TEMPLE UNIVERSITY
OFFICE OF FACILITIES MANAGEMENT
PROJECT DELIVERY GROUP

TECHNICAL SPECIFICATIONS

PROJECT TITLE:
T.U. PROJECT NUMBER:
WORK REQUEST NUMBER:

CONTENTS: PAGE

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DIVISION 1 REVISED: January 2015
DIVISION 2-16 REVISED: 03/29/10

Note: These technical specifications are generic in nature and have not been edited for this specific project. Some sections may not apply. Where there is a conflict between any other specifications and the Temple University Technical Specifications, this document shall apply and supersede. In the event of a conflict between the terms of the Agreement that governs this project and the terms of these specifications, the terms of the Agreement shall control.
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01100 - SUMMARY

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. Section Includes:
   1. Project information.
   2. Work covered by Contract Documents.
   3. Phased construction.
   4. Work by Owner.
   5. Work under separate contracts.
   6. Future work.
   7. Purchase contracts.
   8. Owner-furnished products.
   10. Access to site.
   11. Coordination with occupants.
   12. Work restrictions.

B. Related Requirements:
   1. Section 01500 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification: Refer to Scope of Work.

   1. Owner's Representative: Temple University Project Delivery Group Construction Manager (TU CM) or as otherwise noted in contract documents.
C. Architect: Temple University Campus Planning & Design (TU CPD) or as otherwise noted in contract documents.

1.4 WORK COVERED BY CONTRACT DOCUMENTS
A. The Work of Project is defined by the Contract Documents and consists of the following:
   1. Refer to Scope of Work.
B. Type of Contract:
   1. Project will be constructed under a single prime contract unless otherwise noted in the Scope of Work

1.5 PHASED CONSTRUCTION
A. The Work shall be conducted in one or more phases as defined in the Scope of Work.

1.6 WORK BY OWNER
A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
B. Work by Owner: Refer to the Scope of Work.

1.7 WORK UNDER SEPARATE CONTRACTS
A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts. Refer to the Scope of Work for Work Under Separate Contracts.
B. Work Under Separate Contracts: Refer to the Scope of Work.

1.8 PURCHASE CONTRACTS
A. General: Owner may have negotiated purchase contracts with suppliers of material and equipment to be incorporated into the Work. Owner will assign these purchase contracts to Contractor. Include costs for purchasing, receiving, handling, storage if required, and installation of material and equipment in the Contract Sum, unless otherwise indicated.
B. Purchase Contracts: Refer to the Scope of Work.
1.9 OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products and making building services connections as identified by the drawings Owner-Furnished Products.

B. Owner-Furnished Products: Refer to the Scope of Work

1.10 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Use of Site: Limit use of Project site to areas identified within the contract documents. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Confine construction operations to limits as shown in the contract documents.
2. Limits: Limit site disturbance, including earthwork and clearing of vegetation, to 40 feet beyond building perimeter; 10 feet beyond surface walkways, patios, surface parking, and utilities less than 12 inches in diameter; 15 feet beyond primary roadway curbs and main utility branch trenches; and 25 feet beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities, and playing fields) that require additional staging areas in order to limit compaction in the constructed area. These areas are intended to be maximum areas of disturbance permitted but in no case shall the limits exceed those shown on any AHJ (e.g. PADEP/PWD).
3. Driveways, Walkways and Entrances: Keep driveways, parking garage, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
   a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
   b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.11 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner may occupy site and existing and/or adjacent building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used
facilities without written permission from Owner and approval of authorities having jurisdiction.
2. Notify Owner not less than 14 calendar days in advance of activities that will affect Owner's operations.

1.12 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction. Contractor shall procure all required street closure and connection permits as required.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 3:30 p.m., Monday through Friday, unless otherwise indicated.

1. Notify Owner not less than 10 business days in advance of any off-hours work.
2. Obtain Owner's written permission before proceeding with off-hours work. Submit “Weekend & Off Hours Authorization Form” for approval prior to performing any off-hours work.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than 10 business days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions. Submit “Utility Shutdown Authorization Form” for approval prior to initiating any utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than three business days in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.

E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

F. Controlled Substances: Use of alcohol, tobacco products and other controlled substances within existing buildings or on the Project site is not permitted.

G. Employee Identification: Owner will provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times and to produce to any TU personnel upon request.
1.13 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual or as detailed in the contract documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100
WEEKEND & OFF HOURS WORK AUTHORIZATION FORM

Project Title: ________________________________

Work Order Number: _________________________

Temple Project Manager: ________________ Phone Number: ________________

Contractor: _____________________________

On-Site Contact: _________________________ Phone Number: ________________

General Information:

Date Work is Requested: _______ to _______

Timeframe Work is Requested: [ ] to [ ]

Associated Costs: No Additional Costs Other: __________________________

Premium Time Only

Shut Downs required?

Scope of Contractors Work:

Office of Facilities Management Support: Yes No N/A

Shut Down Posted: Yes No N/A

Coordinated With Event Schedule: Yes No N/A

Authorization: ____________________________

Construction Operations & Maintenance

Please note: this is a REQUEST and requires proper authorization. If Shutdowns are required, the Shutdown notice form needs to be processed
# Utility Shutdown Authorization Form

**Date:**

## Utility Shutdown Authorization Form

**PROJECT TITLE:**

(As identified by the Office of Facilities Management)

### 1. Requesting Source:

<table>
<thead>
<tr>
<th>Contractor:</th>
<th>Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SubContractor:</th>
<th>Phone:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 2. Utility to Be Shutdown:

<table>
<thead>
<tr>
<th>Mechanical Systems</th>
<th>Advance Notice</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHILLED WATER</td>
<td>10 Days</td>
</tr>
<tr>
<td>REFRIGERATION SYSTEMS/GLYCOL</td>
<td>10 Days</td>
</tr>
<tr>
<td>STEAM/CONDENSATE</td>
<td>10 Days</td>
</tr>
<tr>
<td>HEATING WATER LOOPS (including Reheat)</td>
<td>10 Days</td>
</tr>
<tr>
<td>MEDICAL GAS</td>
<td>10 Days</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plumbing Systems</th>
<th>Advance Notice</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOMESTIC HOT WATER</td>
<td>10 Days</td>
</tr>
<tr>
<td>DOMESTIC COLD WATER</td>
<td>10 Days</td>
</tr>
<tr>
<td>SANITARY WASTE</td>
<td>10 Days</td>
</tr>
<tr>
<td>SPRINKLER (includes fire pump)</td>
<td>2 Days</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrical Systems</th>
<th>Advance Notice</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELECTRICAL (high and low voltage)</td>
<td>10 Days</td>
</tr>
<tr>
<td>FIRE ALARM</td>
<td>2 Days</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hot Work Permits</th>
<th>Advance Notice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 Days</td>
</tr>
</tbody>
</table>

### 3. Shutdown Explanation:

**Date of Shutdown Request:**

**Requested Start Time:**

**Approximate Completion:**

**Reason for Shutdown:**

**Extent of Shutdown:**

**On Site Contact:**

**Contact Info:**

**Facilities Management Use Only**

**Internal Distribution:**

**Received By & Date:**

Submit Form to: Office of Facilities Management, Main Campus: 1009 Montgomery Avenue, Philadelphia PA 19122

or HSC Campus: 3525 Germantown Avenue, Philadelphia PA 19140
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01210 - 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. Section includes administrative and procedural requirements governing allowances.

   1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

   1. Lump-sum allowances.
   2. Unit-cost allowances.
   3. Quantity allowances.
   4. Contingency allowances.
   5. Testing and inspecting allowances.

C. Related Requirements:

   1. Section 01270 "Unit Prices" for procedures for using unit prices.
   2. Section 01330 “Submittal Procedures” for action and informational submittals.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect'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 Architect from the designated supplier.
1.4 ACTION SUBMITTALS
   A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS
   A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
   B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
   C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 COORDINATION
   A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.7 LUMP-SUM, UNIT-COST AND QUANTITY ALLOWANCES
   A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight and delivery to Project site.
   B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials under allowance shall be included as part of the Contract Sum and not part of the allowance.
   C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
      1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.8 CONTINGENCY ALLOWANCES
   A. Use the contingency allowance only as directed by Owner for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
   B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.
The Owner may request Change Orders authorizing the use of contingency funds. Change Orders will include Contractor's related costs and overhead and profit margins as defined in Owner's General Conditions.

At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

**TESTING AND INSPECTING ALLOWANCES**

Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.

The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.

Costs of services not required by the Contract Documents are not included in the allowance.

At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

**ADJUSTMENT OF ALLOWANCES**

Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

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 Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's 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 the Contract Documents.
2. No change to 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.
PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

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

Refer to Scope of Work or contract documents for allowances, if required.

END OF SECTION 01210
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01230 - ALTERNATES

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. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS
   A. Alternate: An amount proposed by bidders and stated on the Bid Response Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

      1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
      2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES
   A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

      1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

   B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

Refer to Scope of Work or contract documents.

END OF SECTION 01230
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01250 - CONTRACT 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. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Section 01635 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710.

1.4 PROPOSAL REQUESTS

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

1. Work Change Proposal Requests issued by Owner are not instructions either to stop work in progress or to execute the proposed change.

2. Within time specified in Proposal Request or within 14 calendar days when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

   a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

   b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
e. Quotation Form: Use AIA G701 with material and labor backup.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Owner.

1. Include a statement outlining 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 the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 01635 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use AIA G701 with material and labor backup.

1.5 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: See Section 01210 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

B. Unit-Price Adjustment: See Section 01270 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Contractor will issue a Change Order for signatures of Owner's representative on AIA Document G701.

1.7 WORK CHANGE DIRECTIVE

1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.

1. Daily logs shall be submitted at the end of each shift to Owner for signature.

2. After completion of change, submit to the Owner an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01250
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01270 - UNIT PRICES

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. Section includes administrative and procedural requirements for unit prices.

B. Related Requirements:

1. Section 01250 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

2. Section 01400 "Quality Requirements" for general testing and inspecting requirements.

1.3 DEFINITIONS

A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

Refer to Scope of Work or Contract Documents, if required.

END OF SECTION 01270
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01290 - PAYMENT 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. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Section 01210 "Allowances" for procedural requirements governing the handling and processing of allowances.
2. Section 01250 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
3. Section 01270 "Unit Prices" for administrative requirements governing the use of unit prices.
4. Section 01320 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of Contractor's construction schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Owner at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use Major Work Divisions as a guide to establish line items for the schedule of values, as applicable.

1. Identification: Include the following Project identification on the schedule of values:
   a. Project name and location.
   b. Name of Architect.
   c. Architect's project number.
   d. Contractor's name and address.
   e. Date of submittal.
   f. Owner's Purchase Order Number

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of ten percent of the Contract Sum.
4. Round amounts to nearest whole dollar; 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 evidence of insurance and Bill of Lading.
6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
7. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate Owner payments or deposits, if any, and balance to be paid by Contractor.
8. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit 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.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified and paid for by Owner.
1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: Submit Application for Payment to Owner by the 25th of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

1. Submit draft copy of Application for Payment seven days prior to due date for review by Owner.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Owner will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives approved before last day of construction period covered by application.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.

F. Transmittal: Submit one signed and notarized original copy of each Application for Payment to Owner by a method ensuring receipt. Application for Payment shall include waivers of liens and similar attachments.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application. Waivers shall also be submitted from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.

5. Waiver Forms: Submit executed waivers of lien on forms, acceptable to Owner.

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

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Submittal schedule (preliminary if not final).
5. Copies of permits, if applicable.
6. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work if applicable.
7. Initial progress report.
8. Owner's "Contractor Payment Affidavit, Release and Waiver of Liens."

I. Application for Payment at Substantial Completion: After Owner issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited to, the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. Owner’s "Contractor Final Payment Affidavit, Release and Waiver of Liens."
5. Evidence that claims have been settled.
6. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
7. Final liquidated damages settlement statement, if applicable.
PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01310 - PROJECT MANAGEMENT AND 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. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

   1. General coordination procedures.
   2. Coordination drawings.
   3. Requests for Information (RFIs).
   4. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:

   1. Section 01320 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
   2. Section 01700 "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
   4. Section 01810 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

1.3 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.
1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.

B. Key Personnel Names: Before starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1.5 GENERAL COORDINATION PROCEDURES

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

1. Schedule construction operations in 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 ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in 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 with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings and meeting minutes.
6. Photographic documentation
7. Preinstallation conferences.
8. Project closeout activities.
9. Startup and adjustment of systems.
10. Track and provide documentation of all cost events including but not limited to: Change orders, allowances, unit prices, and contingencies.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

   a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
   b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
   c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
   d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
   e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
   f. Indicate required installation sequences.
   g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed
resolution of such conflicts. Minor dimension changes and difficult installations
will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and
mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of
visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan
drawings with section drawings where required to adequately represent the Work.

2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical
and electrical equipment, and related Work. Locate components within ceiling plenum to
accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict
between light fixtures and other components.

3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans
and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical
equipment.

4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.

5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of
embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door
floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and
similar items.

6. Mechanical and Plumbing Work: Show the following:
   a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including
      insulation, bracing, flanges, and support systems.
   b. Dimensions of major components, such as dampers, valves, diffusers, access
doors, cleanouts and electrical distribution equipment.
   c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:
   a. Runs of vertical and horizontal conduit.
   b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-
alarms locations.
   c. Panel board, switch board, switchgear, transformer, busway, generator, and motor
control center locations.
   d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire-Protection System: Show the following:
   a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler
heads.

9. Review: Architect or Owner will review coordination drawings to confirm that the Work
   is being coordinated, but not for the details of the coordination, which are Contractor's
   responsibility. If Architect or Owner determines that coordination drawings are not being
   prepared in sufficient scope or detail, or are otherwise deficient, Architect or Owner will
   so inform Contractor, who shall make changes as directed and resubmit.

10. Coordination Drawing Prints: Prepare coordination drawing prints according to
    requirements in Section 01330 "Submittal Procedures."
C. Coordination Digital Data Files: Prepare coordination digital data files according to specification.

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings or as directed by the Owner or Architect.
2. File Submittal Format: Submit or post coordination drawing in a format directed by Owner or Architect.

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

   a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Form with substantially the same content as indicated above, acceptable to Architect.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow 5 business days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following business day.
1. The following Contractor-generated RFIs will be returned without action:
   a. Requests for approval of submittals.
   b. Requests for approval of substitutions.
   c. Requests for approval of Contractor's means and methods.
   d. Requests for coordination information already indicated in the Contract Documents.
   e. Requests for adjustments in the Contract Time or the Contract Sum.
   f. Requests for interpretation of Architect's actions on submittals.
   g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.

3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01250 "Contract Modification Procedures."
   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 business days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log bi-weekly. Spreadsheet with the following information is acceptable:

   1. Project name.
   2. Name and address of Contractor.
   3. Name and address of Architect.
   4. RFI number including RFIs that were returned without action or withdrawn.
   5. RFI description.
   6. Date the RFI was submitted.
   7. Date Architect's response was received.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven calendar days if Contractor disagrees with response.

   1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
   2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

A. General: Contractor will schedule, conduct, and document meetings and conferences at Project site unless otherwise indicated.

   1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
   2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Contractor will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned within five business days of the meeting.

B. Preconstruction Conference: Contractor shall schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 10 business days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:
   a. Tentative construction schedule.
   b. Phasing.
   c. Critical work sequencing and long-lead items.
   d. Designation of key personnel and their duties.
   e. Lines of communications.
   f. Procedures for processing field decisions and Change Orders.
   g. Procedures for RFI.
   h. Procedures for testing and inspecting.
   i. Procedures for processing Applications for Payment.
   j. Distribution of the Contract Documents.
   k. Submittal procedures.
   l. Preparation of record documents.
   m. Use of the premises.
   n. Work restrictions.
   o. Working hours.
   p. Owner's occupancy requirements.
   q. Responsibility for temporary facilities and controls.
   r. Procedures for moisture and mold control.
   s. Procedures for disruptions and shutdowns.
   t. Construction waste management and recycling.
   u. Parking availability.
   v. Office, work, and storage areas.
   w. Equipment deliveries and priorities.
   x. First aid.
   y. Security.
   z. Progress cleaning.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Pre-installation Conferences: Conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and
installations that have preceded or will follow, shall attend the meeting. Advise Architect and Owner of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

   b. Options.
   c. Related RFIs.
   d. Related Change Orders.
   e. Purchases.
   f. Deliveries.
   g. Submittals.
   h. Review of mockups.
   i. Possible conflicts.
   j. Compatibility requirements.
   k. Time schedules.
   l. Weather limitations.
   m. Manufacturer's written instructions.
   n. Warranty requirements.
   o. Compatibility of materials.
   p. Acceptability of substrates.
   q. Temporary facilities and controls.
   r. Space and access limitations.
   s. Regulations of authorities having jurisdiction.
   t. Testing and inspecting requirements.
   u. Installation procedures.
   v. Coordination with other work.
   w. Required performance results.
   x. Protection of adjacent work.
   y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 30 calendar days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.

2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
a. Preparation of record documents.
b. Procedures required prior to inspection for Substantial Completion and for final
inspection for acceptance.
c. Submittal of written warranties.
d. Requirements for preparing operations and maintenance data.
e. Requirements for delivery of material samples, attic stock, and spare parts.
f. Requirements for demonstration and training.
g. Preparation of Contractor's punch list.
h. Procedures for processing Applications for Payment at Substantial Completion and
for final payment.
i. Submittal procedures.
j. Coordination of separate contracts.
k. Owner's partial occupancy requirements.
l. Installation of Owner's furniture, fixtures, and equipment.
m. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Conduct progress meetings at a minimum of biweekly intervals or as
directed by the Scope of Work.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Architect, each contractor,
subcontractor, supplier, and 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 meeting shall be familiar with Project and authorized to
conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review
other items of significance that could affect progress. Include topics for discussion as
appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting.
Determine whether each activity is on time, ahead of schedule, or behind schedule,
in relation to Contractor's construction schedule. Determine how construction
behind schedule will be expedited; secure commitments from parties involved to
do so. Discuss whether schedule revisions are required to ensure that current and
subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.
2) Provide and review a 2-week look-ahead schedule.

b. Review present and future needs, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Resolution of BIM component conflicts.
4) Status of submittals.
5) Deliveries.
6) Off-site fabrication.
7) Access.
8) Site utilization.
9) Temporary facilities and controls.
10) Progress cleaning.
11) Quality and work standards.
12) Status of correction of deficient items.
13) Field observations.
14) Status of RFI's.
15) Status of proposal requests.
16) Pending changes.
17) Status of Change Orders.
18) Pending claims and disputes.
19) Documentation of information for payment requests.

4. Minutes: Contractor to record and distribute the meeting minutes to each party present and to parties requiring information.

   a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

F. Coordination Meetings: Conduct Project coordination meetings as directed by owner or as needed. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, and 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 meetings shall be familiar with Project and authorized to conclude matters relating to the Work.

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

   a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

   b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.

   c. Review present and future needs of project, including the following:

      1) Interface requirements.
      2) Sequence of operations.
      3) Resolution of BIM component conflicts.
      4) Status of submittals.
      5) Deliveries.
      6) Off-site fabrication.
      7) Access.
8) Site utilization.
9) Temporary facilities and controls.
10) Work hours.
11) Hazards and risks.
12) Progress cleaning.
13) Quality and work standards.
14) Change Orders.
15) Regulatory Agencies.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01320 - CONSTRUCTION PROGRESS DOCUMENTATION

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. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's construction schedule.
3. Construction schedule updating reports.
4. Daily construction reports.
5. Material location reports.
6. Site condition reports.
7. Special reports.

B. Related Requirements:

1. Section 01125 "Summary of Multiple Contracts" for preparing a combined Contractor's construction schedule.
2. Section 01330 "Submittal Procedures" for submitting schedules and reports.
3. Section 01400 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. 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 Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.
B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.
   1. Float time belongs to the Owner.
   2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
   3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:
   1. Working electronic copy of schedule file, where indicated.
   2. PDF electronic file.

B. Startup construction schedule.
   1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
   1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

E. Construction Schedule Updating Reports: Submit with Applications for Payment.

F. Daily Construction Reports: Submit at monthly intervals or as directed by Owner.
G. Material Location Reports: Submit at monthly intervals or as directed by Owner.

H. Site Condition Reports: Submit at time of discovery of differing conditions.

I. Special Reports: Submit at time of unusual event.

J. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: If required by the Contract Documents, an experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01310 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing, work stages, area separations, interim milestones and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures, including commissioning activities if required.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.
PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 10 working days, unless specifically allowed by Owner.
2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 calendar days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
4. Startup and Testing Time: Include no fewer than 5 working days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Construction Manager's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 10 working days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01100 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01100 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
6. Work Restrictions: Show the effect of the following items on the schedule:

   a. Coordination with existing construction.
   b. Limitations of continued occupancies.
   c. Uninterruptible services.
   d. Partial occupancy before Substantial Completion.
   e. Use of premises restrictions.
g. Seasonal variations.
h. Environmental control.

7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

a. Subcontract awards.
b. Submittals.
c. Purchases.
d. Mockups.
e. Fabrication.
f. Sample testing.
g. Deliveries.
h. Installation.
i. Tests and inspections.
j. Adjusting.
k. Curing.
l. Building flush-out.
m. Startup and placement into final use and operation.

8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

a. Structural completion.
b. Temporary enclosure and space conditioning.
c. Permanent space enclosure.
d. Completion of mechanical installation.
e. Completion of electrical installation.
f. Substantial Completion.

9. Other Constraints as described in the Scope of Work and not included elsewhere.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, final completion and any interim milestones as described in the Scope of Work and not included elsewhere.

E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

1. See Section 01290 "Payment Procedures" for cost reporting and payment procedures.

F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.

G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
   1. Use Microsoft Project compatible with Owner’s operating system.

2.2 STARTUP CONSTRUCTION SCHEDULE
A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within 7 calendar days of date established for the Notice to Proceed.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)
A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 14 calendar days of date established for the Notice to Proceed. Base schedule on the startup construction schedule and additional information received since the start of Project. Schedule shall indicate the critical path of the project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
   1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.4 REPORTS
A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
   1. List of subcontractors at Project site.
   2. List of separate contractors at Project site.
   3. Approximate count of personnel at Project site.
   4. Equipment at Project site.
   5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Work Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At bi-weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule at each progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect, Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in 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.

END OF SECTION 01320
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01322 - PHOTOGRAPHIC DOCUMENTATION

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. Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Periodic construction photographs.
3. Final completion construction photographs.
4. Preconstruction video recordings.
5. Periodic construction video recordings.

