service due to short-circuiting or other conditions which may adversely affect the connecting devices. Each individual signaling circuit shall be classified as a circuit pair.

3. Screw terminal blocks or connectors shall be furnished for all cables which interface with racks, cabinets, consoles or equipment modules. No more than 2 mm of exposed bare wire may show when either crimped or fastened to a connector

block or terminal strip.

4. Care shall be exercised in wiring to avoid damage to the cables or the equipment. All joints and connections shall be made with mechanical butt splice connectors. The crimping tool used shall be recommended by the manufacturer. Wire nuts shall not be an acceptable splice method.
5. To reduce the possibility of signal contamination, all cables shall be grouped according to the signals being carried. The horizontal and vertical cable runs should be bundled or grouped as follows:
   a. Low Voltage Power
   b. Signal, Control Cables, and Video Cables
6. All cabling shall be U.L. listed for its intended application and meet or exceed the standards as recommended by the manufacturers of the components being interconnected. All shielded cabling used shall be 100 percent shielded.
7. All system wiring shall be installed in accordance with the instructions provided by the manufacturers of the components being used in the system and in accordance with codes, specifications, and standards as referenced herein.
8. Splices shall not be permitted in system wiring between components which are incorporated in the system. Wiring runs must terminate at either a system component or a junction box where wiring is interconnected using terminal strips or connectors. Wire ends shall be prepared for attachment to component terminals in accordance with the recommendations of the equipment manufacturers. If there is no alternative and a wire/cable splice must be made, the Contractor shall notify the OWNER and request approval through a formal RFI process prior to making the wire splice.
   a. The RFI shall include the following:
      1) The Contractor shall identify the device and/or system affected by the proposed splice and why the splice is required.
      2) Provide in detail the methodology which shall be utilized for the wire/cable splice. A diagram may be used to demonstrate methodology but shall not replace the written methodology requirement.
      3) If splicing is required for more than five (5) wires/cables, a formal wire management plan shall be developed to provide methodology for maintaining wire/cable consistency and performance.
      4) In all instances the Contractor shall provide the OWNER with a mock-up of the proposed splice and samples of the materials to be used.
      5) The Contractor shall not proceed until written approval has been received from the OWNER for the splice and the splice materials.
   b. The following criteria shall be utilized for installing wire/ cable splices.
      1) Twist type connectors shall not be used for wire splicing.
      2) Wire splices shall be made on binding screw captive mechanical compression terminal strips.
      3) Soldered and crimped connections are allowed and shall be accomplished with crimping Lug Manufacturers Calibrated Tool.

4) Solder connections shall be applied in accordance with BICSI standards.
5) Mechanical splices shall utilize a UL listed ratchet type connector. The Contractor shall select the appropriate connector size based on gauge of the wire/cable being spliced. The Contractor shall only use manufacture approved full cycle ratchet crimping devices.
6) The Contractor shall utilize appropriately sized UL listed heat shrink tubing. Splices shall be encapsulated with an epoxy or ultraviolet light cured splice encapsulator, particularly if the spliced wire/cable is direct-buried, environmentally exposed, or located in an exterior hand hold.
7) The Contractor shall ensure all completed splices are accessible. Splices shall be made in lockable/tampered security enclosures or in security junction/pull boxes. At no time shall spliced wires/cables be permitted to be pulled into the conduit system.
8) All spliced wires/cables shall be tested in witness of the OWNER to ensure system performance is not adversely affected by the splices' presence.

c. All copper conductor splices shall be accomplished in the following method:
1) Strip insulation from wires to be spliced using caution not to score or strip away the actual conductor.
2) Twist together the stripped conductors for a minimum of four rotations.
3) Solder the twisted conductors using rosin core solder.
4) Trim the twisted and soldered conductors to a length accommodated by the vinyl insulated closed end splice or butt splices in the next step. Trimmed bare conductors shall not extend beyond the insulated closed end splice (or equal).
5) Crimp insulated closed end splice utilizing a full cycle ratchet crimp tool approved by the splice manufacturer. The crimped connections shall be free of any movement between the wire and crimp splice device.