B. Related Requirements:

1. Section 01270 "Unit Prices" for procedures for unit prices for extra photographs.
2. Section 01330 "Submittal Procedures" for submitting photographic documentation.
3. Section 01732 "Selective Demolition" for photographic documentation before selective demolition operations commence.
4. Section 01770 "Closeout Procedures" for submitting photographic documentation as project record documents at Project closeout.
5. Section 01820 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For photographer if required.

B. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph and video recording if required by Owner. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

C. Digital Photographs: Submit image files within 3 business days of taking photographs.
1. Digital Camera: Minimum sensor resolution of 8 megapixels.
2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
3. Identification: Provide the following information with each image description in file metadata tag:
   a. Name of Project.
   b. Name and contact information for photographer.
   c. Name of Owner and Construction Manager.
   d. Name of Contractor.
   e. Date photograph was taken.
   f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
   g. Unique sequential identifier keyed to accompanying key plan.

D. Video Recordings: Submit video recordings within seven business days of recording.
1. Submit video recordings in digital video format acceptable to Owner.
2. Identification: With each submittal, provide the following information:
   a. Name of Project.
   b. Name and address of photographer.
   c. Name of Owner and Construction Manager.
   d. Name of Contractor.
   e. Date video recording was recorded.
   f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
   g. Weather conditions at time of recording.

1.4 QUALITY ASSURANCE
A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.
B. Web-Based Photographic Documentation Service Provider: A firm specializing in providing photographic equipment, Web-based software, and related services for construction projects, with record of providing satisfactory services similar to those required for Project.

1.5 USAGE RIGHTS
A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.
PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.

B. Digital Video Recordings: Provide high-resolution, digital video in format acceptable to Owner.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. Photographer: Engage a qualified photographer to take construction photographs.

B. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in file name for each image.
2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Owner and Construction Manager.

D. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Owner and Construction Manager.

E. Periodic Construction Photographs: Take a minimum of 20 photographs monthly with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

F. Owner and Construction Manager-Directed Construction Photographs: From time to time, Owner and Construction Manager will instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.

G. Final Completion Construction Photographs: Take 20 color photographs after date of Substantial Completion for submission as project record documents. Owner and Construction Manager will inform photographer of desired vantage points.

1. Do not include date stamp.
H. Additional Photographs: Owner or Construction Manager may request photographs in addition to periodic photographs specified.

1. Three business days' notice will be given, where feasible.
2. In emergency situations, take additional photographs within 24 hours of request.
3. Circumstances that could require additional photographs include, but are not limited to, the following:
   a. Special events planned at Project site.
   b. Immediate follow-up when on-site events result in construction damage or losses.
   c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
   d. Substantial Completion of a major phase or component of the Work.
   e. Extra record photographs at time of final acceptance.
   f. Owner's request for special publicity photographs.

3.2 CONSTRUCTION VIDEO RECORDINGS

A. Video Recording Photographer: Engage a qualified videographer to record construction video recordings.

B. Recording: Mount camera on tripod before starting recording unless otherwise necessary to show area of construction. Display continuous running time and date. At start of each video recording, record weather conditions from local newspaper or television and the actual temperature reading at Project site.

C. Preconstruction Video Recording: Before starting construction, record video recording of Project site and surrounding properties from different vantage points, as directed by Owner and Construction Manager.

END OF SECTION 01322
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01330 - 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. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Section 01290 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 01320 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
3. Section 01781 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
4. Section 01782 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
5. Section 01820 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect’s and Construction Manager’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 and Construction Manager’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."

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet
protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.


1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. 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 Construction Manager and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 calendar days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

a. Scheduled date for first submittal.
b. Specification Section number and title.
c. Submittal category: Action; informational.
d. Name of subcontractor.
e. Description of the Work covered.
f. Scheduled date for Architect’s and Construction Manager’s final release or approval.
g. Scheduled date of fabrication.
h. Scheduled dates for purchasing.
i. Scheduled dates for installation.
j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings may be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings at no cost to the contractor or owner.
a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
b. Digital Drawing Software Program: The Contract Drawings are available in AutoCAD.
c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.

B. 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 packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
   a. Architect and Construction Manager reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Construction Manager'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 [10] business days for initial review of each submittal. This includes [2] business days on the receipt and [1] business day on return for the Construction Manager’s review and [7] working days for Architect/Engineer review. Allow additional time if coordination with subsequent submittals is required. Architect or Construction Manager will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow [15] business days for initial review of each submittal.
5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow [10] business days for review of each submittal. Submittal will be returned to Construction Manager, through Architect before being returned to Contractor.

D. Paper Submittals: Shall be provided only at the request of the owner with the exception of samples, color charts, and other items related to the visible selection of materials. Refer to section 2.1D.
1. Indicate name of firm or entity that prepared each submittal on label or title block.

2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect and Construction Manager.

3. Include the following information for processing and recording action taken:
   a. Project name.
   b. Date.
   c. Name of Architect.
   d. Name of Construction Manager.
   e. Name of Contractor.
   f. Name of subcontractor.
   g. Name of supplier.
   h. Name of manufacturer.
   i. Submittal number or other unique identifier, including revision identifier.

   1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).

   j. Number and title of appropriate Specification Section.
   k. Drawing number and detail references, as appropriate.
   l. Location(s) where product is to be installed, as appropriate.
   m. Other necessary identification.

4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect and Construction Manager observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
   a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect and Construction Manager.

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect and Construction Manager will return without review submittals received from sources other than Contractor.
   a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:

      1) Project name.
      2) Date.
      3) Destination (To:).
      4) Source (From:).
      5) Name and address of Architect.
      6) Name of Construction Manager.
      7) Name of Contractor.
      8) Name of firm or entity that prepared submittal.
      9) Names of subcontractor, manufacturer, and supplier.
E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
   a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-06100.01.A).
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect and Construction Manager.
4. Transmittal Form for Electronic Submittals: Use form acceptable to Owner, containing the following information:
   a. Project name.
   b. Date.
   c. Name and address of Architect.
   d. Name of Construction Manager.
   e. Name of Contractor.
   f. Name of firm or entity that prepared submittal.
   g. Names of subcontractor, manufacturer, and supplier.
   h. Category and type of submittal.
   i. Submittal purpose and description.
   j. Specification Section number and title.
   k. Specification paragraph number or drawing designation and generic name for each of multiple items.
   l. Drawing number and detail references, as appropriate.
   m. Location(s) where product is to be installed, as appropriate.
   n. Related physical samples submitted directly.
   o. Indication of full or partial submittal.
   p. Transmittal number.
   q. Submittal and transmittal distribution record.
   r. Other necessary identification.
   s. Remarks.
F. Options: Identify options requiring selection by Architect.

G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect and Construction Manager on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect’s and Construction Manager’s action stamp.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect’s and Construction Manager’s action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Submit electronic submittals via email as PDF electronic files or if directed by Owner through post electronic submittals as PDF electronic files directly to an FTP site as directed by the Owner.


2. Action Submittals and Informational Submittals: Submit 3 paper copies of each submittal if requested by Owner.

3. Certificates and Certifications Submittals: Provide 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.

   a. Provide a digital signature with digital certificate in a form acceptable to the Owner on electronically submitted certificates and certifications where indicated.
b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
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.
   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 showing factory-installed wiring.
   b. Printed performance curves.
   c. Operational range diagrams.
   d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:
   a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements 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. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 36 by 48 inches.
3. Submit Shop Drawings in the following format:
a. PDF electronic file.

b. Three paper copies of each submittal if requested by Owner. Architect and Construction Manager will retain two copies; remainder will be returned.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of Samples that includes the following:

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

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.

4. 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.

5. 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 one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

6. 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 three sets of Samples. Architect and Construction Manager will retain two Sample sets; remainder will be returned.
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.

E. Coordination Drawing Submittals: Comply with requirements specified in Section 01310 "Project Management and Coordination."

F. Contractor's Construction Schedule: Comply with requirements specified in Section 01320 "Construction Progress Documentation."

G. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01290 "Payment Procedures."

H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01400 "Quality Requirements."

I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01770 "Closeout Procedures."

J. Maintenance Data: Comply with requirements specified in Section 01782 "Operation and Maintenance Data."

K. Qualification Data: Prepare 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.

L. 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.

M. 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.

N. 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.

O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

Q. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
R. 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.

S. 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:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

T. 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.

U. 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.

V. 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.

W. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 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 not sufficient 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 electronic file, 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 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01770 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT’S AND CONSTRUCTION MANAGER’S ACTION

A. Action Submittals: Architect and Construction Manager will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect and Construction Manager will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

B. Informational Submittals: Architect and Construction Manager will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect and Construction Manager will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect and Construction Manager.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 01330
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01400 - QUALITY REQUIREMENTS

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. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.

2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.

3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Commissioning Authority, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.

4. Specific test and inspection requirements are not specified in this Section.

C. Related Requirements:

1. Refer to Scope of Work or contract documents for allowances, if required.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Construction Manager.
C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.

2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.

3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by a Nationally Recognized Testing Laboratory (NRTL), a National Voluntary Laboratory Accreditation Program (NVLAP), or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of 5 previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two 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 conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. 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 requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

A. Shop Drawings: For integrated exterior or laboratory mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.

1. Indicate manufacturer and model number of individual components.
2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor's quality-control personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.

D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 business days of Notice to Proceed, and not less than 5 business days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager may also serve as Project superintendent.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
3. Owner-performed tests and inspections indicated in the Contract Documents.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and re-inspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner'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 for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:
   a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.

c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.

d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.

e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.

f. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, and Commissioning Authority if applicable, through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect or Construction Manager.

2. Notify Architect and Construction Manager five (5) business days in advance of dates and times when mockups will be constructed.

3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.

4. Demonstrate the proposed range of aesthetic effects and workmanship.

5. Obtain Architect's and Construction Manager's approval of mockups before starting work, fabrication, or construction.

   a. Allow 5 business days for initial review and each re-review of each mockup.

6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

7. Demolish and remove mockups when directed unless otherwise indicated.

L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.

M. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.

1.10 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
   a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01330 "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority, if applicable, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, Commissioning Authority, if applicable, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, Commissioning Authority, if applicable, Construction Manager, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Unless otherwise noted in the Scope of Work, Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect, Commissioning Authority, if applicable, Construction Manager, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect and Commissioning Authority, through Construction Manager, with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's, Commissioning Authority, if applicable, and Construction Manager's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01700 "Execution Requirements."

B. Protect construction exposed by or for quality-control service activities.
C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01400
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01420 - REFERENCES

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. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations" or "Codes": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless 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 standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should 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, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AABC Associated Air Balance Council www.aabc.com (202) 737-0202

AAMA American Architectural Manufacturers Association www.aamanet.org (847) 303-5664

AASHTO American Association of State Highway and Transportation Officials www.transportation.org (202) 624-5800

AATCC American Association of Textile Chemists and Colorists www.aatcc.org (919) 549-8141

ABMA American Bearing Manufacturers Association www.americanbearings.org (202) 367-1155

ACI American Concrete Institute (Formerly: ACI International) www.concrete.org (248) 848-3700
<table>
<thead>
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<th>Reference</th>
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</tr>
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<td>ACPA</td>
<td>American Concrete Pipe Association</td>
<td><a href="http://www.concrete-pipe.org">www.concrete-pipe.org</a></td>
<td>(972) 506-7216</td>
</tr>
<tr>
<td>AEIC</td>
<td>Association of Edison Illuminating Companies, Inc. (The)</td>
<td><a href="http://www.aeic.org">www.aeic.org</a></td>
<td>(205) 257-2530</td>
</tr>
<tr>
<td>AF&amp;PA</td>
<td>American Forest &amp; Paper Association</td>
<td><a href="http://www.afandpa.org">www.afandpa.org</a></td>
<td>(800) 878-8878 (202) 463-2700</td>
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<tr>
<td>AGA</td>
<td>American Gas Association</td>
<td><a href="http://www.agaa.org">www.agaa.org</a></td>
<td>(202) 824-7000</td>
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<td>AHAM</td>
<td>Association of Home Appliance Manufacturers</td>
<td><a href="http://www.aham.org">www.aham.org</a></td>
<td>(202) 872-5955</td>
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<td>AHRI</td>
<td>Air-Conditioning, Heating, and Refrigeration Institute (The)</td>
<td><a href="http://www.ahrinet.org">www.ahrinet.org</a></td>
<td>(703) 524-8800</td>
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<td>AI</td>
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<td><a href="http://www.asphaltinstitute.org">www.asphaltinstitute.org</a></td>
<td>(859) 288-4960</td>
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<td>AIA</td>
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<td><a href="http://www.aia.org">www.aia.org</a></td>
<td>(800) 242-3837 (202) 626-7300</td>
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<td>AISC</td>
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<td><a href="http://www.aisc.org">www.aisc.org</a></td>
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<td>AISI</td>
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<td>(202) 452-7100</td>
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<td>AITC</td>
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<td><a href="http://www.aiac-glulam.org">www.aiac-glulam.org</a></td>
<td>(303) 792-9559</td>
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<td><a href="http://www.ansi.org">www.ansi.org</a></td>
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<td>AOSA</td>
<td>Association of Official Seed Analysts, Inc.</td>
<td><a href="http://www.aosaseed.com">www.aosaseed.com</a></td>
<td>(607) 256-3313</td>
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<td>APA</td>
<td>APA - The Engineered Wood Association</td>
<td><a href="http://www.apawood.org">www.apawood.org</a></td>
<td>(253) 565-6600</td>
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<td>APA</td>
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<td>API</td>
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<td>Asphalt Roofing Manufacturers Association</td>
<td><a href="http://www.asphaltroofing.org">www.asphaltroofing.org</a></td>
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<td>ASCE</td>
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<td><a href="http://www.asce.org">www.asce.org</a></td>
<td>(800) 548-2723</td>
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<td><a href="http://www.ashrae.org">www.ashrae.org</a></td>
<td>(800) 527-4723</td>
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<td>ASME</td>
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<td>ASSE</td>
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<td><a href="http://www.asse.org">www.asse.org</a></td>
<td>(847) 699-2929</td>
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<td>ASSE</td>
<td>American Society of Sanitary Engineering</td>
<td><a href="http://www.asse-plumbing.org">www.asse-plumbing.org</a></td>
<td>(440) 835-3040</td>
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<td>ATIS</td>
<td>Alliance for Telecommunications Industry Solutions</td>
<td><a href="http://www.atis.org">www.atis.org</a></td>
<td>(202) 628-6380</td>
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<td>AWEA</td>
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<td><a href="http://www.awea.org">www.awea.org</a></td>
<td>(202) 383-2500</td>
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<td>AWI</td>
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<td><a href="http://www.awinet.org">www.awinet.org</a></td>
<td>(571) 323-3636</td>
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<td>AWMAC</td>
<td>Architectural Woodwork Manufacturers Association of Canada</td>
<td><a href="http://www.awmac.com">www.awmac.com</a></td>
<td>(403) 453-7387</td>
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<td>AWPA</td>
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<td>AWS</td>
<td>(800) 443-9353 (305) 443-9353</td>
<td><a href="http://www.aws.org">www.aws.org</a></td>
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<td>American Water Works Association</td>
<td>(800) 926-7337 (303) 794-7711</td>
<td><a href="http://www.awwa.org">www.awwa.org</a></td>
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<td>Builders Hardware Manufacturers Association</td>
<td>(212) 297-2122</td>
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<td>Brick Industry Association (The)</td>
<td>(703) 620-0010</td>
<td><a href="http://www.geobrick.com">www.geobrick.com</a></td>
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<td>BICSI, Inc.</td>
<td>(800) 242-7405 (813) 979-1991</td>
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<td>BIFMA International (Business and Institutional Furniture Manufacturer's Association)</td>
<td>(616) 285-3963</td>
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<td>Baking Industry Sanitation Standards Committee</td>
<td>(866) 342-4772</td>
<td><a href="http://www.bissc.org">www.bissc.org</a></td>
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<td>BOCA BOCA (Building Officials and Code Administrators International Inc.) (See ICC)</td>
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<td>Badminton World Federation (Formerly: International Badminton Federation)</td>
<td>603 9283 7155</td>
<td><a href="http://www.bwfbadminton.org">www.bwfbadminton.org</a></td>
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<td>Copper Development Association</td>
<td>(800) 232-3282 (212) 251-7200</td>
<td><a href="http://www.copper.org">www.copper.org</a></td>
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<td>Canadian Electricity Association</td>
<td>(613) 230-9263</td>
<td><a href="http://www.electricity.ca">www.electricity.ca</a></td>
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<td>Consumer Electronics Association</td>
<td>(866) 858-1555 (703) 907-7600</td>
<td><a href="http://www.ce.org">www.ce.org</a></td>
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<td>Chemical Fabrics &amp; Film Association, Inc.</td>
<td>(216) 241-7333</td>
<td><a href="http://www.chemicalfabricsandfilm.com">www.chemicalfabricsandfilm.com</a></td>
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<td>Cold-Formed Steel Engineers Institute</td>
<td>(866) 465-4732 (202) 263-4488</td>
<td><a href="http://www.cfsei.org">www.cfsei.org</a></td>
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<td>Compressed Gas Association</td>
<td>(703) 788-2700</td>
<td><a href="http://www.cganet.com">www.cganet.com</a></td>
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<td>Cellulose Insulation Manufacturers Association</td>
<td>(888) 881-2462</td>
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REFERENCES

Temple University Office of Facilities Management
Technical Specifications

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www.cellulose.org (937) 222-2462
CISCA Ceilings & Interior Systems Construction Association
www.cisca.org (630) 584-1919
CISPI Cast Iron Soil Pipe Institute
www.cispi.org (404) 622-0073
CLFMI Chain Link Fence Manufacturers Institute
www.chainlinkinfo.org (301) 596-2583
CPA Composite Panel Association
www.pbmfd.com (703) 724-1128
CRI Carpet and Rug Institute (The)
www.carpet-rug.org (706) 278-3176
CRRC Cool Roof Rating Council
www.coolroofs.org (866) 465-2523
www.coolroofs.org (510) 485-7175
CRSI Concrete Reinforcing Steel Institute
www.crsi.org (800) 328-6306
www.crsi.org (847) 517-1200
CSA Canadian Standards Association
www.csa.ca (800) 463-6727
www.csa.ca (416) 747-4000
CSA CSA International
(Formerly: IAS - International Approval Services)
www.csa-international.org (866) 797-4272
www.csa-international.org (416) 747-4000
CSI Construction Specifications Institute (The)
www.csinet.org (800) 689-2900
www.csinet.org (703) 684-0300
CSSB Cedar Shake & Shingle Bureau
www.cedarbureau.org (604) 820-7700
CTI Cooling Technology Institute
(Formerly: Cooling Tower Institute)
www.cti.org (281) 583-4087
CWC Composite Wood Council
(See CPA)
DASMA Door and Access Systems Manufacturers Association
www.dasma.com (216) 241-7333
DHI Door and Hardware Institute
www.dhi.org (703) 222-2010
ECA Electronic Components Association
www.ee-central.org (703) 907-8024
ECAMA  Electronic Components Assemblies & Materials Association
       (See ECA)

EIA    Electronic Industries Alliance
       (See TIA)

EIMA   EIFS Industry Members Association
       www.eima.com
       (800) 294-3462
       (703) 538-1616

EJMA   Expansion Joint Manufacturers Association, Inc.
       www.ejma.org
       (914) 332-0040

ESD    ESD Association
       (Electrostatic Discharge Association)
       www.esda.org
       (315) 339-6937

ESTA   Entertainment Services and Technology Association
       (See PLASA)

EVO    Efficiency Valuation Organization
       www.evo-world.org
       (415) 367-3643
       44 20 88 167 857

FIBA   Fédération Internationale de Basketball
       (The International Basketball Federation)
       www.fiba.com
       41 22 545 00 00

FIVB   Fédération Internationale de Volleyball
       (The International Volleyball Federation)
       www.fivb.org
       41 21 345 35 45

FM Approvals FM Approvals LLC
       www.fmglobal.com
       (781) 762-4300

FM Global FM Global
       (Formerly: FMG - FM Global)
       www.fmglobal.com
       (401) 275-3000

FRSA   Florida Roofing, Sheet Metal & Air Conditioning Contractors
       Association, Inc.
       www.floridaroof.com
       (407) 671-3772

FSA    Fluid Sealing Association
       www.fluidsealing.com
       (610) 971-4850

FSC    Forest Stewardship Council U.S.
       www.fscus.org
       (612) 353-4511

GA     Gypsum Association
       www.gypsum.org
       (301) 277-8686
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<td>GANA</td>
<td>Glass Association of North America</td>
<td>(785) 271-0208</td>
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<td>GS</td>
<td>Green Seal</td>
<td>(202) 872-6400</td>
<td><a href="http://www.greenseal.org">www.greenseal.org</a></td>
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<td>HI</td>
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<td>(973) 267-9700</td>
<td><a href="http://www.pumps.org">www.pumps.org</a></td>
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<td>HI/GAMA</td>
<td>Hydronics Institute/Gas Appliance Manufacturers Association</td>
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<td>HPVA</td>
<td>Hardwood Plywood &amp; Veneer Association</td>
<td>(703) 435-2900</td>
<td><a href="http://www.hpva.org">www.hpva.org</a></td>
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<td>HPW</td>
<td>H. P. White Laboratory, Inc.</td>
<td>(410) 838-6550</td>
<td><a href="http://www.hpwhite.com">www.hpwhite.com</a></td>
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<td>IAPSC</td>
<td>International Association of Professional Security Consultants</td>
<td>(415) 536-0288</td>
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<td>IAS</td>
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<td>ICC</td>
<td>International Code Council</td>
<td>(888) 422-7233</td>
<td><a href="http://www.iccsafe.org">www.iccsafe.org</a></td>
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<td>ICEA</td>
<td>Insulated Cable Engineers Association, Inc.</td>
<td>(770) 830-0369</td>
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<td>ICPA</td>
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<td>(703) 525-0511</td>
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<td>ICRI</td>
<td>International Concrete Repair Institute, Inc.</td>
<td>(847) 827-0830</td>
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<td>IEC</td>
<td>International Electrotechnical Commission</td>
<td>41 22 919 02 11</td>
<td><a href="http://www.iec.ch">www.iec.ch</a></td>
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<td>IEEE</td>
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<td>(212) 419-7900</td>
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<td>IES</td>
<td>Illuminating Engineering Society</td>
<td>(212) 248-5000</td>
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<td>IESNA</td>
<td>Illuminating Engineering Society of North America (See IES)</td>
<td>(847) 981-0100</td>
<td><a href="http://www.ies.org">www.ies.org</a></td>
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<td>IEST</td>
<td>Institute of Environmental Sciences and Technology</td>
<td><a href="http://www.iest.org">www.iest.org</a></td>
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<td>IGMA</td>
<td>Insulating Glass Manufacturers Alliance</td>
<td>(613) 233-1510</td>
<td><a href="http://www.igmaonline.org">www.igmaonline.org</a></td>
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<td>IGSHPA</td>
<td>International Ground Source Heat Pump Association</td>
<td>(405) 744-5175</td>
<td><a href="http://www.igshpa.okstate.edu">www.igshpa.okstate.edu</a></td>
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<td>ILI</td>
<td>Indiana Limestone Institute of America, Inc.</td>
<td>(812) 275-4426</td>
<td><a href="http://www.iliai.com">www.iliai.com</a></td>
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<td>Intertek</td>
<td>Intertek Group (Formerly: ETL SEMCO; Intertek Testing Service NA)</td>
<td>(800) 967-5352</td>
<td><a href="http://www.intertek.com">www.intertek.com</a></td>
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<td>ISA</td>
<td>International Society of Automation (The) (Formerly: Instrumentation, Systems, and Automation Society)</td>
<td>(919) 549-8411</td>
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<td>ISFA</td>
<td>International Surface Fabricators Association (Formerly: International Solid Surface Fabricators Association)</td>
<td>(877) 464-7732</td>
<td><a href="http://www.isfanow.org">www.isfanow.org</a></td>
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<td>ISO</td>
<td>International Organization for Standardization</td>
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<td>ITU</td>
<td>International Telecommunication Union</td>
<td>41 22 730 51 11</td>
<td><a href="http://www.itu.int/home">www.itu.int/home</a></td>
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<td>KCMA</td>
<td>Kitchen Cabinet Manufacturers Association</td>
<td>(703) 264-1690</td>
<td><a href="http://www.kcma.org">www.kcma.org</a></td>
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<td>LMA</td>
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<td>LPI</td>
<td>Lightning Protection Institute</td>
<td>(800) 488-6864</td>
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<td>MBMA Metal Building Manufacturers Association</td>
<td>(216) 241-7333</td>
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<td><a href="http://www.mbma.com">www.mbma.com</a></td>
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<td>MCA Metal Construction Association</td>
<td>(847) 375-4718</td>
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<td>MFMA Maple Flooring Manufacturers Association, Inc.</td>
<td>(888) 480-9138</td>
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<td><a href="http://www.maplefloor.org">www.maplefloor.org</a></td>
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<td>MFMA Metal Framing Manufacturers Association, Inc.</td>
<td>(312) 644-6610</td>
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<td>MHIA Material Handling Industry of America</td>
<td>(800) 345-1815</td>
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<td>(704) 676-1190</td>
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<td>MIA Marble Institute of America</td>
<td>(440) 250-9222</td>
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<td><a href="http://www.marble-institute.com">www.marble-institute.com</a></td>
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<td>MMPA Moulding &amp; Millwork Producers Association</td>
<td>(800) 550-7889</td>
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<td>(Formerly: Wood Moulding &amp; Millwork Producers Association)</td>
<td>(530) 661-9591</td>
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<td><a href="http://www.wmmpa.com">www.wmmpa.com</a></td>
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<td>MPI Master Painters Institute</td>
<td>(888) 674-8937</td>
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<td><a href="http://www.paintinfo.com">www.paintinfo.com</a></td>
<td>(604) 298-7578</td>
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<td>MSS Manufacturers Standardization Society of The Valve and Fittings Industry Inc.</td>
<td>(703) 281-6613</td>
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<td><a href="http://www.mss-hq.org">www.mss-hq.org</a></td>
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<td>NAAMM National Association of Architectural Metal Manufacturers</td>
<td>(630) 942-6591</td>
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<td><a href="http://www.naamm.org">www.naamm.org</a></td>
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<td>NACE NACE International (National Association of Corrosion Engineers International)</td>
<td>(800) 797-6223</td>
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<tr>
<td><a href="http://www.nace.org">www.nace.org</a></td>
<td>(281) 228-6200</td>
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<td>NADCA National Air Duct Cleaners Association</td>
<td>(202) 737-2926</td>
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<td><a href="http://www.nadca.com">www.nadca.com</a></td>
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<td>NAIMA North American Insulation Manufacturers Association</td>
<td>(703) 684-0084</td>
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<td><a href="http://www.naima.org">www.naima.org</a></td>
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<tr>
<td>NBGQA National Building Granite Quarries Association, Inc.</td>
<td>(800) 557-2848</td>
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<td><a href="http://www.nbqga.com">www.nbqga.com</a></td>
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<td>NCAA National Collegiate Athletic Association (The)</td>
<td>(317) 917-6222</td>
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**Temple University Office of Facilities Management**

**Technical Specifications**

**Issued January 2015**

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<th>Organization</th>
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<td>NCMA</td>
<td>National Concrete Masonry Association</td>
<td>(703) 713-1900</td>
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<td><a href="http://www.ncma.org">www.ncma.org</a></td>
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<tr>
<td>NEBB</td>
<td>National Environmental Balancing Bureau</td>
<td>(301) 977-3698</td>
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<td><a href="http://www.nebb.org">www.nebb.org</a></td>
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<td>NECA</td>
<td>National Electrical Contractors Association</td>
<td>(301) 657-3110</td>
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<td><a href="http://www.necanet.org">www.necanet.org</a></td>
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<td>NeLMA</td>
<td>Northeastern Lumber Manufacturers Association</td>
<td>(207) 829-6901</td>
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<td><a href="http://www.nelma.org">www.nelma.org</a></td>
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<td>NEMA</td>
<td>National Electrical Manufacturers Association</td>
<td>(703) 841-3200</td>
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<td><a href="http://www.nema.org">www.nema.org</a></td>
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<td>NETA</td>
<td>InterNational Electrical Testing Association</td>
<td>(888) 300-6382</td>
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<td><a href="http://www.netaworld.org">www.netaworld.org</a></td>
<td>(269) 488-6382</td>
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<td>NFHS</td>
<td>National Federation of State High School Associations</td>
<td>(317) 972-6900</td>
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<td>NFPA</td>
<td>NFPA (National Fire Protection Association)</td>
<td>(800) 344-3555</td>
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<td><a href="http://www.nfpa.org">www.nfpa.org</a></td>
<td>(617) 770-3000</td>
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<td>NFRC</td>
<td>National Fenestration Rating Council</td>
<td>(301) 589-1776</td>
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<tr>
<td>NHLA</td>
<td>National Hardwood Lumber Association</td>
<td>(800) 933-0318</td>
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<td><a href="http://www.nhla.com">www.nhla.com</a></td>
<td>(901) 377-1818</td>
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<td>NLGA</td>
<td>National Lumber Grades Authority</td>
<td>(604) 524-2393</td>
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<tr>
<td>NOFMA</td>
<td>National Oak Flooring Manufacturers Association</td>
<td>(888) 516-8585</td>
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<td>(See NWFA)</td>
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<td>NOMMA</td>
<td>National Ornamental &amp; Miscellaneous Metals Association</td>
<td>(888) 516-8585</td>
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<td><a href="http://www.nomma.org">www.nomma.org</a></td>
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<td>NRCA</td>
<td>National Roofing Contractors Association</td>
<td>(800) 323-9545</td>
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<td><a href="http://www.nrca.net">www.nrca.net</a></td>
<td>(847) 299-9070</td>
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<td>NRMCA</td>
<td>National Ready Mixed Concrete Association</td>
<td>(888) 846-7622</td>
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<td><a href="http://www.nrmca.org">www.nrmca.org</a></td>
<td>(301) 587-1400</td>
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<tr>
<td>NSF</td>
<td>NSF International (National Sanitation Foundation International)</td>
<td>(800) 673-6275</td>
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<td>(734) 769-8010</td>
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www.nsf.org

NSPE  National Society of Professional Engineers  (703) 684-2800
www.nspe.org

NSSGA  National Stone, Sand & Gravel Association  (800) 342-1415
www.nssga.org  (703) 525-8788

NTMA  National Terrazzo & Mosaic Association, Inc. (The)  (800) 323-9736
www.ntma.com

NWFA  National Wood Flooring Association  (800) 422-4556
www.nwfa.org  (636) 519-9663

PCI  Precast/Prestressed Concrete Institute  (312) 786-0300
www pci.org

PDI  Plumbing & Drainage Institute  (800) 589-8956
www pdionline.org  (978) 557-0720

PLASA  PLASA
(Formerly: ESTA - Entertainment Services and Technology Association)
www.plasa.org  (212) 244-1505

RCSC  Research Council on Structural Connections
www.boltcouncil.org

RFCI  Resilient Floor Covering Institute  (706) 882-3833
www.rfci.com

RIS  Redwood Inspection Service  (925) 935-1499
www.redwoodinspection.com

SAE  SAE International
(Society of Automotive Engineers)  (877) 606-7323
www.sae.org  (724) 776-4841

SBCCI  Southern Building Code Congress International, Inc.
(See ICC)

SCTE  Society of Cable Telecommunications Engineers  (800) 542-5040
www.scte.org  (610) 363-6888

SDI  Steel Deck Institute  (847) 458-4647
www.sdi.org

SDI  Steel Door Institute  (440) 899-0010
www.steeldoor.org

SEFA  Scientific Equipment and Furniture Association  (877) 294-5424
TCNA  Tile Council of North America, Inc.  (Formerly:  Tile Council of America)  www.tileusa.com  (864) 646-8453
TEMA  Tubular Exchanger Manufacturers Association, Inc.  www.tema.org  (914) 332-0040
TIA  Telecommunications Industry Association  (Formerly:  TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance)  www.tiaonline.org  (703) 907-7700
TIA/EIA  Telecommunications Industry Association/Electronic Industries Alliance  (See TIA)
TMS  The Masonry Society  www.masonrysociety.org  (303) 939-9700
TPI  Truss Plate Institute  www.tpinst.org  (703) 683-1010
TPI  Turfgrass Producers International  www.turfgrasssod.org  (800) 405-8873  (847) 649-5555
TRI  Tile Roofing Institute  www.tileroofing.org  (312) 670-4177
UBC  Uniform Building Code  (See ICC)
UL  Underwriters Laboratories Inc.  www.ul.com  (877) 854-3577
UNI  Uni-Bell PVC Pipe Association  www.uni-bell.org  (972) 243-3902
USAV  USA Volleyball  www.usavolleyball.org  (888) 786-5539  (719) 228-6800
USGBC  U.S. Green Building Council  www.usgbc.org  (800) 795-1747
USITT  United States Institute for Theatre Technology, Inc.  www.usitt.org  (800) 938-7488  (315) 463-6463
WASTEC  Waste Equipment Technology Association  www.wastec.org  (800) 424-2869  (202) 244-4700
WCLIB  West Coast Lumber Inspection Bureau  (800) 283-1486
**C. Code Agencies:** Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

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<th>Code</th>
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<td>DIN</td>
<td>Deutsches Institut für Normung e.V.</td>
<td>49 30 2601-0</td>
<td><a href="http://www.din.de">www.din.de</a></td>
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<td>IAPMO</td>
<td>International Association of Plumbing and Mechanical Officials</td>
<td>(909) 472-4100</td>
<td><a href="http://www.iapmo.org">www.iapmo.org</a></td>
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<td>ICC</td>
<td>International Code Council</td>
<td>(888) 422-7233</td>
<td><a href="http://www.iccsafe.org">www.iccsafe.org</a></td>
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<td>ICC-ES</td>
<td>ICC Evaluation Service, LLC</td>
<td>(800) 423-6587</td>
<td><a href="http://www.icc-es.org">www.icc-es.org</a></td>
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<td>COE</td>
<td>Army Corps of Engineers</td>
<td>(202) 761-0011</td>
<td><a href="http://www.usace.army.mil">www.usace.army.mil</a></td>
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<td>DOC</td>
<td>Department of Commerce</td>
<td>(301) 975-4040</td>
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<td>National Institute of Standards and Technology</td>
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<td>DOD</td>
<td>Department of Defense</td>
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<td>DOE</td>
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<td>(202) 586-9220</td>
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<td><a href="http://www.energy.gov">www.energy.gov</a></td>
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<td>EPA</td>
<td>Environmental Protection Agency</td>
<td>(202) 272-0167</td>
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<td><a href="http://www.epa.gov">www.epa.gov</a></td>
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<td>FAA</td>
<td>Federal Aviation Administration</td>
<td>(866) 835-5322</td>
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<td>GSA</td>
<td>General Services Administration</td>
<td>(800) 488-3111</td>
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<td><a href="http://www.gsa.gov">www.gsa.gov</a></td>
<td>(202) 619-8925</td>
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<td>HUD</td>
<td>Department of Housing and Urban Development</td>
<td>(202) 708-1112</td>
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<td>Lawrence Berkeley National Laboratory</td>
<td>(510) 486-4000</td>
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<td>Environmental Energy Technologies Division</td>
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<td>OSHA</td>
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<td>(202) 334-2934</td>
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<td>National Cooperative Highway Research Program</td>
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<td>USDJ</td>
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E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CFR  Code of Federal Regulations  
Available from Government Printing Office  
www.gpo.gov/fdsys

DOD  Department of Defense  
Military Specifications and Standards  
Available from Department of Defense Single Stock Point  
http://dodssp.daps.dla.mil

DSCC  Defense Supply Center Columbus  
(See FS)

FED-STD  Federal Standard  
(See FS)

FS  Federal Specification  
Available from Department of Defense Single Stock Point  
http://dodssp.daps.dla.mil

Available from Defense Standardization Program  
www.dsp.dla.mil

Available from General Services Administration  
www.gsa.gov  
(800) 488-3111  
(202) 619-8925

Available from National Institute of Building Sciences/Whole Building Design Guide  
www.wbdg.org/ccb  
(202) 289-7800

MILSPEC  Military Specification and Standards  
(See DOD)

USAB  United States Access Board  
www.access-board.gov  
(800) 872-2253  
(202) 272-0080

USATBCB  U.S. Architectural & Transportation Barriers Compliance Board  
(See USAB)
F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

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<td>CBHF</td>
<td>State of California  Department of Consumer Affairs Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation</td>
<td>(800) 952-5210 (916) 574-2041</td>
<td><a href="http://www.bearhfti.ca.gov">www.bearhfti.ca.gov</a></td>
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<tr>
<td>CCR</td>
<td>California Code of Regulations Office of Administrative Law California Title 24 Energy Code</td>
<td>(916) 323-6225</td>
<td><a href="http://www.calregs.com">www.calregs.com</a></td>
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<td>CDHS</td>
<td>California Department of Health Care Services (Formerly: California Department of Health Services) (See CCR)</td>
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<td>CDPH</td>
<td>California Department of Public Health Indoor Air Quality Program</td>
<td>(800) 848-5580 (415) 703-2782</td>
<td><a href="http://www.cal-iaq.org">www.cal-iaq.org</a></td>
</tr>
<tr>
<td>CPUC</td>
<td>California Public Utilities Commission</td>
<td>(800) 848-5580 (415) 703-2782</td>
<td><a href="http://www.cpuc.ca.gov">www.cpuc.ca.gov</a></td>
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<tr>
<td>SCAQMD</td>
<td>South Coast Air Quality Management District</td>
<td>(909) 396-2000</td>
<td><a href="http://www.aqmd.gov">www.aqmd.gov</a></td>
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<tr>
<td>TFS</td>
<td>Texas Forest Service Forest Resource Development and Sustainable Forestry</td>
<td>(979) 458-6606</td>
<td><a href="http://txforestservice.tamu.edu">http://txforestservice.tamu.edu</a></td>
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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01420
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

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. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Refer to the Scope of Work for limitations on work restrictions and utility interruptions.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.

C. Water Service: Pay water-service use charges for water used by all entities for construction operations.

D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA, PADEP, PWD, Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

D. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
   1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
   2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
   3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

E. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
   1. Locations of dust-control partitions at each phase of work.
   2. HVAC system isolation schematic drawing.
   3. Location of proposed air-filtration system discharge.
   5. Other dust-control measures.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.
PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts.

B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top and bottom rails. Provide concrete bases for supporting posts.

C. Wood Enclosure Fence: Plywood, 6 feet high, framed with four 2-by-4-inch rails, with preservative-treated wood posts spaced not more than 8 feet apart.

D. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

E. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.

F. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack and marker boards.
3. Drinking water and private toilet.
5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
6. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.
2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
   1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
   2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
   1. Locate facilities to limit site disturbance as specified in Section 01100 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.
   1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
   1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction. If connection to Owner’s existing water service facilities is approved, clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
   a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
   b. Maintain negative air pressure within work area using HEPA-equipped air- filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust- producing equipment. Isolate limited work within occupied areas using portable dust- containment devices.

3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter- equipped vacuum equipment.

G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead unless otherwise indicated.

2. Connect temporary service to Owner's existing power source, as directed by Owner.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Install lighting for Project identification sign, if required.

J. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one <1> telephone line for each field office.

1. Provide additional telephone lines for the following:
   a. Provide a dedicated telephone line for each facsimile machine in each field office.

2. At each telephone, post a list of important telephone numbers.
   a. Police and fire departments.
   b. Ambulance service.
   c. Contractor's home office.
   d. Contractor's emergency after-hours telephone number.
   e. Architect's office.
   f. Engineers' offices.
   g. Owner's office.
   h. Principal subcontractors' field and home offices.

3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 02300 "Earthwork."
3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 02741 "Asphalt Paving."

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
   1. Protect existing site improvements to remain including curbs, pavement, and utilities.
   2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Construction personnel are responsible for their own parking and are not to park in any loading docks or adjacent to buildings where public parking is otherwise not permitted.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
   1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
   2. Remove snow and ice as required to minimize accumulations.

G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
   1. Identification Signs: Provide Project identification signs as indicated on Drawings.
   2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
      a. Provide temporary, directional signs for construction personnel and visitors.
   3. Maintain and touchup signs so they are legible at all times.

H. Waste Disposal Facilities: Comply with requirements specified in Section 01524 "Construction Waste Management."

I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01700 "Execution Requirements."

J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
   1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
K. Existing Elevator Use: Use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

1. Do not load elevators beyond their rated weight capacity.
2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

L. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

M. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

N. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 01100 "Summary."

C. Temporary Erosion and Sedimentation Control: Comply with the requirements of authorities having jurisdiction.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

G. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.

H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

J. Temporary Egress: Provide and/or Maintain temporary egress from existing occupied facilities as indicated and as required by project phasing and/or authorities having jurisdiction.

K. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.

1. Construct covered walkways using scaffold or shoring framing.
2. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
3. Paint and maintain appearance of walkway for duration of the Work.

L. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

M. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
2. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.
a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.

3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
4. Insulate partitions to control noise transmission to occupied areas.
5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
6. Protect air-handling equipment.
7. Provide walk-off mats at each entrance through temporary partition.

N. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program, Temple University’s Fire Marshal, and/or the authorities having jurisdiction.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL


B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
   a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
   b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
   c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.

D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01770 "Closeout Procedures."

END OF SECTION 01500
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01524 - CONSTRUCTION WASTE MANAGEMENT

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. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition and construction waste.
3. Disposing of nonhazardous demolition and construction waste.

B. Related Requirements:

1. Section 01125 "Summary of Multiple Contracts" for coordination of responsibilities for waste management.
2. Section 01732 "Selective Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements.

1.3 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:

1. Demolition Waste:
   a. Asphalt paving.
   b. Concrete.
   c. Concrete reinforcing steel.
   d. Brick.
   e. Concrete masonry units.
   f. Wood studs.
   g. Wood joists.
   h. Plywood and oriented strand board.
   i. Wood paneling.
   j. Wood trim.
   k. Structural and miscellaneous steel.
   l. Rough hardware.
   m. Roofing.
   n. Insulation.
   o. Doors and frames.
   p. Door hardware.
   q. Windows.
   r. Glazing.
   s. Metal studs.
   t. Gypsum board.
   u. Acoustical tile and panels.
   v. Carpet.
   w. Carpet pad.
   x. Demountable partitions.
   y. Equipment.
   z. Cabinets.
   aa. Plumbing fixtures.
   bb. Piping.
   cc. Supports and hangers.
   dd. Valves.
   ee. Sprinklers.
   ff. Mechanical equipment.
   gg. Refrigerants.
hh. Electrical conduit.
ii. Copper wiring.
jj. Lighting fixtures.
kk. Lamps.
ll. Ballasts.
mm. Electrical devices.
nn. Switchgear and panelboards.
oo. Transformers.

2. Construction Waste:

a. Site clearing waste
b. Masonry and CMU.
c. Lumber.
d. Wood sheet materials.
e. Wood trim.
f. Metals.
g. Roofing.
h. Insulation.
i. Carpet and pad.
j. Gypsum board.
k. Piping.
l. Electrical conduit.
m. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
   1) Paper.
   2) Cardboard.
   3) Boxes.
   4) Plastic sheet and film.
   5) Polystyrene packaging.
   7) Plastic pails.

1.5 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within 7 calendar days of date established for the Notice to Proceed.

1.6 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use attached Temple University Waste Reduction Report Form. Submit an electronic (.pdf) copy to the Owner with a separate copy sent directly to Temple University’s Office of Sustainability. Include the following information:
1. Type of waste: Demolition or Construction
2. Total quantity of waste in tons.
3. Quantity of waste salvaged, both estimated and actual in tons.
4. Quantity of waste recycled, both estimated and actual in tons.
5. Total quantity of waste recovered (salvaged plus recycled) in tons.
6. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Qualification Data: For refrigerant recovery technician, if applicable.

H. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements, that employs a LEED-Accredited Professional, certified by the USGBC, as waste management coordinator.

B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 01310 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of waste management coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.8 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis.

B. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures. Submit an electronic (.pdf) copy to the Owner with a separate copy sent directly to Temple University’s Office of Sustainability.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
1. Comply with operation, termination, and removal requirements in Section 01500 "Temporary Facilities and Controls."

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
   1. Distribute waste management plan to everyone concerned within 3 working days of submittal return.
   2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
   2. Comply with Section 01500 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
   1. Clean salvaged items.
   2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
   3. Store items in a secure area until installation.
   4. Protect items from damage during transport and storage.
   5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Sale and Donation: Not Permitted on Project site.

C. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
   1. Clean salvaged items.
   2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
   3. Store items in a secure area until delivery to Owner.
   4. Transport items to Owner's storage area designated by Owner.
   5. Protect items from damage during transport and storage.

D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

F. Plumbing Fixtures: Separate by type and size.

G. Lighting Fixtures: Separate lamps by type and protect from breakage.

H. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:

1. Revolution Recovery
2. Richard S. Burns & Company, Inc.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
   a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.

4. Store components off the ground and protect from the weather.

5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Asphalt Paving: Grind asphalt to maximum 1-1/2-inch size.
1. Crush asphaltic concrete paving and screen to comply with requirements in Section 02300 "Earthwork" for use as general fill.

B. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.

C. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
   1. Pulverize concrete to maximum 1-1/2-inch size.
   2. Crush concrete and screen to comply with requirements in Section 02300 "Earthwork" for use as satisfactory soil for fill or subbase.

D. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
   1. Pulverize masonry to maximum 1-inch size.
   2. Clean and stack undamaged, whole masonry units on wood pallets.

E. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

F. Metals: Separate metals by type.
   1. Structural Steel: Stack members according to size, type of member, and length.
   2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

G. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.

H. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

I. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.

J. Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.

K. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
   1. Store clean, dry carpet and Pad in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

L. Carpet Tile: Remove debris, trash, and adhesive.
   1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

M. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
N. Conduit: Reduce conduit to straight lengths and store by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:
   1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
   3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
   4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:
   1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
   2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
      a. Comply with requirements in Section 02930 "Exterior Plants" for use of clean sawdust as organic mulch.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.
   1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
      a. Comply with requirements in Section 02930 "Exterior Plants" for use of clean ground gypsum board as inorganic soil amendment.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
   1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials from Owner's property and legally dispose of them.
3.7 ATTACHMENTS


B. Note: If this project is intended to be LEED Certified, Contractor shall refer to the LEED specifications for the applicable forms.

END OF SECTION 01524
A. Company Name: ____________________________
B. Project Name: ____________________________
C. Project Location: __________________________

D. Summary

E. Project Statistics

1. Demolition Waste

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<tr>
<th>Date</th>
<th>Total Weight Collected (tons)</th>
<th>Weight of Recycled or Salvaged Materials (tons)</th>
<th>Weight of Materials sent to Landfill (tons)</th>
<th>Landfill Diversion Rate</th>
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   Total

2. Construction Waste

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<th>Date</th>
<th>Total Weight Collected (tons)</th>
<th>Weight of Recycled or Salvaged Materials (tons)</th>
<th>Weight of Materials sent to Landfill (tons)</th>
<th>Landfill Diversion Rate</th>
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   Total
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01600 - PRODUCT REQUIREMENTS

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. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:
1. Section 01210 "Allowances" for products selected under an allowance.
2. Section 01230 "Alternates" for products selected under an alternate.
3. Section 01635 "Substitution Procedures" for requests for substitutions.
4. Section 01420 "References" for applicable industry standards for products specified.

1.3 DEFINITIONS
A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type,
function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 business days of receipt of request, or 7 business days of receipt of additional information or documentation, whichever is later.

   a. Form of Approval: As specified in Section 01330 "Submittal Procedures."

   b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.


1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.

2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

3. In no case shall the coordination and selection of compatible products result in an additional cost to the Owner.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01770 "Closeout Procedures."
PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

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

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:
   a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
4. Manufacturers:
   a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01635 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require 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 those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, 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 architects and owners, if requested.

5. Samples, if requested.

PART 3 - EXECUTION (Not Used)
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01635 - SUBSTITUTION 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. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 01210 "Allowances" for products selected under an allowance.
2. Section 01230 "Alternates" for products selected under an alternate.
3. Section 01600 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven (7) calendar days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within fifteen (15) calendar days of receipt of request, or seven (7) calendar days of receipt of additional information or documentation, whichever is later.

b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.
1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than fifteen (15) calendar days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

   a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   b. Requested substitution provides sustainable design characteristics that specified product provided.
   c. Substitution request is fully documented and properly submitted.
   d. Requested substitution will not adversely affect Contractor's construction schedule.
   e. Requested substitution has received necessary approvals of authorities having jurisdiction.
   f. Requested substitution is compatible with other portions of the Work.
   g. Requested substitution has been coordinated with other portions of the Work.
   h. Requested substitution provides specified warranty.
   i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01635
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01700 - EXECUTION REQUIREMENTS

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. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.

B. Related Requirements:

1. Section 01100 "Summary" for limits on use of Project site.
2. Section 01330 "Submittal Procedures" for submitting surveys.
3. Section 01732 "Selective Demolition" for demolition and removal of selected portions of the building.
4. Section 01770 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
5. Section 07841 "Through-Penetration Firestop Systems" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For land surveyor.

B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

C. Cutting and Patching Plan: Submit plan describing procedures at least 10 business days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

   a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

E. Certified Surveys: Submit 3 paper copies and one electronic copy signed and sealed by land surveyor.

F. Final Property Survey: Submit 3 paper copies and one electronic copy signed and sealed by land surveyor showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

   1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and
patch structural elements in a manner that could change their load-carrying capacity or increase deflection.

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
   a. Primary operational systems and equipment.
   b. Fire separation assemblies.
   c. Air or smoke barriers.
   d. Fire-suppression systems.
   e. Mechanical systems piping and ducts.
   f. Control systems.
   g. Communication systems.
   h. Fire-detection and -alarm systems.
   i. Conveying systems.
   j. Electrical wiring systems.
   k. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
   a. Water, moisture, or vapor barriers.
   b. Membranes and flashings.
   c. Exterior curtain-wall construction.
   d. Sprayed fire-resistive material.
   e. Equipment supports.
   f. Piping, ductwork, vessels, and equipment.
   g. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Cutting and Patching Conference: Before proceeding, meet at 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.

D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.
PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.

2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.

2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.

2. List of detrimental conditions, including substrates.

3. List of unacceptable installation tolerances.

4. Recommended corrections.
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D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01310 "Project Management and Coordination."

E. Surface and Substrate Preparation: Comply with manufacturer's written recommendations for preparation of substrates to receive subsequent work.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Construction Manager promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect and Construction Manager when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect and Construction Manager.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect or Construction Manager. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect and Construction Manager before proceeding.

2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of 2 permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.

3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.

2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."
3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
   1. Make vertical work plumb and make horizontal work level.
   2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
   3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
   2. Allow for building movement, including thermal expansion and contraction.
   3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.
3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

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

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01100 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
   a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
   b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
   a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

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

5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.

2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
2. Do not hold waste materials more than seven calendar days during normal weather or three calendar days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
   a. Use containers intended for holding waste materials of type to be stored.
4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01500 "Temporary Facilities and Controls." and Section 01524 "Construction Waste Management."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

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

J. 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.
3.9 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 01810 "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Section 01400 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01700
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01732 - SELECTIVE DEMOLITION

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. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

B. Related Requirements:

1. Section 01100 "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 01351 "Special Procedures for Historic Treatment" for historic removal and dismantling.
3. Section 01700 "Execution Requirements" for cutting and patching procedures.
4. Section 02230 "Site Clearing" for site clearing and removal of above- and below-grade improvements.
5. Section 02231 "Tree Protection and Trimming" for temporary protection of existing trees and plants that are affected by selective demolition.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PRE-INSTALLATION MEETINGS

A. Pre-demolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property for environmental protection, for dust control, and for noise control. Indicate proposed locations and construction of barriers.

C. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

D. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
E. Pre-demolition Photographs or Video: Submit before Work begins.

F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

G. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.9 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

   1. Before selective demolition, Owner will remove the following items:
      
      a. Refer to scope of work

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

   1. Hazardous materials will be removed by Owner before start of the Work.
   2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.
F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding.

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
2. Steel Tendons: Locate tensioned steel tendons and include recommendations for detensioning.

F. Survey of Existing Conditions: Record existing conditions by use of measured drawings and preconstruction photographs.

1. Comply with requirements specified in Section 01322 "Photographic Documentation."
2. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Comply with requirements for existing services/systems interruptions specified in Section 01100 "Summary."

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off indicated utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Section 01500 "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
   2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
   3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   4. Cover and protect furniture, furnishings, and equipment that have not been removed.
   5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01500 "Temporary Facilities and Controls."

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

   1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

   1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and
chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.

5. Maintain adequate ventilation when using cutting torches.

6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

9. Dispose of demolished items and materials promptly.

10. Comply with requirements in Section 01524 "Construction Waste Management."

B. Reuse of Building Elements: Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.

C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

F. Roofing: Remove no more existing roofing than what can be covered in one working day by new roofing and so that building interior remains watertight and weathertight.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 01524 "Construction Waste Management."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.8 SELECTIVE DEMOLITION SCHEDULE

A. Refer to contract documents

END OF SECTION 01732
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01770 - CLOSEOUT 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. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Substantial Completion procedures.
   2. Final completion procedures.
   3. Warranties.
   4. Final cleaning.
   5. Repair of the Work.

B. Related Requirements:
   1. Section 01322 "Photographic Documentation" for submitting final completion construction photographic documentation.
   2. Section 01700 "Execution Requirements" for progress cleaning of Project site.
   3. Section 01781 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
   4. Section 01782 "Operation and Maintenance Data" for operation and maintenance manual requirements.
   5. Section 01820 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.
1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of ten [10] working days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.

3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner. Label with manufacturer's name and model number where applicable.

   a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.

5. Submit test/adjust/balance records.

6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of ten [10] working days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
CLOSEOUT PROCEDURES

1. Advise Owner of pending insurance changeover requirements.
2. Coordinate final changeover of permanent locks with Temple University’s Locksmith. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01820 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of ten [10] working days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 01290 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 working days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after
inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
   a. Project name.
   b. Date.
   c. Name of Architect.
   d. Name of Contractor.
   e. Page number.

4. Submit list of incomplete items in the following format:

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within fifteen [15] working days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by 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.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

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

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. Remove snow and ice to provide safe access to 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. Sweep concrete floors broom clean in unoccupied spaces.

i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.

j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.

k. Remove labels that are not permanent.

l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

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

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

o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.


p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.

q. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 01500 "Temporary Facilities and Controls." Prepare written report.

D. Construction Waste Disposal: Comply with waste disposal requirements in Section 01500 "Temporary Facilities and Controls." And Section 01524 "Construction Waste Management."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.

   a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01770
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01781 - PROJECT RECORD DOCUMENTS

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. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Requirements:

1. Section 01125 "Summary of Multiple Contracts" for coordinating project record documents covering the Work of multiple contracts.
2. Section 01700 "Execution Requirements" for final property survey.
3. Section 01770 "Closeout Procedures" for general closeout procedures.
4. Section 01782 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one [1] set of marked-up record prints.
2. Number of Copies: Submit copies of record Drawings as follows:

   a. Initial Submittal:
      2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
b. Final Submittal:
   2) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
   1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.

E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
   b. Accurately record information in an acceptable drawing technique.
   c. Record data as soon as possible after obtaining it.
   d. Record and check the markup before enclosing concealed installations.
   e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:
   a. Dimensional changes to Drawings.
   b. Revisions to details shown on Drawings.
   c. Depths of foundations below first floor.
   d. Locations and depths of underground utilities.
   e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Duct size and routing.
i. Locations of concealed internal utilities.
j. Changes made by Change Order or Work Change Directive.
k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.

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

5. Mark important additional information that was either shown schematically or omitted from original Drawings.

6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Same digital data software program, version, and operating system as the original Contract Drawings. AutoCAD version (as specified by Owner), Microsoft Word, Excel, and Project.


3. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.

4. Refer instances of uncertainty to Architect for resolution.

5. Architect will furnish Contractor one set of digital data files of the Contract Drawings at no cost to the contractor or owner for use in recording information.

   a. See Section 01330 "Submittal Procedures" for requirements related to use of Architect's digital data files.
   
   b. Architect will provide data file layer information. Record markups in separate layers.

C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.

2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
D. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
3. Record Digital Data Files:
   a. Format: AutoCAD version (as specified by Owner), Microsoft Word, Excel, and Project.
   b. Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
   c. Identification: As follows:
      1) Project name.
      2) Date.
      3) Designation "PROJECT RECORD DRAWINGS."
      4) Name of Architect.
      5) Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file and editable Microsoft Word files.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders and record Drawings where applicable.
B. Format: Submit record Product Data as annotated PDF electronic file.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record 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, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 01781
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01782 - OPERATION AND MAINTENANCE DATA

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. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

   1. Operation and maintenance documentation directory.
   2. Emergency manuals.
   3. Operation manuals for systems, subsystems, and equipment.
   4. Product maintenance manuals.
   5. Systems and equipment maintenance manuals.

B. Related Requirements:

   1. Section 01330 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

   1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
   2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
B. Format: Submit operations and maintenance manuals in the following format:

   a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
   b. Enable inserted reviewer comments on draft submittals.


C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least [10] business days before commencing demonstration and training. Architect will return copy with comments.

   1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within [10] business days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

   1. List of documents.
   2. List of systems.
   3. List of equipment.
   4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."
2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
   
a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
   
b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.


5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
   
a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   
b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

   1. Type of emergency.
   2. Emergency instructions.
   3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

   1. Fire.
   2. Flood.
   5. Power failure.
   7. System, subsystem, or equipment failure.
   8. Chemical release or spill.
C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:
   1. Instructions on stopping.
   2. Shutdown instructions for each type of emergency.
   3. Operating instructions for conditions outside normal operating limits.
   4. Required sequences for electric or electronic systems.
   5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
   2. Performance and design criteria if Contractor has delegated design responsibility.
   3. Operating standards.
   4. Operating procedures.
   5. Operating logs.
   6. Wiring diagrams.
   7. Control diagrams.
   8. Piped system diagrams.
   9. Precautions against improper use.
  10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:
   1. Product name and model number. Use designations for products indicated on Contract Documents.
   2. Manufacturer's name.
   3. Equipment identification with serial number of each component.
   4. Equipment function.
   5. Operating characteristics.
   6. Limiting conditions.
   7. Performance curves.
   8. Engineering data and tests.
   9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:
   1. Startup procedures.
   2. Equipment or system break-in procedures.
   3. Routine and normal operating instructions.
   4. Regulation and control procedures.
   5. Instructions on stopping.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in the manual, identified by product name and arranged to match the manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference the Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Color, pattern, and texture.
   5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
   1. Inspection procedures.
   2. Types of cleaning agents to be used and methods of cleaning.
   3. List of cleaning agents and methods of cleaning detrimental to product.
   4. Schedule for routine cleaning and maintenance.
   5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.
2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
   1. Standard maintenance instructions and bulletins.
   2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
   3. Identification and nomenclature of parts and components.
   4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
   1. Test and inspection instructions.
   2. Troubleshooting guide.
   3. Precautions against improper maintenance.
   4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   5. Aligning, adjusting, and checking instructions.
   6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
   1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
   2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.
PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

   1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
   2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

   1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

   1. Do not use original project record documents as part of operation and maintenance manuals.
   2. Comply with requirements of newly prepared record Drawings in Section 01781 "Project Record Documents."

G. Comply with Section 01770 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01782
In the event of a conflict between the terms of the Agreement that governs this Project and the terms of this Section, the terms of the Agreement shall control. The provisions of other Contract Documents may apply to the subject matter of this Section.

SECTION 01820 - DEMONSTRATION AND TRAINING

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. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
      1. Demonstration of operation of systems, subsystems, and equipment.
      2. Training in operation and maintenance of systems, subsystems, and equipment.
      3. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS
   A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
      1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
   B. Qualification Data: For instructor.
   C. Attendance Record: For each training module, submit list of participants and length of instruction time.
   D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS
   A. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format.
1.5 QUALITY ASSURANCE

A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01400 "Quality Requirements," experienced in operation and maintenance procedures and training.

B. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 01310 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.
   d. Regulatory requirements.
e. Equipment function.
f. Operating characteristics.
g. Limiting conditions.
h. Performance curves.

2. Documentation: Review the following items in detail:
   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Project record documents.
   e. Identification systems.
   f. Warranties and bonds.
   g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.
   l. Required sequences for electric or electronic systems.
   m. Special operating instructions and procedures.

5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.

8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION
   A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01782 "Operation and Maintenance Data."
   B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION
   A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
      1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
      2. Owner will furnish an instructor to describe Owner's operational philosophy.
      3. Owner will furnish Contractor with names and positions of participants.
   B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
      1. Schedule training with Owner with at least ten (10) business days' advance notice.
C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

D. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 01820
DIVISION 2 - SITE WORK

02050 SELECTIVE DEMOLITION

I. GENERAL:

A. Demolition: All existing work designated for removal, including but not limited to walls, floors, ceilings, mechanical equipment, etc., shall be disposed of by the Contractor. "Remove" shall mean completely and entirely from Temple premises. All equipment removed shall be returned to Temple University at their request.

B. Terminating Utilities: The Contractor shall be responsible for terminating plumbing and electrical where items are removed, by dead-ending piping and wires in a safe, Code conforming and permanent manner.

C. Utility Shutdowns: Temple University must receive a minimum of 48 hours for all utility shutdowns and the shutdown must be approved by Temple University. Shutdowns should be scheduled for "off" hours or weekends.

D. Temporary Protection: During any required demolition of designated areas, Contractors shall provide adequate temporary protection and shall secure adjacent areas from dust and debris. All temporary partitions shall maintain existing fire ratings and required fire egress paths and exits. All emergency exit signs shall be fully operational during construction.

E. Patching and Repair: Where partitions or other work is noted to be removed, adjacent walls, ceiling, floors and finishes shall be replaced, patched and/or leveled, as required, to blend together and match existing.

F. Phasing: If work is to be phased it shall be done in segments as noted on the drawings or as designated by Temple University.

G. Signage: Contractor shall provide directional signage as required by Temple. Signage plans must be submitted for approval by Temple University 48 hours prior to the start of any demolition or construction. All signs shall be laminated. Minimal size for exterior signage shall be 24” x 36”. Minimal size for interior signage shall be 18” x 24”.
NEW ASPHALT CONCRETE PAVING(TENNIS COURT/BASKETBALL COURT)

I. GENERAL:
   A. Summary
      1. Provide asphalt concrete (bituminous) paving for new Tennis Court/Basketball Court including color coating and stripping.

   B. Submittals
      1. Material Certificates: Provide copies of materials certificates, signed by material producer and the Contractor, certifying that each material item complies with, or exceeds, specified requirements.

   C. Quality Assurance
      1. Codes and Standards: Comply with following:
         a. Commonwealth of Pennsylvania Department of Transportation Specifications - Pub. 408 (Referred to herein as "PennDOT").

   D. Job Conditions
      1. Weather limitations: Apply surface and tack coats when ambient temperature is above 50øF (10 deg C), and when temperature has not been below 35øF (1 deg. C) for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.

      2. Construct asphalt concrete surface course only when atmospheric temperature is 40øF (4 deg. C), and when base is dry. Base may be placed when air temperature is above 30øF (-1 deg. C) and rising.

   E. Grade Control: Establish and maintain required lines and elevations.

II. PRODUCTS
   A. Materials
      1. Base Course: PennDot Section 350, Type C or better, No. 2A and No. OGS aggregate.

      2. Bituminous Concrete Base Course: PennDot Section 305.


5. Bituminous Tack Coat: PennDot Section 460.


III. EXECUTION

A. Preparation of Subgrade

1. Prepare, shape and compact subgrade in accordance with applicable portions of PennDot Section 210.

B. Base Course

1. Subbase shall be constructed in conference with PennDot Section 350, to a thickness 6”.

2. Set base course at grades to allow specified wearing course to finish at grades indicated on the Drawings.

C. Binder Course

1. Bituminous concrete base course shall be constructed in accordance with PennDot Section 305, to a thickness of 2”.

D. Wearing Course

1. Wearing course shall be constructed in accordance with PennDot Section 401.3, to a thickness of 1”.

2. Finish surface course to grades indicated on the Drawings.

E. Tack Coat

1. Apply to contact surfaces of previously constructed bituminous or portland cement concrete pavement.

2. Allow to dry until at proper condition to receive paving.

3. Exercise care in applying bituminous materials to avoid smearing of adjoining surfaces. Remove and clean damages surfaces.
F. Joints - New and Existing Paving

1. Where construction of new bituminous pavement abuts existing bituminous pavement the existing pavement shall be removed to form a straight, firm edge.

2. The new pavement edges abutting existing pavements and curbs shall be sealed with tack coat for a width of 4 inches.

G. Field Quality Control

1. General: Owner may engage an independent testing agency to test in-place asphalt concrete courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by the Engineer.

2. Thickness: In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:

   a. Base Course: 1/2", plus or minus.

   b. Wearing Course: 1/2", plus or minus.

3. Surface Smoothness: Test will be conducted for finished surface of each asphalt concrete course for smoothness, using 10' straight edge applied parallel with, and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness.

   a. Base Course Surface: 1/2".

   b. Wearing Course Surface: 3/16".
I. GENERAL:
   A. Survey & Layout - Survey court areas and surrounding ground to provide a basis for establishing grades for drainage improvements and new court elevations.
   
   B. Construction Entrance - Stakeout proposed access area from courts to parking lot #2. Have area approved by Temple personnel. Excavate to a depth of at least 8 inches. Install PennDot Class 4 Geotextile and install PennDot #4 ballast. Upon completion of construction, remove construction entrance and restore area to original condition.
   
   C. Fencing - Remove fencing as needed to complete court repairs. Adjust all gates to conform to new surface elevation. Reinstall removed fencing and gates to original design. Fence posts shall be welded to original stubs.
   
   D. Backboard Pole Removal as Directed on Drawings - Remove poles as directed. Cut poles as flush as possible with existing surface. Fill with non-shrink grout or 3,000 psi concrete. Return backboards to Temple. Dispose of poles off-site.

II. PRODUCTS
   A. Install Tennis Net Posts - Install net post foundations (allow 1 c.y. of 3,000 psi concrete for each) as directed. Provide aluminum net posts, and J.A. Cissel Royal tennis nets complete with center anchor and center strap.
   
   
   C. Swale Grading - Install a 4’ wide swale from the asphalt path leading into the court area to a point where the natural fall of the land will allow the water to run. This swale will be graded with a minimum slope of 1%.
   
   D. 24” PetroTac - Material manufactured by Phillips. Install in accordance with manufacturers recommendations.
E. 1 1/2" ID-2 Bituminous Binder - Materials from a PennDot Bulletin 15 approved source and manufactured in accordance with publication 408. Ensure court area is swept clean and bituminous tack coat is applied in accordance with section 460 of publication 408. Due to the tight tolerances required in this work, air temperature must be at least 45 degrees and rigging for asphalt laydown. Install binder to required thickness and sloped to provide positive drainage off of the courts.

F. 1 1/2" ID-2 Bituminous Wearing Course - Materials from a PennDot Bulletin 15 approved source and manufactured in accordance with publication 408. Due to the tight tolerances required in this work, air temperature must be at least 45 degrees and rising for asphalt laydown. Install wearing course to required thickness and sloped to provide positive drainage off of the courts.

G. Color Coating & Striping - Apply color coating system in accordance with the attached specifications. Color coating has a total of five (5) applications of material. The first two applications are acrylic resurfacer, two applications of colorized acrylic filler coats, and one coat of colorized finish coat. Line stripe to owners multi-purpose configuration for four (4) basketball courts and four (4) tennis courts.