9. Connections at devices shall be soldered or fastened with approved crimp connectors. No wire nuts will be permitted. Wire should be twisted four times before a crimp connector is applied. The Manufacturers crimping tool shall be utilized for the crimp connectors of choice. Environmental connectors shall be used in harsh or outdoor environments. Devices requiring connections within metal extrusions associated with perimeter windows and doors are considered to be a harsh environment.
10. All mounted wire ties shall be the screw down type. Wire ties utilizing only an adhesive back are not acceptable.
11. Heat shrink tubing must be installed on all cable ends within cabinets.
12. Cable shields are to be grounded only at the DGP end, for alarms and CCTV. Shields are to be carefully insulated to prevent conductor shorts.

E. Grounding Practices:
   1. The existing single system ground point shall be maintained for all security and security related systems described in the BICSI guidelines and is to be provided and installed by the Contractor.
   2. Under no circumstances shall either the conduit or AC neutral be used for the security system ground reference point.

F. Control of Electromagnetic Interference (EMI):
   1. The control of EMI is critical to the reliable operations of the systems described in these specifications. It is the responsibility of the Security Contractor to ensure all equipment and systems proposed meet FCC requirements and certifications for type regarding electromagnetic emissions. The Security Contractor shall submit evidence of such certifications with their pre-fabrication submittals.
   2. All equipment shall be installed in accordance with manufacturers' specifications and recommendations to assure compliance with FCC certifications and requirements. This shall include proper installation to maintain case integrity; proper fastening of conductors, wires, cables, and connectors; use of appropriate connectors and fasteners; and following manufacturers' recommendations for grounding practices.
   3. The Security Contractor shall certify the installed system is in compliance with the manufacturers' recommendations and specifications regarding control of EMI.

## 3.6 INSTALLATION – FIRE ALARM SYSTEM

A. Updates to Annunciator Panels and Network Command Centers:
   1. Annunciator Panels: Include updates to the existing Graphic Annunciator Panels as necessary for updated floor plans and/or changes to device locations.
   2. Network Command Centers: Include upgrades to the four (4) existing Network Command Centers as necessary for updated floor plans and/or changes to device locations.

B. All field wiring shall be installed in conduit. Conduit and boxes shall be sized according to National Electrical Code requirements based on the number of conductors. Initiating device circuit wiring shall be two-conductor twisted with integral shield and ground. Indicating appliance circuits shall be minimum 14 AWG. Provide new wiring as necessary and extend and connect to the nearest SLC/NAC loop. **Do not T-TAP to existing wiring. T-TAP is not allowed.**

C. Fire alarm circuits shall be identified by red junction box covers stenciled in white letters "fire alarm". Fire alarm wiring shall be color coded in accordance with requirements of local authority having jurisdiction.

D. Final Acceptance test shall be witnessed by the UMB Fire Marshal.

E. Prior to testing of the system with UMB Fire Marshal, the contractor shall conduct pre-testing of the system and correct all deficiencies.

F. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

G. Tests and Inspections:
   1. Visual Inspection: Conduct visual inspection prior to testing.
      a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
      b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.

H. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

I. Fire-alarm system will be considered defective if it does not pass tests and inspections.

J. Prepare test and inspection reports.

K. Contractor Pretesting: After installation, align, adjust, and balance system and perform complete pretesting. Determine, through pretesting, compliance of system with requirements of Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new ones, and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results. Provide documentation summarizing pretesting to UMB Fire Marshal. Documentation should include statement that system is working properly and summary of corrections made during pretesting. Project Manager may attend contractor pretesting as desired.

L. The contractor shall have a fire alarm technician present during all tests and shall have laptop with them to modify and program changes during the tests.

M. Final acceptance testing with the UMB Fire Marshal: After installation, align, adjust, and balance system and perform complete pretesting with the University Fire Marshal. Determine, through pretesting, compliance of system with requirements of Drawings and Specifications. After pretesting is completed, correct deficiencies observed in pretesting for final testing. Replace malfunctioning or damaged items with new ones, and retest until satisfactory performance and conditions are achieved. Remove existing devices after pretesting has been completed with the UMB Fire Marshal.

N. Final acceptance testing: After final acceptance testing is complete, provide letter certifying installation is complete and fully operable, including names and titles of witnesses to preliminary tests.

O. Final Test Notice: Provide minimum of ten business (10) days' notice in writing when system is ready for final acceptance testing.

P. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by system test that total system meets Specifications and complies with applicable standards.