H. Landscape Restoration - Restore all disturbed areas to original condition. Install topsoil as needed, seed using an approved mixture, and apply straw mulching. Areas include but are limited to the underdrain trench areas, the drainage swale, and the construction entrance.
I. Substrate Repair and Preparation for Coating:
   A. Materials: All material to be used must be manufactured by California Products. No approved equals will be permitted.
      1. Patching Mix (Court Patch Binder) - for use in cracks, holes, depressions (bird baths) and other imperfections in the surface. This material will be used in accordance with manufacturer's specifications with regard to sand sizes, prime coats and depth of depression, hole or crack.
      2. Crack Filler - for use in the cracks and for minor cosmetic this repairs and fills prior to filler course.
      3. 100% Acrylic Filler Course (Acrylic Resurfacer) Description: The filler course (Acrylic Resurfacer) shall be California Acrylic Resurfacer and consist of a 100% acrylic emulsion binder containing no vinyl copolymerization constituent and no asbestos fillers. The product shall contain no less than 4% attapulgite and have a pigment-volume concentration not to exceed 9.5%.

   B. Material Specifications:
      1. Acrylic Resurfacer (California Products)
         a. percent solids by weight (minimum) 26.70%
         b. percent solids by volume (minimum) 22.90%
         c. weight per gallon (minimum) 8.7-8.9 lbs
      2. Court Patch Binder
         a. percent solids by weight (minimum) 46.50%
         b. percent solids by volume (minimum) 44.0%
         c. weight per gallon (minimum) 8.7-8.9 lbs
      3. Crack Filler
         a. percent solids by weight (minimum) 85.605
         b. percent solids by volume (minimum) 73.60%
         c. weight per gallon (minimum) 15 lbs

   C. Construction Methods: The courts shall be surfaced as specified below and/or as directed by the Owner, after consultation with the surfacing material manufacturer or his representative.
D. Surface Preparation: The surface to be coated must be sound, smooth and free from loose dirt or oil materials. All courts must be power washed before any material may be applied to court surface.

E. Holes and Cracks: Cracks and holes shall be cleaned and a suitable soil sterilant as approved by the Owner, shall be applied to kill all vegetation prior to use of Court Patch Binder according to manufacturer's specifications.

F. Depression: Depressions holding enough water to cover a five cent piece shall be filled with Court Patching Mix. This step shall be accomplished prior to the squeegee application of Acrylic Resurfacer. The Contractor shall flood all the courts, then allow to drain. The drainage shall continue until there are no obvious avenues of escape for the water. (i.e. up to 2 hours after flooding). Define and mark all areas holding enough water to cover a nickel. Once depressions have been located, measured and marked, an on-site meeting with the Owner or representative will be required before any work may begin. After defined areas are dry, prime with tack coat mixture of 2 parts water/1 part Court Patch Binder. Allow tack coat to dry completely. Spread Court Patch Binder mix true to grade, using a straight edge (never a squeegee) for strike off. Steel trowel or wood float the patch so that the texture matches the surrounding area. NEVER ADD WATER TO MIX. light misting on surface and edges to feather in is allowed as needed to maintain workability. Allow to dry thoroughly and cure.

G. Filler Course (Acrylic Resurfacer): Filler course shall be applied to the clean underlying surface in one application to obtain a total quantity of not less than 15/20 yards per gallon based on the material prior to any dilution. Acrylic Resurfacer may be used to pre-coat depression and crack/ hole repairs to achieve better planarity prior to filler course application.

1. Over a properly repaired surface of asphalt on new or existing courts, apply two or more coats of Acrylic Resurfacer according to the following mix:

<table>
<thead>
<tr>
<th>Material</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrylic Resurfacer</td>
<td>55 gallons</td>
</tr>
<tr>
<td>Water</td>
<td>20-40 gallons</td>
</tr>
<tr>
<td>Sand (30-80 mesh, dry)</td>
<td>600-900 pounds</td>
</tr>
<tr>
<td>Liquid Yield</td>
<td>112-138 gallons</td>
</tr>
</tbody>
</table>

Use clean, dry sand and clean, potable water to make mixers. The quantity of sand and water in the above mix may be adjusted to complement the roughness and temperature of the surface.
2. Mix the ingredients thoroughly using accepted mixing devices and use a 70 Durometer rubber bladed squeegee to apply each coat of Acrylic Resurfacer as required.

3. Allow the application of Acrylic Resurfacer to dry thoroughly. Scrape off all ridges and rough spots prior to any subsequent application of Acrylic Resurfacer or subsequent cushion or color surface system.

II. Acrylic Color Playing Surface
   A. The Contractor shall apply three (3) coats of Factory Fortified Plexipave.
   B. Materials:
      1. Description: Job Mixed Fortified Plexipave is a field Mixed combination of California Corporations' Plexichrome and Plexipave Color Base blended in accordance with the manufacturer's Specification Number 10.12 and shall consist of lightfast mineral oxide pigments and fillers, uniformly dispersed in a non-oxidizing 100% acrylic base.
      2. Material Specifications:
         a. Storage Stability - After 30 days storage in a sealed container at normal temperatures (50 degrees F to degrees F) the product shall not become hard-packed nor show signs of mold growth or spoilage.
         b. Weathering - After 1,000 hour accelerated weathering, the product shall not develop checks, cracks, or blisters and shall not excessively fade when compared with a standard.
         c. Water Resistance - After 24 hours soaking in distilled water (70 degrees F - 80 degrees F) the film shall not blister or show signs of re-emulsification.
         d. Application Properties - The product, when diluted to proper consistency, shall be capable of being applied with 50 Durometer squeegees over clean, dry surfaces, at temperatures between 50 degrees F and 100 degrees F.
      3. Application:
         a. All areas to be color coated shall be clean, free from sand, clay, grease, dust, salt or other foreign matters. The
Contractor shall obtain the Owner's approval prior to applying any surface treatment. The storage of materials, mixing and surface preparation shall be in accordance with the manufacturer's instructions.

III. Playing Lines

A. The Contractor shall paint lines to define game location in accordance with the plans, specifications and directions of the Owner. All basketball courts shall have collegiate all Tennis Courts shall be striped for both singles and doubles play three (3) point lines.

B. Materials:

1. The line part shall be California Textured Plexicolor Line Paint and shall conform to the following characteristics and performance.

2. The paint shall be 100$ acrylic emulsion type containing no alkyds, butadiene styrene or vinyl, and shall be thinned with water only. The paint shall also be suitable for the addition of reflectance-type glass spheres at the time of application.

3. All materials used in the manufacture of the paint shall be of good commercial quality, entirely suitable for the purpose intended under normal conditions of use. For white line paint, the opaque portion of the pigment shall be rutile titanium dioxide and vehicle shall consist of 100% acrylic polymer dispersed in water together with the minimum amounts of necessary additives, such as pigment, dispersant, antifoaming agents and preservatives, but no drier shall be used.

4. The paint shall meet a minimum requirement of total solids (percent by weight of paint) of 52.5% and a maximum pigment content (percent by weight of paint) of 39.4%. The white paint shall contain not less than 26% per gallon Type 1 rutile titanium dioxide. Pigment volume concentration not to exceed 39.5%, a minimum fineness of grid of 4 and a viscosity (krebs units) of 70 minimum and 85 maximum as required. The paint shall brush easily and have good flowing, leveling and spreading characteristics and, although it shall be suitable for application by spray equipment, shall not be sprayed but applied by brush for this contract.

5. The paint shall meet the following Solvent Resistance est:
Use a sample of unreduced paint for a draw-down of 0.0003 inch wet film thickness on glass and air dry for 24 hours. Remove the dried paint film in sheets from the glass and weigh out one gram. Place one ram of white paint film (or yellow paint film) in a 50 millimeter beaker and add 20 grams of Toluol (TT-T-548A). The beaker shall be rotated periodically during test period. The paint film shall not crumple, cloud the liquid or otherwise disintegrate in the liquid within 48 hours and the Toluol shall remain clear and colorless throughout the test. Failure of the film to pass this test shall disqualify the product. Procedures for all other tests shall be as described in TT-P-0019A.

6. The paint shall be suitable for use over all types of asphaltic surfaces, and when applied over emulsified asphalt surface. It shall not cause lifting, crazing, peeling or other damage to the base.

C. Construction Details:

1. All lines shall be carefully laid out, and defined on the surface by chalk markings and tape before being painted, and shall be accurately painted within the limits shown on the plans. All surfaces shall be thoroughly cleaned before the lines are painted thereon. All lines shall be double coated, clear and distinct with sharply defined edges. Use of spraying equipment is not allowed. At least 1/2 hour shall elapse between the paintings of the first and second coats.

2. Unless otherwise indicated, the width of all lines on the courts will be painted two (2) inches wide.

3. Contractor must deliver materials to the job site in unopened drums and supply Owner with a list of batch numbers from the manufacturer for the various materials.

4. GUARANTEE: The contractor shall furnish the Owner a two-year guarantee of workmanship and materials such as paint delamination, excess wear and fading, chipping, flaking, etc. dating from time of acceptance of the project and shall make good any defects which may occur during the period. If any special guarantees in excess of the two-year period are specified by the manufacturer, these guarantees should also be included.
02515    UNIT PAVERS

1    GENERAL

1.1    RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2    SUMMARY

A. Section Includes:

1. Concrete pavers set in bituminous setting bed.
2. Asphalt-block pavers set in bituminous setting bed.

B. Related Sections:

1. Division 3 “Concrete” for concrete base course under unit pavers.

C. References:

1. ASTM C33-93: Specifications for Concrete Aggregates
2. ASTM C136-93: Method for Sieve Analysis of Fine and Coarse Aggregates
3. ASTM C150-94: Specifications for Portland Cement
4. ASTM D36-84: Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)
5. ASTM D113-85: Test Method for Ductility of Bituminous Materials
6. ASTM D312-84: Specification for Asphalt Used in Roofing
8. ASTM E303-83: Method of Measuring Surface Frictional Properties using the British Pendulum Tester

1.3    SUBMITTALS

A. Product data for the following:

1. Concrete pavers, five (5) samples of each.
2. Asphalt pavers, five (5) samples of each.
4. Edge restraints and miscellaneous materials.

B. Shop Drawings:

1. Paving Layout: Indicate types, patterns, layout base lines, and work phasing.
2. Curb Layout: Indicate types, length of pieces and work phasing.

C. Samples for verification in full-size units of each type of unit paver indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.

D. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed unit paver installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Single-Source Responsibility: Obtain each color, type, and variety of unit pavers, joint materials, and setting materials from a single source with resources to provide products and materials of consistent quality in appearance and physical properties without delaying the Work.

C. Mockup: Prior to installing unit pavers, construct mockups for each form and pattern of unit pavers required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work, including same base construction, special features for expansion joints, and contiguous work as indicated.

1. Locate mockups of 100 s.f. minimum on-site in the location directed by Architect.
2. Notify Architect ten working days in advance of the dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   a. When directed, demolish and remove mockups from Project site.
   b. Accepted mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect unit pavers and aggregate during storage and construction against soilage, contamination from earth and other materials, or discoloration from packaging materials.
1. Wrap pavers in plastic or use other packaging materials that will prevent rust marks from steel strapping.

B. Protect asphalt cement and other bituminous materials from moisture and heat. Keep containers tightly closed and away from open flames.

1.6 PROJECT CONDITIONS
   A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

   B. Weather Limitations for Bituminous Setting Bed: Comply with the following requirements:
      1. Apply asphalt primer coat when ambient temperature is above 50°F (10°C) and when temperature has not been below 35°F (2°C) for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.
      2. Install bituminous setting bed only when atmospheric temperature is above 40°F (4°C) and when base is dry.

1.7 MAINTENANCE SUPPLY
   A. At a location directed by the Owner, provide 30 pieces of each paver type and color as stock for repairs.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1. Concrete Pavers:
         a. Hanover Architectural Products, Inc.
      2. Asphalt-Block Pavers:
         a. Hanover Architectural Products, Inc.

2.2 COLORS AND TEXTURES
   A. Provide materials and products that result in colors and textures of exposed unit paver surfaces and joints complying with the following requirements:
      1. Match Architect's samples.
      2. Match color and texture indicated by referencing manufacturer's standard designations for these characteristics.
3. Provide Architect's selections from manufacturer's full range of colors and textures for materials and products of type indicated.

2.3 UNIT PAVERS
A. Concrete Pavers: Solid, interlocking paving units, ASTM C 936, made from normal-weight aggregates in sizes and shapes indicated. Concrete pavers shall be 4" X 8" X 3" Prest Paver by Hanover Architectural Products or equal. Color to be by Owner with natural finish.

B. Asphalt-Block Pavers: Manufacturer's standard solid units consisting of coarse aggregate, inorganic dust as filler, and asphalt cement, in sizes and shapes indicated.

   1. Coarse Aggregate: Clean, hard, unweathered stone crushed into angular particles varying in size up to 3/8 inch (9.5 mm).
   2. Filler: Dust produced from limestone or other material as standard with manufacturer.
   3. Asphalt Cement: ASTM D 312, Type III.
   4. Dimensional Tolerances: Manufacture unit to standard dimensions indicated with deviations in any dimension not exceeding plus or minus 1/16 inch (1.6 mm).
   5. Asphalt pavers shall be 8" X 8" X 3" Hex Asphalt Block by Hanover Architectural Products. Color to be by Owner with ground tudor finish.

2.4 ACCESSORIES
A. Steel Edge Restraints: Painted commercial steel edging with loops pressed from or welded to face of sections at 36 inches (900 mm) o.c. to receive stakes, and steel stakes 15 inches (380 mm) long for each loop. Size of edging as follows:

   1. 3/16 inch (4.8 mm) thick by 4 inches (100 mm) high.
   2. 1/4" inch (6.4 mm) thick by 5 inches (125 mm) high.

B. Concrete for Job-Built Edge Restraints: Comply with requirements of Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with minimum 28-day compressive strength of 3000 psi (20 MPa).

2.5 BITUMINOUS SETTING-BED MATERIALS
A. Primer for Base: ASTM D 2028, cutback asphalt, grade as recommended by unit paver manufacturer.

B. Fine Aggregate for Setting Bed: ASTM D 1073, Grading No. 2 or No. 3.

C. Asphalt Cement: ASTM D 3381, Viscosity Grade AC-10 or AC-20.
D. Neoprene-Modified Asphalt Adhesive: Paving manufacturer’s standard adhesive consisting of oxidized asphalt combined with 2 percent neoprene and 10 percent long-fibered mineral fibers containing no asbestos.

E. Joint Filler Materials: Portland cement, ASTM C 150, Type I; and sand, ASTM C 144.

2.6 BITUMINOUS SETTING-BED MIX
   A. Mix bituminous setting-bed materials at an asphalt plant in approximate proportion, by weight, of 7 percent asphalt cement to 93 percent fine aggregate, unless otherwise indicated. Heat mixture to 300°F (149°C).

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine surfaces indicated to receive paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit pavers. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION
   A. Clean concrete substrates to remove dirt, dust, debris, and loose particles.
   
   B. Remove substances from concrete substrates that could impair setting bed bond, including curing and sealing compounds, form oil, etc.

3.3 INSTALLATION, GENERAL
   A. Do not use unit pavers with chips, cracks, voids, discolorations, and other defects which are visible to the eye 6 feet away from the surface or could cause staining in finished work.

   B. Mix pavers from several pallets or cubes as they are placed to produce uniform blend of colors and textures.

   C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable. Cut pavers are to be no smaller than 3 inches in any dimension where field cutting would result in pavers below these minimum sizes, use larger pavers adjacent to fill space.

   D. Joint Pattern: Match field-constructed mockup.
1. Concrete: 1/8 inch max. joint.

E. Joint Pattern: As indicated on drawings.

F. Tolerances: Do not exceed $1/32$-inch (0.8mm) unit-to-unit offset from flush (lippage) nor 1/8 inch in 10 feet (3 mm in 3 m) from level, or indicated slope, for finished surface of paving.

G. Tolerances: Do not exceed $1/16$-inch (1.5-mm) unit-to-unit offset from flush (lippage) nor 1/8 inch in 24 inches (3 mm in 600 mm) and 1/4 inch in 10 feet (6 mm in 3 m) from level, or indicated slope, for finished surface of paving.

H. Provide edge restraints as indicated. Install edge restraints prior to placing unit pavers.

1. Install job-built concrete edge restraints to comply with requirements of Division 3 Section "Cast-in-Place Concrete."

2. Edge Restraint: Edge restraint shall be in place at commencement of each days work, prior to any compacting, prior to operating vehicles on finish pavements and as otherwise necessary to ensure the integrity of the finished work. Edge restraint shall be vertical to facilitate paver abutment, and shall extend at least to depth of setting bed.

   a. Permanent edge restraint includes: The abutting of paver units against vertical elements of curbs, steps, building faces, and pavement as indicated in the drawings. Plan work to lay pavers from permanent edge restraints on 3 sides whenever possible.

   b. Temporary edge restraint: Where edge restraints are needed but permanent restraints are not possible, provide means of temporary confinement of pavers and setting material during and after installation to maintain joint pattern and width, and setting bed compaction. Temporary edge restraint shall be used as necessary until permanent edge restraint shall be used as necessary or directed to facilitate construction. Remove and relay 3 feet of pavers abutting temporary restraint when restraint is removed, before proceeding with further paver placement. Recompact all temporarily restrained areas together with entire completed area to distribute lateral forces evenly over entire permanently restrained area.

3.4 BITUMINOUS (IMPERVIOUS) SETTING-BED APPLICATIONS

A. Apply primer to concrete slab or binder course.
B. Prepare for setting-bed placement by locating 1/4 inch (19mm) deep control bars approximately 11 feet (3.3 m) apart and parallel to one another, to serve as guides for striking board. Adjust bars to subgrades required for accurate setting of paving units to finished grades indicated.

C. Place bituminous setting bed where indicated, in panels, by spreading bituminous material between control bars. Strike setting bed smooth, firm, even, and not less than 3/4 inch (19 mm) thick using a 12 foot (3.7m) long, 1 1/2 by 5 1/2 inch (38 by 140mm) board. Add fresh bituminous material to low, porous spots after each pass of striking board. After each panel is completed, advance first control bar to next position in readiness for striking adjacent panels. Carefully fill depressions that remain after removing depth control bars.

1. Roll setting bed with power roller to a nominal depth of 3/4 inch (19 mm) while still hot. Adjust thickness as necessary to allow accurate setting of unit pavers to finished grades indicated.

2. Apply neoprene-modified asphalt adhesive to cold setting bed by squeegeeing or troweling. If troweled on, use trowel with serrations not exceeding 1/16 inch (1.6 mm). Do not proceed with setting of paving units until adhesive is dry to the touch.

D. Place pavers carefully by hand in straight courses, maintaining accurate alignment and uniform top surface. Protect newly laid pavers with plywood panels on which workers stand. Advance protective panels as work progresses but maintain protection in areas subject to continued movement of materials and equipment to avoid creating depressions or disrupting alignment of pavers. If additional leveling of paving is required, and before treating joints, roll with power roller after sufficient heat has built up in the surface from several days of hot weather.

E. Joint Treatment: Place unit pavers with hand-tight joints. Fill hand-tight joints with a dry mixture of 1 part portland cement and 3 parts sand by sweeping mixture over paved surface until joints are filled. Follow by fogging lightly with water.

3.5 INTERLOCKING PAVERS

A. Hand place in pattern shown on drawings.

B. Place in such a manner that the pattern is maintained and the pavers are laid together as closely as possible to provide a joint approximately 1/8 inch wide.

C. Use string lines to hold all patterns true.
D. The gaps at the edge of the paver surface shall be filled with standard pavers or with pavers cut to fit.

E. Cutting pavers, using a diamond bladed, wet cut masonry saw shall be used.

F. Pavers to be alternately selected from at least three (3) pallets, working from top to bottom in each pallet stack.

G. Pavers shall be rolled into the bituminous setting bed to a nominal depth of 3/4 inch while still hot.

H. Surplus joint filling material shall be swept from the surface (or left on the surface during construction to ensure complete filling of the joints during initial use. This filler may also provide surface protection from construction debris).

3.6 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to Installer that ensures that unit paver work is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 02515
I. GENERAL:

A. Steel Picket Fencing: All steel picket fencing to be either 4'-0" or 6'-0" high as stated on drawings. Main supports to be 1 1/2" x 2 1/2" solid bars at 5'-0" O.C. with angled top and to extend 18" below grade in a concrete footing 24" deep by 12" in diameter. Horizontal members to be 2" by 1/2" solid bars and pickets to be 1" x 1/2" at 5" O.C. All steel picket fencing to be painted Black. Sections not intended to be removable are to be welded and not bolted.

B. Chain Link Fencing:

1. Description

This work shall include the installation of Galvanized Chain Link Fence, fittings and gate in accordance with Section 1110 of PennDOT Publication 408, 2000 Edition at amended and supplemented.

2. Material

Section 1110.01, 1110.02 and 1110.04 of PennDOT 408 Specifications.

a. Wire Fabric – Galvanized, (No 11 – gauge, min) Steel Wire
b. Corner and End Posts, with Caps – Galvanized, 2" O D Round, 10'-0" O.C., 30" min below grade.
d. Gate – Galvanized, 30" wide, single, or as noted on plan.

3. Construction

The Contractor shall provide all tools, equipment and labor necessary for the completion of this work. All work shall be performed in a safe and workmanlike manner.

4. Measurement and Payment

The price shall be full compensation for furnishing all materials, for all preparation and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete the item. Payments will be made under:
Chain Link Fence with Gate(s) or Openings) – Linear Foot or Item A – Base Items – Lump Sum
02842 BICYCLE RACKS

I. PRODUCTS:
   A. All bicycle racks where called for on Drawings shall be Ribbon Rack by Brandir International, Inc. (212) 505-6500.

      All racks shall be for 5, 7, 9 or 11 units as indicated on drawings and shall be Inground Anchor Mount in Stainless Steel.

II. INSTALLATION
   A. Contractor will have Temple University field verify the exact location of the bicycle rack in the field.
I. PRODUCT:
   A. Outdoor Wood Benches can be obtained from Recreational Resources (800) 220-4402, and the order information is:

      Manufacturer: Victor Stanley, Inc., Brickhouse Road, Dunkirk, MD 20754

      Bench Description:

      UB314, 8'-0", Redwood, Surface Mounted, including assembly hardware.

   B. Outdoor Metal Benches can be obtained from Wabash Valley (800) 253-8619, and the order information is:

      Manufacturer: Wabash Valley Manufacturing, Inc., P.O. Box 5, 505E. Main, Silver Lake, IN 46982

      Bench Description: Model CL7017, 2 Seat w/o back – Inground. Model CL7027, 3-Seat w/o back-Inground.
02980 LANDSCAPE ACCESSORIES

I. PRODUCT:
   A. All tree grates to be 5' x 5', Model No. R8712 by Neenah Foundry Co. with cast iron type "U" angle frame set in concrete with #3 re-bar.
02990 LANDSCAPING

I. GENERAL:

A. The designing exterior, stairways, ramps, etc. are to be designed and constructed to accommodate riding type snow removal machinery/equipment.

B. Temple University's Grounds Department is to be consulted and involved during the design and selection of planting materials and their approval is required PRIOR to the release of any submittals.

END OF DIVISION
DIVISION 3 - CONCRETE

03310 CONCRETE

I. GENERAL
   A. All exterior poured-in-place concrete to be 4,000 p.s.i., 6” in thickness
      where truck traffic is a possibility and 4,000 p.s.i., 4” thick elsewhere.
      Concrete shall be poured on 4” crushed stone on firm undisturbed, virgin
      soil or 95-98% compacted subbase. Reinforcement to be 6 x 6 - W 1.4 x
      W 1.4 WWF. Premolded expansion joints to be 25’ max. and control
      joints to be 5’ max.

      All interior poured-in-place concrete to be 4,000 p.s.i. Thickness as
      shown on drawings.

II. REFERENCES
   A. American Concrete Institute (ACI)
      1. ACI 301 - Specifications for Structural Concrete for Buildings.
      2. ACI 306 - Recommended Practice for Cold Weather Concreting.
      3. ACI 318 - Building Code Requirements for Reinforced Concrete.
      4. ACI 605 - Recommended Practice for Hot Weather Concreting.
   B. American Society for Testing and Materials (ASTM)
      1. ASTM A185 - Welded Steel Wire Fabric for Concrete
         Reinforcement.
      2. ASTM A615 - Deformed and Plain Billet Steel for Concrete
         Reinforcement.
      3. ASTM C33 - Concrete Aggregates.
      4. ASTM C94 - Ready-Mix Concrete.
      5. ASTM C143 - Slump Test for Portland Cement Concrete.
      7. ASTM C171 - Sheet Materials for Curing Concrete.
      8. ASTM C260 - Air Entraining Admixtures for Concrete.
III. PRODUCTS

A. REINFORCEMENT MATERIALS

1. Reinforcing Steel: ASTM 615, 60 ksi yield grade; deformed billet steel bars; plain finish. Rebar is to be continuous around corners with no splices. Rebar is to be cold bent only, no hot bending or preheating permitted. All rebar’s to be galvanized or epoxy coated unless otherwise directed by Temple University.

2. Welded Steel Wire Fabric: ASTM A185 plain type; in flat sheets; plain finish.

3. Tie Wire: Minimum 16 gauge annealed type. All rebar laps are to be tied.

4. Chairs, Bolsters, Bar Supports, Spacers: Sized and shape for strength and support of reinforcement during concrete placement conditions. All rebar and remesh are to sit on chairs. Popcorn brick or other devices are prohibited.

B. CONCRETE MATERIALS


3. Water: Clean and not detrimental to concrete.


5. Grout: Non-shrink type, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives; capable of developing minimum compressive strength of 7,000 psi in 28 days.

C. CONCRETE MIX

1. Mix and deliver concrete in accordance with ASTM C94, Alternate No. 2.

2. Select proportions for normal weight concrete in accordance with ACI 301, Method 1.

3. Provide concrete to the following criteria:
(1) Compressive Strength (28 days): 4,000 psi, unless noted otherwise.

(2) Slump: 4 inches.

(3) Aggregate Size (maximum): one inch.

4. Use accelerating admixtures in cold weather only when approved by Architect. Use of admixtures will not relax cold weather placement requirements.

5. Use set-retarding admixtures during hot weather only when approved by Architect.

6. Add air entraining admixture to normal weight concrete mix for work exposed to exterior.

7. All compressive testing to be cylinder type.

IV. EXECUTION

A. EXAMINATION

1. Verify that course stone base course is dry and ready to receive concrete and vapor barriers.

2. Verify that gradients and elevations of base course are correct.

3. Beginning of installation means acceptance of existing conditions.

B. FORMWORK

1. Verify lines, levels, and centers before proceeding with formwork. Ensure that dimensions agree with Documents.

2. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301.

4. Align joints and make watertight. Keep form joints to a minimum.

5. Provide preformed corner strips on external concrete corners.

6. Apply form release agent on formwork in accordance with manufacturer's recommendation.
7. Provide formed openings where required for items to be embedded in or passing through concrete work.

8. Coordinate work of other Sections in forming and placing openings, slots, reglets, recesses, chases, sleeves, bolts, anchors, and other inserts.

9. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate opening at bottom of forms to allow flushing water to drain.

10. Clean and remove foreign matter within forms as erection proceeds.

11. During cold weather, remove ice and snow from within forms. Do not use de-icing salts or water to clean out forms, unless formwork and concrete construction proceed within heat enclosure. Use compressed air or other means to remove foreign matter.

12. Construct formwork to maintain tolerances required by ACI 301.

13. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

14. Previously used forms may be reused providing they show no distortions or structural weakness due to previous use. Discard damaged forms.

15. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

16. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

17. No part of form ties left in the concrete shall be closer than 1-3/4 inches to any surfaces. Fill holes solidly with non-shrink grout, unless otherwise shown on Drawings.

C. REINFORCEMENT

1. Comply with ACI 318 standards for detail and method of placing reinforcement and supports.
2. Clean reinforcement to remove loose rust and mill scale, earth, and other materials which reduce or destroy bond with concrete.

3. Place, support, and secure reinforcement against displacement. Do not deviate from required positive.

4. Locate and support reinforcement by metal chairs, runners, bolsters, spacers, and hangers, as required.

5. Place reinforcement to obtain proper coverages for concrete protection in accordance with A.C.I. standards.

6. Arrange, space, and securely tie bars and bar supports together with the specified tie wire.

7. Set wire ties so twisted ends are directed away from exposed concrete surfaces.

8. Install welded wire fabric in as long lengths as practicable, lapping adjoining pieces at least one full mesh.

9. Where lap splices are used, tie securely with specified wire to prevent displacement of splices during placement of concrete.

10. Accommodate placement of formed openings.

11. After reinforcement has been placed and tied together, notify Temple University Office of Facilities Management for inspection before pouring concrete.

D. PLACING CONCRETE

1. Verify that anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

2. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer’s instructions.

3. Place concrete in accordance with ACI 301.

   a) Before concrete is placed, moisten wood forms.
   a) Before concrete is placed, all ice, snow, and frost shall be completely removed and the temperature of all surfaces to be in contact with concrete shall be raised above the freezing point.

6. Notify Temple University Office of Facilities Management minimum 24 hours prior to commencement of concreting operations.

7. Ensure reinforcement, inserts, embedded parts, formed joints fillers, and construction joint devices are not disturbed during concrete placement.


9. Install construction joint device in coordination with ramp slab pattern placement sequence. Secure to resist movement by wet concrete.

E. FINISHING CONCRETE

1. Provide formed concrete surfaces to be left exposed with smooth rubbed finish. Walking surfaces to receive broom finish. Floor and pad areas to receive smooth steel troweled finish.

2. Finish concrete wall and slab surfaces in accordance with ACI 301.

F. CURING CONCRETE

1. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

2. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

3. When the average daily temperature is less than 40 degrees F, maintain the temperature of the newly placed concrete between 50 to 70 degrees F during the required curing period.
4. When the average daily temperature is above 70 degrees F, protect the newly placed concrete from high temperatures and drying winds by keeping the concrete surface continually wet and by providing wind breaks during the required curing period.

5. Horizontal Surfaces: Apply one of the following procedures to concrete not in contact with forms, immediately after completion of placement and finishing.
   a) Saturate burlap-polyethylene mat and place burlap-side down over floor slab areas, lapping ends and sides; maintain for 7 days.
   b) Apply curing compound in accordance with manufacturer's instructions.

6. Vertical Surfaces: Apply one of the following procedures to concrete not in contact with forms, immediately after completion of placement and finishing.
   a) Spray water over surfaces and maintain wet for 7 days.
   b) Apply curing compound in accordance with manufacturer's instructions.

G. FIELD QUALITY CONTROL

1. Maintain records of concrete placement. Record date, locations of pour, quantity, air temperature, and test samples taken.
   a) Maintain accurate daily record of atmospheric and curing temperatures during cool and cold weather by means of high-low thermometer.

H. PATCHING CONCRETE

1. Allow Temple University Office of Facilities Management to inspect concrete surfaces immediately upon removal of forms.

2. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Temple University Office of Facilities Management upon discovery.
3. Patch imperfections as directed.

I. DEFECTIVE CONCRETE

1. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances, compressive or specified requirements.

2. Repair or replacement of defective concrete as determined by Temple University independent testing agency will be determined by Temple University Office of Facilities Management and all defective concrete shall be removed and replaced by the contractor at no cost to Temple University.

3. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Temple University Office of Facilities Management for each individual area.

J. PROTECTION

1. Do not permit traffic over unprotected floor surface.
03320 CONCRETE FLOOR REPAIR

I. GENERAL
   A. This section is to include the patching of incidental holes in concrete floors either existing or as a result of this Contract. It also covers self leveling concrete to repair irregular floor surfaces.

II. RELATED SECTIONS
   A. Section 02050, I.A. Demolition.
   B. Section 02050, I.E., Patching and Repair.

III. PRODUCTS
   A. Water: Potable.
   B. Aggregate: ASTM C33. Sand aggregate as approved by concrete repair material manufacturer.
   D. Cementitious Leveling Compounds (Underlayment Compound): Free-flowing self-leveling, pumpable, cement-based compounds for applications from 1/2 inch thick to feathered edges. Primers recommended by the underlayment manufacturer.

1. Manufacturers:
   a. Ardex, Inc. "K-15"; "V-800"
   b. Master Builders "Underlayment 110"
   c. Euclid Chemical Co. "Flo-Top 90"

IV. CLEAN-UP AND REPAIR
   A. Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave interior areas broom clean.
   C. Repair demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF DIVISION
DIVISION 4 - MASONRY

04200  UNIT MASONRY

I  GENERAL:
   A.  Related Documents:
        1.  Drawings and general provisions of Contract, including General and Supplementary Conditions and Division - 1 Specification sections, apply to work of this section.

   B.  Description of Work:
        1.  Extent of each type of masonry work is indicated on drawings.
        2.  Types of masonry work required include:
                a.  Concrete unit masonry
                b.  Brick masonry

   C.  Quality Assurance:
        1.  Single Source Responsibility for Masonry Units:  Obtain exposed masonry units of uniform texture and color, or a uniform blend with the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.
        2.  Single Source Responsibility for Mortar Materials:  Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementious component and from one source and producer for each aggregate.
        3.  Field Constructed Mock-Ups:  Prior to installation of masonry work, erect sample wall panels to further verify selections made for color and textural characteristics, under sample submittals of masonry units and mortar, and to represent completed masonry work for qualities of appearance, materials and construction; build mock-ups to comply with the following requirements:
                a.  Locate Mock-ups on site.
                b.  Where Masonry is to Match Existing, erect panels parallel to existing surface.
                c.  Retain Mock-ups during construction as standard for judging completed masonry work.  When directed, demolished mock-ups and remove from site.
D. Delivery, Storage, and Handling:

1. Delivery masonry materials to project in undamaged condition.
2. Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion or other causes.
   a. Limit moisture absorption of concrete masonry units during delivery and until time of installation to the maximum percentage specified for Type 1 units for the average annual relative humidity as reported by the U.S. Weather Bureau Station nearest project site.
3. Store cementious materials off the ground, under cover and in dry location.
4. Store aggregates where grading and other required characteristics can be maintained.
5. Store masonry accessories including metal items to prevent deterioration by corrosion and accumulation of dirt.

E. Project Conditions:

1. Protection of Work: During erection, cover top of walls with waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.
2. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
3. Do not apply concentrated loads for at least 3 days after building masonry walls or columns.
4. Staining: Prevent grout or mortar or soil from staining the face of masonry to be left exposed. Remove immediately grout or mortar in contact with such masonry.
5. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
6. Protect sills, ledges and projections from droppings of mortar.
7. For clay masonry units with initial rates of absorption (suction) which require them to be wetted before laying, comply with the following requirements:
I. For units with surface temperatures above 32ø F (0øC), wet with water heated to above 70øF (21øC).

II. PRODUCTS:

A. Brick made from clay or Shale:

1. Facing Brick: ASTM C 216, and as follows:
   a. Grade SW.
   b. Type FBX (minimum range of size and color variations).
      To match existing.
   c. Compressive Strength: 8,000 psi, average, per ASTM C 67.
   d. Application: Use where brick is exposed, unless otherwise indicated.
   e. Texture and Color: Match existing.

B. Concrete Masonry Units:

1. Concrete Block: Provide units complying with characteristics indicated below for grade, type, face size, exposed face and under each form of block included, for with classification.
   a. Hollow Loadbearing Block: Normal weight.

C. Mortar and Group Materials:

1. Portland Cement: ASTM C 150, Type 1. Provide natural color or white cement as required to produce required mortar color.
2. Hydrated Lime: ASTM C 207, Type S.

D. Joint Reinforcement, Ties and Anchoring Devices:

1. Materials: Comply with requirements indicated below for basic materials and with requirements indicated under each form of joint reinforcement, tie and anchor for size and other characteristics:
   a. Hot-Dip Galvanized Steel Wire: ASTM A 82 for uncoated wire and with ASTM A 153, class B-2 (1.5 oz. per sq. ft. of wire surface) for zinc coating applied after prefabrication into units.
1) Application: Use for masonry exposed to exterior and in contact with earth.

b. Joint Reinforcement: Provide weld-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less that 10', and complying with requirements indicated below:

1) Width: Fabricate joint reinforcement in units with widths of approximately 2" less than nominal width of walls as required to provide mortar coverage of not less than 5/8" on joint faces.

2) Wire Size for Side Rods: 0.1875" diameter.

3) Wire Size for Cross Rods: 0.1875" diameter.

E. Concealed Flashing Materials:

1. Rubberized Asphalt Membrane Flashing: Fabricate from the following with requirements specified in Division-7 section "Flashing".

F. Miscellaneous Masonry Accessories:

1. Reinforcing Bars: Deformed steel, ASTM A 615, Grade 60.

G. Masonry Cleaners:

1. Job-Mixed Detergent Solution: Solution of trisodium phosphate (1/2 cup dry measure) and laundry detergent (1/2 cup dry measure) dissolved in one gallon of water.

H. Mortar and Grout Mixes:

1. General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds or other admixtures, unless otherwise indicate.

   a. Do not use calcium chloride in mortar or grout.
2. **Mixing:** Combine and thoroughly mix cementious, water and aggregates in a mechanical batch mixer; comply with referenced ASTM standards for mixing time and water content.

3. **Mortar for Unit Masonry:** Comply with ASTM C 270, Proportion Specification, for types of mortar required, unless otherwise indicated.
   a. Limit cementious materials in mortar to portland cementlime.
   b. Use Type N mortar for exterior, above-grade loadbearing and non-loadbearing walls; for interior loadbearing walls; and for other applications where another type is not indicated.

4. **Grout for Unit Masonry:** Comply with ASTM C 476 for grout for use in construction of reinforced and non-reinforced unit masonry. Use grout of consistency indicated or if not otherwise indicated, of consistency (fine or coarse) at time of placement which will completely fill all spaces intended to receive grout.
   a. Use fine grout in grout spaces less than 2" in horizontal direction, unless otherwise indicated.
   b. Use coarse grout in grout spaces 2" or more in least horizontal dimension, unless otherwise indicated.

III. EXECUTION

A. Installation, General:

1. **Wetting clay Brick:** Wet brick made from clay or shale which have ASTM C 67 initial rates of absorption (suction) of more than 30 grams per 30 sq. in. per minute. Use wetting methods which ensure each clay masonry unit being nearly saturated but surface dry when laid.

2. Do not wet concrete masonry units.

3. **Cleaning Reinforcing:** Before placing, remove loose rust, and other coatings from reinforcing.

4. **Thickness:** Build cavity and composite walls, floors and other masonry construction to the full thickness shown.
5. Leave opening for piping to be installed before completion of masonry work. After installation of piping, complete masonry work to match work immediately adjacent to the opening.

6. Cut masonry units using motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining work. Use full-size units without cutting where possible.

   a. Use dry cutting saws to cut concrete masonry units.

7. Matching Existing Masonry Work: Match coursing, bonding, and texture of new masonry work with existing work.

B. Construction Tolerances:

1. Variation from Plumb: For vertical lines and surfaces of piers and walls, do not exceed 1/4" in 10'. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4" in any story or 20' maximum, nor 1/4" in 40' or more. For vertical alignment of head joints do not exceed plus or minus 1/4" in 10', 1/2" maximum.

2. Variation form Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4" in any bay or 20' maximum, nor 1/2" in 40' or more.

3. Variation of Linear Building Line: For position shown in plan and related portion of piers and walls, do not exceed 1/2" in any bay or 20' maximum, nor 3/4" in 40' or more.

4. Variation in cross-sectional Dimensions: For piers and thickness of walls, from dimensions shown, do not exceed minus 1/4" nor plus 1/2".

5. Variation in Mortar Joint Thickness: Do not exceed bed joint thickness indicated by more than plus or minus 1/8", with a maximum thickness limited to 1/2". Do not exceed head joint thickness indicated by more than plus or minus 1/8".

C. Laying Masonry Walls:

1. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to accurately locate movement-type joints, returns, and offsets. Avoid the use of less-
than-half-size units at corners, jambs and wherever possible at other locations.

2. Lay-up walls: to comply with specified construction tolerances, with courses accurately spaced and coordinated with other work.

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

D. Mortar Bedding and Jointing:

1. Lay solid brick size masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and above into place. do not slush head joints.

2. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in all courses of piers, and where adjacent to calls or cavities to be reinforced or filled with concrete or grout.

3. Maintain joint widths shown, except for minor variations required to maintain bond alignment. If not shown, lay walls with 3/8" joints.

4. Tool exposed joints to match existing.

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

6. Collar Joints: After each course is laid, fill the vertical longitudinal joint between wythes solidly and with mortar.

E. Structural Bonding of Multi-Wythe Masonry:

1. Use continuous horizontal joint reinforcement installed in horizontal mortar joints for bond tie between wythes.

F. Horizontal Joint Reinforcement:

1. General: Provide continuous horizontal joint reinforcement as indicated. Install longitudinal side rods in mortar for their entire
length with a minimum cover of 5/8" on exterior side of walls, 1/2" elsewhere. Lap reinforcing a minimum of 6".

2. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

3. Reinforce walls with continuous horizontal joint reinforcing unless specifically noted to be omitted.

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

G. Anchoring Masonry Work:

1. General: Provide anchor devices of type indicated.

2. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

   a. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.

   b. Space anchors as indicated, but not more than 24" o.c. vertically and 36" o.c. horizontally.

H. Control Joints:

1. General: Provide vertical control and isolation joints in masonry where shown. Build-in related items as the masonry work progresses.

I. Flashing of Masonry Work:

1. General: Provide concealed flashing in masonry work at, or above, shelf angles, ledges and other obstructions to the downward flow of water in the wall so as to divert such water to the exterior. Prepare masonry surfaces smooth and free from projections which could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with mastic before covering with mortar. Extend flashings through exterior face of masonry and turn down to form drip.
2. Extend flashing the full length of lintels and shelf angles. Minimum of 4" into masonry each end. At heads turn up ends not less than 2" to form a pan.

3. Provide weep holes in the head joints of the first course of masonry immediately above concealed flashings. Space 24" o.c., unless otherwise indicated.

J. Repair, Pointing and Cleaning:

1. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

2. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings and adjacent work to provide a neat, uniform appearance, prepared for application of sealants.

3. Final Cleaning: After mortar is thoroughly set and cured, clean masonry as follows:
   a. Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.
   b. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film or waterproof masking tape.
   c. Saturate wall surfaces with water prior to application of cleaners; remove cleaners promptly by rising thoroughly with clear water.
   d. Use bucket and brush hand cleaning method described in BIA "Technical Note No. 20 Revised" to clean brick masonry made from clay or shale.

4. Protection: Provide final protection and maintain conditions in a manner acceptable to Installer, which ensures unit masonry work being without damage and deterioration at time of substantial completion.

END OF DIVISION
DIVISION 5 - METALS

05120 STRUCTURAL STEEL

I. GENERAL:

   B. Shop Drawings: Show complete details and schedules (if required) for fabrication, assembly and erection. Furnish anchor bolts required for installation in other work; furnish templates for bolt installation.

   C. Steel Plates, Shapes, Bars: ASTM A 36.

   D. Cold-Formed Steel Tubing: ASTM A 500, Grade B.

   E. Steel Pipe: ASTM A 53, Type E or S, Grade B.

   F. Fasteners: High-strength bolts and nuts, ASTM A 325 or A 490; unfinished bolts and nuts, ASTM A 307, Grade A.

   G. Shop Paint: FS TT-P-86, Type II; or, SSPC-Paint 2.

   H. Fabrication: Comply with AISC "Specification" and final shop drawings. Mark and match-mark units for field assembly.

   I. Connection: As shown on final shop drawings. Use high-strength bolts for field connections, except as otherwise indicated.


   J. Provisions for Other Work: Fabricate structural steel members to provide holes for securing other work and for passage of other work through steel framing as indicated.

   K. Shop Painting: Paint structural steel work, except members or portions of member embedded in concrete or mortar, and contact areas to be welded or riveted. Clean steel free of loose mill scale, rust, oil and grease. Apply prime paint to provide a minimum dry film thickness of 2.0 mils.
II. ERECTION:
   A. Comply with AISC Code and Specifications, and maintain work in safe and stable condition during erection. Provide temporary bracing and shoring as required; remove when final connections placed.
   
   B. Set Base Plates: On cleaned bearing surfaces, using wedges or other adjustments as required. Solidly pack open spaces with bedding mortar, consisting of 1 part portland cement to 3 parts sand and only enough water for packing and hydration, or use commercial non-shrink grout material at Erector's option.
   
   C. Splice Members: Only where shown on final shop drawings.
   
   D. Touch-up Prime: Paint after erection. Clean field welds, bolted connections and abraded areas, and apply same type paint as used in shop.
05210 STEEL JOISTS AND JOIST GIRDERS

I. GENERAL:
   A. Code and Standards: SJI "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders" for types of joists indicated; comply with applicable provisions except as otherwise indicated.
   
   B. Shop Drawings and Data: Show complete details and schedules (if required) for fabrication and erection, including layout, special connections, jointing and accessories. Locate anchor bolts for installation in other work; furnish templates for bolt installation by others.

II. PRODUCTS:
   A. Steel: ASTM A 36, or other per SJI "Specification".
   
   B. Fasteners: High-strength bolts and nuts, ASTM A 325 or A 490; unfinished bolts and nuts, ASTM A 307, Grade A.
   
   C. Shop Paint: Comply with SJI "Specifications" for materials and application.
   
   D. Fabrication: Comply with SJI "Specifications" and final shop drawings.
   
   E. Provisions for Other Work: Provide holes to accommodate other work to be secured to joists as indicated on final shop drawings.
   