3.7 FEES

A. A fee applies if testing with the Fire Marshal reveals that the fire alarm system does not meet applicable codes and standards, the project specifications and/or the design documents. Each failed test will result in a $250 fee.
   1. If any programming changes are required during the test or after, the test is considered a failed test.
   2. Any issue that requires re-testing is considered a failed test.
   3. Any test in which the contractor fails to show at the scheduled start time or is not prepared to perform the test with testing materials is considered a failed test.

B. Invoices will be sent to the contract holder from the University of Maryland, Baltimore Central Administration Support Services (CASS) Department. Payment must be made electronically with credit card or via check. Cash payment is not acceptable.

C. Failure to pay the fee within 30 days of receipt will result in appropriate administrative and/or legal action. Further inspection or testing may not take place until the fee is paid in full. This may result in delay of the issuance of a use and occupancy permit for the building or facility.

3.8 INSTALLATION OF PATHWAYS – VSS AND ACCESS CONTROL SYSTEMS

A. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.

B. Comply with requirements in Division 26.

C. Install manufactured conduit sweeps and long-radius elbows whenever possible.

D. Pathway Installation in Equipment Rooms:
   1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed or in the corner of the room where multiple sheets of plywood are installed around perimeter walls of room.
   1. Install cable trays to route cables if conduits cannot be located in these positions.
   2. Secure conduits to backboard when entering room from overhead.

3. Extend conduits 75 mm (3 in) above finished floor (AFF).
4. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

E. Backboards: Install backboards with 2440 mm (96 in) d i m e n s i o n vertical. Butt adjacent sheets tightly and form smooth gap-free corners and joints.

3.9 INSTALLATION OF CONDUCTORS AND CABLES – VSS AND ACCESS CONTROL SYSTEMS

A. Comply with NECA 1.

B. General Requirements for Cabling:
1. Comply with TIA/EIA-568-B.1.
2. Comply with BICSI ITSIM, Ch. 6, and “Cable Termination Practices."
3. Install 110-style IDC termination hardware unless otherwise indicated.
4. Terminate all conductors; no cable shall contain un-terminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
5. Cables may not be spliced. Secure and support cables at intervals not exceeding 760 mm (30 in) and not more than 150 mm (6 in) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
6. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
9. Pulling Cable: Comply with BICSI ITSIM, Ch. 4,“Pulling Cable”. Monitor cable pull tensions.

C. UTP Cable Installation:
1. Comply with TIA/EIA-568-B.2.
2. Do not untwist UTP cables more than 12 mm (0.5 in) from the point of termination to maintain cable geometry.

D. Optical Fiber Cable Installation:
1. Comply with TIA/EIA-568-B.3.
2. Cable shall be terminated on connecting hardware that is rack or cabinet mounted.

E. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend copper cable not in a wire way or pathway a minimum of 200 mm (8 in)

above ceilings by cable supports not more than 1525 mm (60 in) apart.

3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

F. Installation of Cable Routed Exposed under Raised Floors:
   1. Install plenum-rated cable only.
   2. Install cabling after the flooring system has been installed in raised floor areas.
   3. Coil cable 1830 mm (72 in) long shall be neatly coiled not less than 300 mm (12 in) in diameter below each feed point.

G. Outdoor Coaxial Cable Installation:
   1. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed O-rings to keep out moisture.
   2. Attach antenna lead-in cable to support structure at intervals not exceeding 915 mm (36 in).

H. Separation from EMI Sources:

   1. Comply with BICSI TDMM and TIA/EIA-569-A recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
   2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
      a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 127 mm (5 in).
      b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 300 mm (12 in).
      c. Electrical Equipment Rating More Than 5 kVA: A minimum of 600 mm (24 in).
   3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
      a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 64 mm (2.5 in).
      b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 150 m (6 in).
      c. Electrical Equipment Rating More Than 5 kVA: A minimum of 300 mm 12 in).
   4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
      a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
      b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 75 mm (3 in).
      c. Electrical Equipment Rating More Than 5 kVA: A minimum of 150 mm (6

in).

5. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 1200 mm (48 in).
6. Separation between Cables and Fluorescent Fixtures: A minimum of 127 mm (5 in).

## 3.10 CONTROL-CIRCUIT CONDUCTORS

A. Minimum Conductor Sizes:
   1. Class 1 remote-control and signal circuits, No. 14 AWG.
   2. Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.
   3. Class 3 low-energy, remote-control, alarm and signal circuits, No. 12 AWG.