   F. Extended and Special Ends: Provide where indicated, complying with SJI "Specifications".
   
   G. Ceiling Extensions: Provide at locations having ceilings attached directly to joist bottom chord. Extend ends to within 1/2" of finished wall surface.
   
   H. Header Units: Provide header units to support tail joists at openings in floor or roof system not framed with steel shapes.
   
   I. Bridging: Comply with SJI "Specifications" for type of joists and installation requirements. Provide bridging anchors for ends of bridging lines terminating at walls or beams.
   
   J. End Anchorage: Comply with SJI "Specifications" unless otherwise indicated.

III. ERECTION:
A. Comply with SJI "Specifications", and maintain work in safe and stable condition during erection. Do not apply construction loads until bridging and anchorages are completed.

05300 METAL DECKING

I. GENERAL:
   A. Shop Drawings and Data: Show complete details and schedules (if required) for layout and types of deck panels, anchorage, supplementary framing, cut openings, and accessories.
   B. Codes and Standards: AISI "Specification for the Design of Cold-Formed Steel Structural Members"; AWS "Structural Welding Code", SDI "Design manual for Floor Decks and Roof Decks"; comply with applicable provisions except as otherwise indicated.

Provide metal deck units listed in UL "Fire Resistance Directory", bearing UL label and marking for the system detailed.

C. FM Listing: Provide metal roof deck units which have been evaluated by Factory Mutual System and are listed in "Factory Mutual Approval Guide" for "Class I" fire-rated construction.

II. PRODUCTS:
   A. Steel for Painted Units: ASTM A 611, Grade C.
   B. Steel for Galvanized Units: ASTM A 446, Grade A.
   C. Steel Shapes: ASTM A 36.
   D. Sheet Metal Accessories: ASTM A 526, galvanized.
   E. Galvanizing: ASTM A 525, G60.
   F. Galvanizing Repair Paint: MIL-P-21035 (Ships).
   G. Shop Paint: Manufacturer's standard baked-on rust-inhibitive paint.
   H. Fabrication: Form deck units in lengths to span at least 3 supports; flush, telescoped, or nested 2" end laps; nested or interlocked side laps, unless otherwise indicated.
   I. Roof Deck: Comply with SDI "Roof Deck Specifications", of metal thickness, width, and depth indicated.
J. Acoustic Metal Roof Deck Units: Single-pan fluted units with vertical webs perforated with 5/32" diameter holes staggered 3/8" o.c., metal thickness, depth and width as indicated. Provide mineral fiber acoustical insulation strips of profile to fit void space between vertical ribs.

K. Composite Metal Floor Deck: Fluted sections, of metal thickness, width and depth indicated.

L. Cellular Metal Floor Deck: Top fluted sections with flat plate closure; metal thickness, depth, width of unit, number of cells per unit, and width of cells as indicated.

Epic Metals Corp.
Mac-Fab Products, Inc.
H.H. Robertson Co.
Roll Form Products, Inc.
United Steel Deck, Inc.

M. Cellular Composite Metal Floor Deck: Matching top and bottom fluted sections; metal thickness, depth, width of unit, number of cells per unit, and width of cells as indicated.

Manufacturers:

Epic Metals Corp.
Mac-Fab Products, Inc.
H.H. Robertson Co.
Roll Form Products, Inc.
United Steel Deck, Inc.

N. Accessories: Provide cover plates, closure strips, roof sump pans, cant strips, as required, use deck manufacturer's standard unless otherwise shown.

II. INSTALLATION:

A. Place deck units and secure to adjacent framing by fusion welding 12" o.c. to supports, with a minimum of 2 welds at each support, unless otherwise indicated.

B. Secure roof deck units at ends and side laps at spacings recommended by deck manufacturer to provide resistance for gross uplift of 45 psf at eave overhang and 30 psf for other roof areas.

C. Place accessory units in accordance with manufacturer's recommendations unless otherwise shown.
Touch-up Shop Paint: After installation. Clean field welds and abraded areas, and apply same type paint as used in shop. Use galvanizing repair paint to correct damaged galvanized surfaces.
II. GENERAL:
   A. Shop Drawings and Data: Show complete details and schedules (if required) for layout and types of deck panels, anchorage supplementary framing, cut openings, and accessories.
   
   B. Codes and Standards: American Iron and Steel Institute (AISI) "Specification for the Design of Cold-Formed Steel Structural Members"; American Welding Society (AWS) "Structural Welding code", Steel Deck Institute (SDI) "Design Manual for Composite Decks, Form Decks and Roof Decks" comply with applicable provisions except as otherwise indicated.
       
       Provide metal deck units listed in UL "Fire Resistance Directory", bearing UL label and marking for the system detailed.
       
       Provide cellular floor deck units listed in UL "Electrical Construction Materials List".
   
   C. FM Listing: Provide metal roof deck units which have been evaluated by Factory Mutual System and are listed in "Factory Mutual Approval Guide" for "Class I" fire-rated construction.

II. PRODUCTS:
   A. Manufacturers: Provide steel deck as fabricated by one of the following:
       
       Bowman Metal Deck
       Consolidated Systems, Inc.
       Epic Metals Corp.
       Marlyn Steel Products, Inc.
       Roll Form Products, Inc.
       Roof Deck, Inc.
       United Steel Deck, Inc.
       Vulcraft/Div. Nucor Corp.
       Wheeling Corrugating Co.
   
   B. Steel for Painted Units: ASTM A 611, Grade C.
   
   C. Steel for Galvanized Units: ASTM A 446, Grade A.
   
   D. Steel Shapes: ASTM A 36.
   
   E. Sheet Metal Accessories: ASTM A 526, Galvanized.
   
   F. Galvanizing: ASTM A 525, G60.
G. Galvanizing Repair: ASTM A780.

H. Shop Paint: Manufacturer's standard baked-on rust-inhibitive paint.

III. FABRICATION:
   A. Form deck units in lengths to span at least 3 supports; flush, telescoped, or nested 2-inch end laps; nested or interlocked side laps, unless otherwise indicated.

   B. Deck Units: Comply with SDI requirements for type of sections, of metal thickness, width, and depth indicated.

   C. Accessories: Provide cover plates, closure strips, roof sump pans, cant strips, as required; use deck manufacturer's standard unless otherwise shown.

IV. EXECUTION:
   A. Installation: Place deck units and secure to adjacent framing by fusion welding 12 inches o.c. to supports, with a minimum of 2 welds at each support.

   B. Mechanical Fasteners: Either powder-actuated or pneumatically driven, may be used in lieu of welding. Locate mechanical fasteners and install in accordance with deck manufacturers' instructions.

      Secure roof deck units at ends and side laps at spacings recommended by deck manufacturer to provide resistance for gross uplift of 45 psf at eave overhang and 30 psf for other roof areas.

      Place accessory units in accordance with manufacturer's recommendations unless otherwise shown.

   C. Touch-up Shop Paint: After installation. Clean field welds and abraded areas, and apply same type paint as used in shop. Use galvanizing repair materials to correct damaged galvanized surfaces.
05400 COLD-FORMED METAL FRAMING

I. GENERAL:
   A. Types: Of cold-formed metal framing units for project include the following:
      - Load-bearing punched channel studs.
      - C-shaped steel studs.
      - C-shaped steel joists.
   B. Shop Drawings and Data: Submit shop drawings for special components and installations not fully dimensioned or detailed in manufacturer's products data.
   C. Component Design: Calculated structural properties of studs and joists in accordance with AISI "Specification for the Design of Cold-Formed Steel Structural Members".
   D. Fire-Rated Assemblies: Where framing units are components of assemblies indicated for a fire-resistance rating, provide units approved by governing authorities having jurisdiction.

II. PRODUCTS:
   A. Manufacturers: Provide cold-formed metal framing produced by one of the following:
      - Alabama Metal Industries Corp.
      - Dale Industries, Inc.
      - Dietrich Industries, Inc.
      - Marino Industries Corp.
      - Superior Steel Studs, Inc.
      - USG Industries
      - United States Steel
      - Wheeling Corrugating Co.
   B. System Components: Manufacturer's standard load-bearing steel studs and joists of type, size, shape, and gage as indicated. With each type of metal framing required, provide manufacturer's standard steel runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories as recommended by manufacturer for application indicated as needed to provide a complete metal framing system.

III. MATERIALS AND FINISHES:
   A. For 16-Gage and Heavier Units: Fabricate metal framing components of structural quality steel sheet with a minimum yield point of 40,000 psi; ASTM A 446, A 570, or A 611.
B. For 18-Gage and Lighter Units: Fabricate metal framing components of commercial quality steel sheet with a minimum yield point of 33,000 psi, ASTM A 446, A 570, or A 611.

C. Provide Galvanized Finish: To metal framing components that comply with ASTM A 525 for minimum G 60 coating.

D. Provide Prime-Coated Finish: With one coat of shop-applied red-oxide, zinc-chromate, or other similar rust-inhibitive primer.

E. Electrodes for Welding: Comply with AWS Code and recommendations of framing manufacturer.


G. Prefabrication: Structural framing components may be prefabricated into panels prior to erection. Fabricate panels plumb, square, true to line and braced against racking with joints welded. Perform lifting of prefabricated panels to prevent damage or distortion.

Fabricated panels in jig templates to hold members in proper alignment and position and to assure consistent component placement.

H. Fastenings: Attach similar components by welding. Attach dissimilar components by welding, bolting, or screw fasteners, as standard with manufacturer.

Wire tying of framing components is not permitted.

I. Fabrication Tolerances: Fabricate panels to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet.

III. EXECUTION:
A. Installation: Install metal framing systems in accordance with manufacturer's printed or written instructions and recommendations unless otherwise indicated.

Install continuous tracks sized to match studs. Secure tracks as recommended by stud manufacturer for type of construction involved.

B. Set Studs Plumb: Except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
C. Install Supplementary Framing: Blocking and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work.

D. Secure Studs: To top and bottom runner tracks by either welding or screw fastening at both inside and outside flanges.

E. Install Horizontal: Stiffeners in stud system, spaces (vertical distance) at not more than 54 inches o.c. Weld at each intersection.

F. Installation of Joists: Install level and plumb, complete with bracing and reinforcing as indicated. Provide not less than 1-1/2-inches end bearing.

Reinforce ends with end clips steel hangers, steel angle clips steel stud section, or as otherwise recommended by joist manufacturer.
05500 METAL FABRICATIONS

I. GENERAL:
   A. Definitions: In ASTM E 985 for railing-related terms apply to this section.
   B. Structural Performance of Handrails and Railing Systems: Provide handrails and railing systems capable of withstanding the following structural loads without exceeding the allowable design working stress of materials involved. All handrails to be hot dipped galvanized steel.
      1. Top Rails of Guardrail Systems: Concentrated load of 300 lbf applied at any point and a uniform load of 100 lbf per linear ft. with each load applied nonconcurrently with respect to direction and each other, vertically downward or horizontally.
      2. Handrails Not Serving as Top Rails: Concentrated load of 200 lbf applied at any point and a uniform load of 50 lbf per linear ft. with each load applied nonconcurrently with respect to direction and each other, vertically downward or horizontally.
      3. Infill Area of Guardrail Systems: Horizontal concentrated load of 200 lbf applied to one sq. ft. at any point in the system including panels, intermediate rails balusters, or other elements composing the infill area.
      4. Treads of Steel Stairs: Uniform load of 100 lbf per sq. ft. or a concentrated load of 300 lbf on a area of 4 sq. inches located in the center of the tread, whichever produces the greater stress.
      5. Platforms of Steel Stairs: Capable of withstanding a uniform load of 100 lbf per sq. ft.
   C. Submittals: In addition to product data, submit the following:
      1. Shop Drawings: Showing details of fabrication, assembly and installation including templates for anchor bolt placement.
      2. Samples: Of materials and finished products as may be requested by Architect.

II. PRODUCTS:
   A. General: For work exposed to view use materials selected for their smoothness and freedom from surface blemishes.
      1. Steel Plates, Shapes, and Bars: ASTM A 36.
2. Rolled Steel Floor Plates: ASTM A 786.

3. Steel Bars for Grating: ASTM A 569 or A 36.


5. Cold-Formed Steed Tubing: ASTM A 500, grade as indicated below:

   Grade A: Unless otherwise indicated or required for design loading.

   Grade B: Unless otherwise indicated or required for design loading.


   For exterior installations and where indicated, provide tubing with hot-dip galvanized coating per ASTM A 53.

7. Uncoated Cold-Rolled Structural Steel Sheet: ASTM A 611, Grade A, unless otherwise indicated or required by design loading.

8. Uncoated Hot-Rolled Structural Steel Sheet: ASTM A 570, Grade 30, unless otherwise indicated or required by design loading.


10. Uncoated Hot-Rolled Commercial Quality Steel Sheet: ASTM A 569.

11. Galvanized Structural Quality Steel Sheet: ASTM A 446; Grade A, unless another grade required for design loading, and G90 coating designation unless otherwise indicated.

12. Galvanized Commercial Quality Steel Sheet: ASTM A 536, G90 coating designation unless otherwise indicated.

13. Steel Pipe: ASTM A 53; finish, type, and weight class as follows:


   b. Galvanized Finish: For exterior installations and where indicated.
c. Type F, Standard Weight: (Schedule 40) unless another weight, type, and grade required by structural loads.

d. Type S, Grade A, Standard Weight: (Schedule 40) unless another grade or weight or both required by structural loads.

e. Type S, Grade B, Standard Weight: (Schedule 40) unless another weight required by structural loads.


16. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails.

17. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.

18. Extruded Aluminum Bars and Shapes: ASTM B 221, alloys as follows:

   6061-T6 or 6063-T6 for bearing bars of gratings and shapes.

   6061-T1 for grating cross bars.

19. Aluminum-Alloy Rolled Tread Plate: ASTM B 632, alloys as follows:

   6061-T6 for platforms.
   6061-T4 for treads.


22. Fasteners for Aluminum Gratings: Same basic metal as fastened metal except use galvanized fasteners complying with ASTM A 153 for exterior aluminum units, unless otherwise indicated. Do not use metals which are corrosive or incompatible with metals joined.
23. **Nonshrink Metallic Grout**: Premixed, factory-packaged, ferrous aggregate grout complying with CE CRD-C 621.

24. **Nonshrink Nonmetallic Grout**: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with CE CRD-C 621.

25. **Interior Anchoring Cement**: Factory-prepackaged nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site. Use for interior applications only.

26. **Fasteners**: Provide bolts, nuts, lag bolts, machine screws, wood screws, toggle bolts, masonry anchorage devices, lock washers as required for application indicated and complying with applicable Federal standards. Hot-dip galvanize fasteners for exterior applications to comply with ASTM A 153.

27. **Shop Primer for Ferrous Metal**: Manufacturer's or fabricator's standard, fast-curing, lead-free, universal modified alkyd primer; resistant to normal atmospheric corrosion, compatible with finish paint systems indicated. capable of providing a sound foundation for field-applied topcoats despite prolonged exposure; complying with performance requirements of FS TT-P-645.

28. **Bituminous Paint**: Cold-applied asphalt mastic complying with SSPC-Paint 12 except containing no asbestos fibers.

29. **Zinc Chromate Primer**: FS TT-P-645.

30. **Shop Painting**: Apply shop primer to surface of metal fabrications except those embedded in concrete or galvanized; comply with SSPC-PA1 and requirements indicated below:
   
   a. **Surface Preparation**: Comply with SSPC-SP6 "Commercial Blast Cleaning" for exterior work, and with SSPC-SP3 "Power Tool Cleaning" for interior work.
   
   b. **Stripe Paint**: Edges, corners, crevices, bolts, welds and sharp edges.

31. **Galvanizing**: ASTM A 123 for fabricated and unfabricated steel products made of uncoated rolled, pressed and forged steel shapes, plates, bars and strip 0.0229 inch and thicker.
32. Galvanizing Repair Paint: High zinc dust content paint with dry film containing not less than 94 percent zinc dust by weight, complying with DOD-P-21035 or SSPC-Paint-20.

33. Fabrication, General: Use materials of size and thickness shown, or, if not shown, of required size, grade and thickness to produce strength and durability in finished product. Shop-paint all items not specified to be galvanized after fabrication.

   a. Weld Corners and Seams: Continuously to comply with AWS recommendations. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain fusion without undercut or overlap. Remove welding flux immediately. Finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

   b. Form Exposed Connections: With hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.

34. Rough Hardware: Furnish custom-fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes for framing and supporting and anchoring woodwork.

   a. Galvanize, unless otherwise indicated.

35. Ladders: Fabricate ladders for locations shown, with dimensions, spacings, and anchorages as indicated. Comply with the requirements of ANSI A14.3, unless otherwise indicated.

   a. Provide Sloping Ladders: (Ship's ladders) where indicated. Fabricate or open type construction with structural steel channel of plate stringers, pipe handrails, and open steel grating treads, unless otherwise indicated. Provide all necessary brackets, fittings, and anchorages for installation.

   b. Provide ladder Safety Cages: Where indicated. Fabricated of structural steel flat bars, assembled by welding or riveting.

   c. Galvanize after fabrication.
36. Loose Bearing and Leveling Plates: Provide for steel items bearing on masonry or concrete, as indicated. Drill plates to receive anchor bolts.

37. Loose Steel Lintels: Fabricate from shapes and to sizes indicated.
   1. Galvanize after fabrication.

38. Miscellaneous Framing and Supports: Provide as required to complete work and not included with structural steel framework. Fabricate of welded construction in as large units as possible; drill and tap as required to receive hardware and similar items. Include required anchors for building into other work; spaced not more than 24 inches o.c.

39. Miscellaneous Steel Trim: Fabricate to shapes and sizes as required for profiles shown; continuous welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings, and anchorages; coordinate assembly and installation with other work.

40. Prefabricated Building Columns: Assemblies composed of load-bearing steel structural member protected by manufacturer's standard insulating concrete fireproofing encased in outer non-loadbearing steel shell and bearing UL Classification Marking or fire-resistance rating indicated; of size, shape and column configuration indicated.
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      
      Bridgeport Column Co., Inc.
      George A. Dean Inc.
      Lally Tubular Div., LB Industries, Inc.

41. Nosings: Fabricate of shapes as indicated; miter corners and weld joints. Provide anchors 6 inches from ends of corners and 24 inches o.c.
    Galvanize after fabrication.

42. Shelf and Relieving Angles: Fabricate to sizes indicated for attachment to support framing. Provide slotted holes to receive anchor bolts, spaced not more than 6 inches from ends and 24 inches o.c.
a. Furnish wedge-type concrete inserts complete with fasteners for securing shelf angles to cast-in-place concrete.
b. Galvanize shelf angles to be installed on exterior concrete.

43. Steel Door Frames: Fabricate from structural shapes and bars of size and to dimensions indicated, fully welded together. Secure removable stops to frame with countersunk machine screws. Reinforce frames and drill and tap as required to accept finish hardware.

a. Provide Steel Strap Anchors: Of size indicated for securing door frames into adjoining concrete or masonry for a minimum 8 inches embedment. Weld anchors to frames.
b. Extend Bottom of Frames: To Floor elevation indicated with steel angle clips welded to frames for anchoring to floor with expansion shields and bolts.
c. Galvanize: Frames and anchors where indicated.

44. Metal Bar Gratings: Produce metal bar gratings indicated per NAAMM marking system that comply with the following:


46. Welded Steel Gratings: W-15-4 (welded with bearing bars 15/16 inch o.c. and cross bars 4 inches o.c.)/bearing bar sizes as indicated.

47. Pressure-Locked Steel Gratings: P-15-4 (pressure-locked with bearing bars 15/16 inch o.c. and cross bars 4 inches o.c.)/bearing bar sizes as indicated.

48. Riveted Steel Gratings: R-12-7 (riveted with 3/4 inch space between bearing bars and cross bars 7 inches o.c.)/bearing bar sizes as indicated.
49. Pressure-Locked Rectangular Bar Aluminum Gratings: P-7-4 (pressure-locked with bearing bars 7/16 inch o.c. and cross bars 4 inches o.c./rectangular bearing bar sizes as indicated.

50. Pressure-Locked I-bar Aluminum Gratings: P-16-2 (pressure-locked with bearing bars on inch o.c. and cross bars 2 inches o.c./I-shaped bearing bar sizes as indicated.

51. Welded Heavy Duty Steel Gratings: W-19-4 (welded with bearing bars 1-3/16 inch o.c. and cross bars 4 inches o.c./bearing bar sizes as indicated.

52. Riveted Heavy Duty Steel Gratings: R-19-3-1/2 (riveted with 1-3/16 inch space between bearing bars and cross bars 3-1/2 inches o.c./bearing bar sizes as indicated.

53. Traffic Surface For Steel Bar Gratings: As follows: Serrated

54. Traffic Surface for Aluminum Bar Gratings: As follows: Grooved

55. Steel Finish: As follows:
   a. Shop prime paint applied in accordance with manufacturer’s standard practice.
   b. Hot-dip galvanized with a coating weight of not less than 1.8 oz. per sq. ft. of coated surface.

56. Aluminum Finish: As follows:
    Class I clear anodized finish.

57. Fabricate Removable Grating Sections: With banding bars attached by welding to entire perimeter of each section. Include anchors and fasteners of type indicated for attachment to supports.
   a. Provide not less than 4 anchor blocks for each section.
   b. Provide not less than 4 saddle clips for each grating section.
   c. Provide not less than 4 flange blocks for each section of aluminum I-bar grating.
   d. Furnish threaded bolts with nuts and washers for each clip required.
e. Furnish self-drilling fasteners with washers for each clip required.

58. Attach Toe Plates: To grating by welding unless otherwise indicated.

59. Furnish Toe Plates: For attachment in field.

60. Fabricate Cutouts: In grating sections for penetration as indicated. Arrange layout of cutouts to permit grating removal without disturbing items penetrating gratings.

   a. Edge band openings in grating which interrupt 4 or more bearing bars with bars of same size and material as bearing bars.

61. Expanded Metal Gratings: Provide style and type indicated in material and finish indicated below:

   Material: Steel

   Steel Finish: Shop prime paint.

62. Floor Plate: Fabricate raised pattern floor plate from rolled steel floor plate of thickness and pattern indicated.

   a. Provide 2 Steel Bar Drop Handles: For lifting plates, one at each end of each removable section.

63. Abrasive Surface Floor Plate: With manufacturer's standard abrasive granules rolled into surface.

   a. Provide 2 Steel Bar Drop Handles: For lifting plates, one at each end of each removable section.

64. Fabricate Raised Pattern Tread Plates: From aluminum-alloy rolled tread plate in pattern 1 of thickness indicated.

65. Steel Pipe Railings: Fabricate to dimensions shown, with smooth bends and welded joints using steel pipe of diameter and finish indicated. Secure posts and rail ends to building construction as indicated.

   a. Galvanize exterior and interior steel railings, including pipe, fittings, brackets, fasteners and other ferrous metal components.
66. Cast Treads and Threshold: Cast-iron units with integral abrasive finish, of size and configuration indicated; with manufacturer’s standard anchors for type of application indicated.