## 3.11 FIRESTOPPING

A. Apply fire stopping to penetrations of fire-rated floor and wall assemblies for electronic security installations to restore original fire-resistance rating of assembly.

B. Comply with TIA/EIA-569-A, "Firestopping" Annex A.

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

## 3.12 GROUNDING

A. For communications wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. For low-voltage wiring and cabling, comply with requirements in Division 26.

## 3.13 CABLE IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 26.

## 3.14 FIELD QUALITY CONTROL

A. Tests and Inspections:
   1. Visually inspect UTP and optical fiber cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-B.1.
   2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
   3. Test UTP cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross connection.

a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

4. Optical Fiber Cable Tests:
   a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
   b. Link End-to-End Attenuation Tests:
      1) Multimode Link Measurements: Test at 850 or 1,300 nm (wavelength) in 1 direction according to TIA/EIA-526-14-A, Method B, One Reference Jumper.
      2) Attenuation test results for links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.

B. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide or transfer the data from the instrument to the computer, save as text files, print, and submit.

C. End-to-end cabling will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

## 3.15 WIRELINE DATA TRANSMISSION

A. Installation: The Contractor shall install all system components including Owner furnished equipment, and appurtenances in accordance with the manufacturer's instructions, ANSI C2 and as shown, and furnish all necessary connectors, terminators, interconnections, services, and adjustments required for a complete and operable data transmission system.

B. The Contractor shall provide all personnel, equipment, instrumentation, and supplies necessary to perform all testing.

## 3.16 DEMOLITION

A. The demolition in the renovation areas shall be complete and include all work in the area unless noted otherwise.

B. Existing systems passing through areas of demolition to serve equipment beyond the demolition areas shall remain in service, or be suitably relocated and restored to normal operation, throughout the demolition and reconstruction of the area. The Contractor shall investigate and identify such equipment prior to demolition.

C. Provide temporary service to equipment disturbed by the demolition until such time as the permanent service can be restored.

D. Where conduit and wiring is to remain are inadvertently damaged or disturbed, cut out and remove damaged portion and all damaged wiring from the source to the destination connection point. Provide new wiring of equal capacity.

E. Exposed conduit to be demolished shall be removed in its entirety. Concealed conduit, abandoned in place, shall be cut out approximately two (2) inches beyond the face of adjacent construction, plugged, and the adjacent surface patched to match existing.

F. Wiring to be demolished shall be removed from both concealed and exposed conduit. No wiring which becomes unused as a result of the contract shall be abandoned in place.

G. Equipment specified or indicated to be demolished, shall be removed from the project site and shall not be reused.

## 3.17 COMMISSIONING NEW FIRE ALARM, SAFETY AND SECURITY SYSTEMS

A. Testing Preparation:
   1. Certify in writing to the CxA that the systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

   2. Place systems, subsystems, and equipment into operating mode to be tested.

   3. Inspect and verify the position of each device and interlock identified on checklists.

   4. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

B. General Testing Requirements:
   1. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

   2. Test all operating modes and verify proper response of controllers and sensors.

   3. Tests will be performed using design conditions whenever possible.

## 3.18 CUTTING AND PATCHING

A. Cutting and patching associated with the work in the existing structure shall be performed a neat and workmanlike manner. Existing surfaces that are damaged by the contractor shall be repaired or provided with new materials to match existing.

B. Structural members shall not be cut or penetrated. Holes cut through concrete and/or masonry to accommodate new work shall be cut by reciprocating or rotary, non-percussive methods.

C. Patching of areas disturbed by installation of new work and/or required demolition shall match existing adjacent surfaces as to material, texture and color.

3.19 CLEAN – UP

A. Excessive debris and dirt, such as occurs from cutting through masonry or plaster walls shall be cleaned up from the equipment and removed immediately after the work of cutting through the walls.

B. Debris shall be removed from UMB property.

C. Ceiling panels shall be replaced as soon as work is finished in the area, and shall be kept free of dirty finger prints. Where work is being done in corridors used by patients and visitors, ceiling panels shall be replaced at the close of the day's work even if work is at the particular location is incomplete.

D. All areas shall be left broom-clean at the end of the work period.

END OF DIVISION 280000