67. Steel Framed Stairs: Complete stair assemblies of type indicated and including metal framing, hangers, columns, railings, newels, balusters, struts, clips, brackets, bearing plates and other components required for support of stairs and platforms.
   a. Stair Framing: Fabricate stringers of structural steel channels or plates or a combination thereof, and platforms of structural steel channel headers and miscellaneous framing members, of size indicated or required to support design loadings.

68. Metal Pan Risers, Subtreads, and Subplatforms: Form metal pans to configuration indicated from hot-rolled or cold-rolled steel. Weld risers and subtreads to stringers, and subplatform to platform framing members.

69. Steel Floor Plate Treads and Platforms: Fabricate treads and platforms from raised pattern steel floor plate of pattern indicated or selected from manufacturer’s standards. Form treads of 1/4 inch thick plate with integral nosing and back edge stiffener. Weld treads and platforms to supporting framing.

70. Floor Grating Treads and Platforms: Fabricate treads and platforms from steel bar gratings of type, size, and traffic surface indicated and complying with NAAMM "Metal Bar Grating Manual". Secure treads to framing with bolts and platform by welding.

71. Wheel Guards: Hollow core, gray-iron castings, filled with 3000 psi concrete after installation.

   a. Fabricate Sleeves: For bollard anchorage from steel pipe with 1/4 inch thick steel plate welded to bottom of sleeve.

II. EXECUTION:
   A. Installation: Perform cutting, drilling and fitting required for installation, set work accurately in location, alignment and elevation, measured from
established lines and levels. Provide anchorage devices and fasteners where necessary for installation to other work.

1. Set loose items on cleaned bearing surfaces, using wedges or other adjustments as required. Solidly pack open spaces with bedding mortar, consisting of 1-part portland cement to 3-parts sand and only enough water for packing and hydration, or use commercial non-shrink grout material.

2. Touch-Up Shop Paint: After installation. Clean field welds, bolted connections and abraded areas, and apply same type paint as used in shop. Use galvanizing repair paint on damaged galvanized surfaces.
I. GENERAL:
   A: Structural Performance of Handrails and Railing Systems: Comply with ASTM E 985 based on testing per ASTM E 894 and E 935. Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

II. PRODUCTS:
   A. Aluminum: Alloy and temper recommended by aluminum producer or finisher for use and finish indicated, with not less than the strength and durability of alloy and temper designated below:
      c. Drawn Seamless Tube: ASTM B 483, 6063-T832.
   B. Stainless Steel: Austenitic stainless steel in form indicted complying with the following requirements:
      a. Tubing: ASTM A 554, Grade MT 304.
      b. Pipe: ASTM A 312, Grade TP 304.
      c. Castings: ASTM A 743, Grade CF 8 or CF 20.
      d. Plate: ASTM A 167, type 304.
   C. Steel Pipe: ASTM A 53; finish, type, and weight class a follows:
      a. Black finish, unless otherwise indicated.
      b. Galvanized finish for exterior installations and where indicated.
      c. Type F, standard weight (schedule 40), unless another weight, type, and grade required by structural loads.
d. Type S. Grade A, standard weight (schedule 40), unless another grade, weight, or both required by structural loads.

e. Type S. Grade B, standard weight (schedule 40), unless another weight required by structural loads.

D. Steel Tubing: Product type (manufacturing method) and other requirements as follows:

a. Cold-Formed Round Steel Tubing: ASTM A 500, grade as required by structural loads.


c. For exterior installations and where indicated, provide tubing with hot-dip galvanized coating per ASTM A 53.

E. Steel Plates, Shapes, and Bars: ASTM A 36.

F. Brackets, Flanges, and Anchors: Cast or formed metal of the same type material and finish as supported rails.

G. Grout/Anchoring Cement: Nonshrink nonmetallic grout; CE CRD-C621 or erosion-resistant anchoring cement; nonstaining, noncorrosive, nongaseous; recommended by manufacturer for types of applications indicated.

H. Fasteners: Same material as fastened metal; concealed unless otherwise indicated or unavoidable and standard with systems indicated.

I. Anchors and Inserts: As required for secure anchorage of handrails and railings to concrete, masonry, and other adjoining work; noncorrosive to materials joined.

III. FABRICATIONS:

A. Fabricate handrails and railings to design, dimensions, and details indicated and as required to support structural loads.

B. Nonwelded Connections: Fabricate railing systems and handrails for connection of members by means of concealed mechanical fasteners and fittings.

   Fabricate splice joints for field connection using epoxy structural adhesive.
C. **Welded Connections:** Use fully welded joints for permanently connecting railing components by welding. Cope or butt components to provide 100 percent contact or use manufacturer's standard fittings designed for this purpose.

D. **Welded Connections for Aluminum Pipe:** Fabricate railing members for connection by concealed internal welds, using manufacturer's standard system of sleeve and socket fittings.

E. **Expansion Joints:** Install expansion joints at locations indicated but not further apart than required to accommodate thermal movement.

F. **Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required without deforming exposed surfaces.**

G. **Provide Toeboards, wall returns, closed ends, brackets, flanges, fittings, and sleeves as required for type of installation indicated.**

IV. **FINISHES:**
   A. **Aluminum Class I Clear Anodized Finish:** AA-M12C22A41 complying with AAMA 607.1.
   
   B. **Aluminum Class I Color Anodized Finish:** AA-M12C22A42/44 complying with AAMA 606.1/AAMA 608.1.
   
   C. **Stainless Steel Finish:** 180-grit polished finish.
   
   D. **Stainless Steel Finish:** AISI No. 4 finish.
   
   E. **Ferrous Metal Finish:** Shop-prime with lead-free "universal" primer selected for compatibility with substrate and field-applied finish paint.

V. **EXECUTION:**
   A. Set work accurately in location, alignment, and elevation and free from rack.
   
   B. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of the railing and wall is 1/4 inch or less.
   
   C. Comply with manufacturer's recommendation for field connections of handrail and railing members.
   
   D. Anchor posts in concrete by inserting into preset sleeves and grouting of annular space between sleeve and post.
E. Anchor posts to metal surfaces with fittings designed for this purpose.

F. Anchor rail ends to masonry and concrete with round flanges connected to rail ends and fastened to wall with post-installed anchors and bolts.

G. Attach handrails to wall with wall brackets and end fittings.
   a. Use brackets with predrilled hole for exposed bolt anchorage.

END OF DIVISION
DIVISION 6 - WOOD AND PLASTICS

06200 FINISH CARPENTRY

I. GENERAL:
   A. Provide all labor, material and services to perform all operations required for and incidental to the complete installation of all shelving and wood trim.

II. PRODUCTS:
   A. Shelving: All shelving will be limited to 4 types.
      1. Type "A" shelving will be 3/4" thick high density particle board 11 1/2" deep with 3/4"x1/2" hardwood edge band on exposed edge with primer and 2 finish coats of paint. Location: all fixed shelving in closets at 24", 36", 48", 60" and 72" A.F.F. and 2" above coat rod in all coat closets. Shelving to be supported by 1 x 2 wood pin rails painted as per shelves where fixed and brackets and standards where adjustable. Paint with primer and 2 finish coats of paint.
      2. Type "B" shelving to be 3/4" thick birch veneer plywood 11 1/2" deep with birch veneer edge band typical on 4 sides. Finish to be either 2 coats of satin polyurethane varnish.
      3. Type "C" shelving to be 3/4" thick M.D.F. with all edges and surfaces finished with plastic laminate as selected by the Architect with a radius edge. Comply with AWI premium grade specifications, flush overlay design.
      4. Type "D" shelving to be 1" x 12" epoxy resin.
      5. Type “E” shelving to be ¾" solid red oak shelving stained or polyurathaned as per drawings.
   B. Brackets and Standards: Shelving brackets and standards to be KV82.182, white finish. Heavy duty brackets and standards to be KV85-185, white finish. All standards to be on 16" centers and heavy duty standards should be on 12" centers. All standards to be attached to studs in drywall partitions and recessed into 1" x 1 1/2" red oak wood strips on C.M.U. partitions. Wood strip to be stained or painted as noted.
I. GENERAL:
A. Specifications: Millwork to be constructed using AWI premium grade specifications, flush overlay design by American Metal Mouldings, Corp, 1801 N. American Street, Philadelphia, PA 19133, (215) 634-3100.

B. Finished Millwork: To be shop-finished and will only require field touch-up.
North Pointe Villager Series, Manhattan Square Raised Penel in Oak.

II. PRODUCTS:
A. Millwork Hardware: Is provided by the Millwork Contractor and shall be as follows: All brushed aluminum finish, unless noted otherwise.

1. Flush Door/Drawer Pulls: EPCO #DP-46
2. Wire Pulls: Stanley 4”x5/16” diameter brushed aluminum finish.
4. Piano Hinges: STANLEY SC 311
5. Kitchen Drawer Slides: Grass 6650, Bottom Mounted Drawer Slide
6. Cabinet Shelf Supports: KV225AL/256AL, standard finish
7. Magnetic Catches: STANLEY SP45/SP46, standard finish
8. Touch Latches: IVES 820, standard finish
9. File Hangers: PENDAFLEX, legal size, in all file drawers
10. Cam Locks: Provide National
Cabinet Lock C8053 on each drawer and door unit.

B. Finishes: Millwork to be finished as follows:

1. Exterior Surfaces: (countertops, cabinet fronts, doors - all surfaces, exposed end panels) Nevamar high-pressure plastic laminate or wood veneer as indicated. All countertop edges to receive red oak bullnose. Substrate to be 3/4” M.D.F. Board.

2. Interior Surfaces, Shelving: - melamine coated panels MCP

3. Natural Finish:

   1st coat Oil Stain
   2nd & 3rd coat Lacquer Based Sanding Sealer, sanded between coats.
   4th & 5th coat "Lac-Thane", Polish with extra fine steel wool and lemon oil.

4. Avonite: Avonite solid surfacing material where called for on drawings. Countertops to be constructed of one-piece, monolithic design including integral sink bowl, size as noted, one-piece integral cove backsplash and integral no-drip edge on counters. Provide Avonite scribe strips to walls and seam with Avonite approved adhesive.

5. Window Stools
      1) Panel Thickness: As indicated Drawings, but not less than that required by referenced woodworking standard.
   b. Finish: Solid Surfacing Material
   c. Exposed Edges: Base Bid: Solid Surfacing Material
   d. Conceal all fasteners.

III. EXECUTION:
   A. Coordination Inspection: Millwork Contractor shall inspect areas to receive work and shall not begin installation until areas have been satisfactorily prepared. Starting work shall indicate acceptance of site conditions. Millwork Contractor to coordinate with General in order to assure that the necessary blocking is installed during framing. All
millwork to have 1/2” plywood blocking unless otherwise noted on drawings. Millwork shall be scribed to wall, ceiling or floor.

B. Field Dimensions: Millwork Contractor shall field check all critical dimensions prior to fabrication and generally coordinate with other trades as required.

C. Cutouts, Grommets: Millwork Contractor to provide cutouts for electrical, telephone and signal outlets where they occur behind millwork and he shall provide grommets in countertops to allow telephone and electrical cord access to the respective outlets. Grommets to be King Kong style by Doug Mocket.

D. Electrical within Millwork: Lighting and electrical work shown attached to Millwork to be provided by the Electrical Contractor, unless noted. MC cable to be used in all Millwork.

IV. QUALITY ASSURANCE

A. Fabricator Qualifications: Firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units without delaying the Work.

B. Installer Qualifications: Arrange for interior architectural woodwork installation by a firm that can demonstrate successful experience in installing architectural woodwork items similar in type and quality to those required for this Project.

C. Single-Source Responsibility for Fabrication and Installation: Engage a qualified woodworking firm to assume undivided responsibility for fabricating, finishing, and installing woodwork specified in this Section.

D. Quality Standard: Except as otherwise indicated, comply with the following standard:

   a. Provide AWI Certification Labels or Certificates of Compliance indicating that woodwork meets requirements of grades specified.

2. The Contract Documents contain selections
chosen from options in the Quality Standard as well as additional requirements beyond those of the Quality Standard. Comply with such selections and requirements in addition to the Quality Standard.

E. Fire Test Response Characteristics: Provide materials with the following fire-test-response characteristics as determined by testing identical products per ASTM test method indicated below by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify fire-retardant-treated material with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

1. Surface-Burning Characteristics: Not exceeding values indicated below, tested per ASTM E 84 for standard time period (10 minutes).
   a. Flame Spread: 75.
   b. Smoke Developed: 450.

2. Surface-Burning Characteristics: Not exceeding values indicated below, tested per ASTM E 84 for 30 minutes with no evidence of significant combustion. In addition, the flame front shall not progress more than 10-1/2 feet (3.2 m) beyond the center line of the burner at any time during the test.
   b. Smoke Developed: 450.

F. Pre-installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meeting”.

V. DELIVERY, STORAGE, AND HANDLING

A. Protect woodwork during transit, delivery, storage, and handling to present damage, soilage, and deterioration.

B. Do not deliver woodwork until painting and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified in “Project Conditions”.

VI. PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet-work is completed, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.
B. Environmental Limitations: Obtain and comply with woodwork fabricator’s and installer’s coordinated advice for optimum temperature and humidity conditions for woodwork during its storage and installation. Do not install woodwork until these condition have been attained and stabilized so that woodwork will be within plus or minus 1.0 percent of optimum moisture content from date of installation through remainder of construction period.

C. Field Measurements: Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Verify locations of concealed framing, blocking, reinforcements, and furring that support woodwork by accurate field measurements before being enclosed. Record measurements on final shop drawings.

2. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site and coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions.

VII. COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

END OF DIVISION
I. GENERAL:
   A. Roof: Unless previously authorized by Temple, roofs are to be Carlisle membrane roofs, 60 mil thickness membrane material 20 feet wide rolls, Carlisle walking pads installed per Carlisle method (unless other pavers are specified) pavers to be arranged to allow convenient access to significant features on roof, 20 year warrantee, ballasted, where possible, and mechanically fastened otherwise, and the warrantee to be issued by the manufacturer, not the installer.
07600 FLASHING AND SHEET METAL

I. PRODUCTS:

A. Flashing: All flashing, unless authorized by Temple, is to be stainless steel and all laps and penetrations are to be properly sealed to prevent admission of water and moisture to the building structure.

The rubber roofing material is to rise a minimum of 6" above the top of the roof drain dome, 6" above an unscuppered parapet or 6" above a gravel stop, before any counterflashings begin.

On parapets or rising perimeters the roofing material is to continue over the top of the rise or parapet and terminate in a reglet on the face of the building and covered by architectural sheetmetal.

All flexible flashings (plastic) or flashings other than stainless steel, are to be authorized by Temple before considered for design.
07720 ROOF ACCESSORIES

I. GENERAL:
   A. Access to roof to be via stairway or opposed tread stairway but not via vertical ladder, unless authorized by Temple. Roof hatch is to be "coffin" style rather than square and the operating and locking mechanisms are to be at the same end as the head of the stairway.
   
   B. Locking shall be by padlock.
   
   C. Skylights are prohibited.

II. MANUFACTURER:
   A. Bilco Company
I. GENERAL:

A. Related Documents:

1. Stipulations: The specifications section "General Conditions" and "Special Requirements" form a part of this section by this reference thereto and shall have the same force and effect as if printed herewith in full.

B. Summary:

1. This Section includes sealers for the following locations:

   a. Exterior joints in vertical surface and non-traffic horizontal surfaces as indicated below.

   Control and expansion joints in unit masonry.

   Joints between different materials. Perimeter joints between materials and frames of doors and windows. Other joints as indicated and or required.

C. System Performances:

1. Provide joint sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.

D. Submittals:

1. Product Data from manufacturers for each joint sealer product required, including instructions for joint preparation and joint sealer application.

E. Quality Assurance:

1. Installer Qualifications: Installer who has successfully completed within the last 3 years at least 3 joint sealer applications similar in type and size to that of this project.

F. Delivery, Storage, and Handling:

1. Deliver materials to project site in original unopened containers with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.

2. Store and handle material in compliance with manufacturer’s recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminates, or other causes.

G. Project Conditions:

1. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:
   a. When ambient and substrate temperature conditions are outside the limits permitted by joint major sealer manufacturers.
   b. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturer or below 40øF (4.4 deg C).
   c. When joint substrates are wet due to rain, frost, condensation, or other causes.

2. Joint Width Conditions: do not proceed with installation of joint sealers where joint widths are less than allowed by joint sealer manufacturer for application indicated.

3. Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminates capable of interfering with their adhesion are removed from joint substrates.

II. PRODUCTS:

A. Materials, General:

1. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Colors: Provide colors exposed joint sealers to match adjacent surfaces. This requires multiple custom colors.
B.  Silicone Joint Sealants:

1.  Silicone Sealant Standard: Provide manufacturer's standard atmospheric moisture curing, sealant of silicone indicated which complies with ASTM C 920 requirements, for Type "S", Grade NS, Class 25 and uses NT, M, G, and A.

2.  Available Products: Subject to compliance with requirements, silicone sealants which may be incorporated in the work include, but are not limited to, the following:

   "Silpruf"; General Electric Co.
   "Dow Corning 795"
   "Omni Seal"; Sonneborn
   "Spectrum 2", Tremco, Inc.

C.  Joint Sealant Backing:

1.  General: Provide sealant backings of material and type which are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

2.  Plastic Foam Joint Fillers: Preformed, compressible, resilient, non-waxing, non-extruding strips of flexible, non-gassing plastic foam of material indicated below; non-absorbent to water and gas; and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

   a.  Foam Backer rod - SOF ROD - manufactured by Applied Extrusion Technologies, Inc. or approved equal.

3.  Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

D.  Miscellaneous Material:

1.  Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from pre-construction joint sealer-substrate tests and field tests.
2. Cleaners for Nonporous Surfaces: Provide nonstaining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials, which are harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.

3. Masking Tape: Provide nonstaining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.

III. EXECUTION

A. Examination:

1. Examine joints indicated to receive joint sealers, for compliance with requirements for joint configuration, installation to tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

B. Preparation:

1. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:

   a. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer, old joint sealers; oil, grease; waterproofing; water repellents; water; surface dirt; and frost.

   b. Clean concrete, masonry, and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

   c. Clean metal, glass, and other nonporous surfaces by chemical cleaners or other means which are not harmful to
substrates or leave residues capable of interfering with adhesion of joint sealers.

2. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

3. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

C. Installation of Joint Sealers:

1. General: Comply with joint sealer manufacturers; printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

2. Silicone Sealant Installation Standard: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications and conditions indicated.

3. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

   a. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.

      1) Do not leave gaps between ends of joint fillers.

      2) Do not stretch, twist, puncture, or tear joint fillers.

      3) Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.

   b. Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints where adhesion of
sealant to surfaces at back of joints would result in sealant failure.

c. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.

4. Installation of Sealants: Install sealants by proves techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

5. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

a. Provide concave joint configuration per Figure 6A in ASTM C 962, unless otherwise indicated.

D. Cleaning:

1. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

E. Protection:

1. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

END OF DIVISION
DIVISION 8 - DOORS AND WINDOWS

08110 METAL DOORS AND FRAMES

I. GENERAL:

A. All hollow metal doors and frames shall conform to NAAMM Standard HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames.

B. Frames: All metal door frames 16 ga. for interior openings (14 ga. for openings over 4’-0” in width) and 14 ga. for exterior openings. The frames are to be welded units unless knock-down frames are designated on the drawings with integral stop and trim where allowed by fire rating. Jamb anchors to be 16 ga. or 0.156” diameter wire for masonry walls and 18 ga. steel anchors welded inside jambs for studs partitions. Frames in masonry walls are to be grouted after installation of conduits, devices, etc. All door frames shall be caulked as required for a monolithic, finished look.

C. Metal Doors: Interior doors shall have 18 ga. face sheets and exterior doors shall be insulated and shall have 16 ga. face sheets. Minimum gauge of stiffeners to be 22. All vertical edges shall be continuous weld and the top and bottom edges are to be closed with 16 ga. continuous recessed channel, spot welded to face sheets. All glass moldings and stops to have fixed moldings welded to door on security side; loose stops, 20 ga. All louvers to have welded blade type construction.
08211 FLUSH WOOD AND PLASTIC DOORS
I. GENERAL:
   A. Swinging Wood Doors Shall be 1 3/4” thick solid core wood door with red oak veneer, plain sliced, factory finish. All doors at Hospital buildings to be rift cut.
   
   B. Wood Doors shall conform to N.F.P.A. 80, 252 ASTM E-152 and A.W.I. Section 1300.
   
   C. Swinging Plastic Doors shall be
       Commercial Door Systems F300 heavy duty wide style FRP fiberglass door.
08213  BIFOLDING DOORS AND BI-PARTING DOORS

I. PRODUCTS:
   A. Bifold Doors and Bi-Parting Doors: Shall be 1 3/4" thick solid core wood. Paint grade, unless noted otherwise.
08410 ALUMINUM ENTRANCES AND STOREFRONTS

I. GENERAL:
   A. Related Documents: Drawings and general provisions Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to this section.

   B. Summary: Extent of aluminum entrances and storefronts is indicated on Drawings and/or schedules.

   Aluminum entrance and storefront types required for this project include:
   - Exterior entrance doors.
   - Interior doors.
   - Storefront type framing system.

   Glazing: Refer to another Division-8 Section of this specification "Glass and Glazing" for glazing requirements for aluminum entrances and storefronts, including doors specified to be factory-preglazed.

   C. System Description:

      Performance Requirements: Provide aluminum entrance and storefront assemblies that comply with performance characteristics herein specified. Test each system by a recognized testing laboratory or agency in accordance with test methods indicated.

      Provide certified test results.

      Thermal Movement: Provide systems capable of withstanding thermal movements resulting from an ambient temperature range of 120 degrees F. (67 degrees C.), that could cause a metal surface temperature range of 180 degrees F. (100 degrees C.) within the framing system.

      Wind Loading: Provide assemblies capable of withstanding a uniform pressure of 20 pounds per square foot outward when tested in accordance with ASTM E 330.

      Fixed Framing Transmission Characteristics: Provide aluminum entrance and storefront framing system that complies with requirements indicated for transmission characteristics.

      Air Infiltration: Provide framing system with an air infiltration rate of not more than 0.06 cubic feet per minute per square foot of fixed area (excluding operable door edges) when tested in
accordance with ASTM E 283 at an inward test pressure differential of 6.24 pounds per square foot.

Water Penetration: Provide framing systems with no water penetration (excluding operable door edges) as defined in test method when tested in accordance with ASTM E 331 at an inward test pressure differential of 6.24 pounds-force per square foot.

Condensation Resistance: Provide entrance door units tested for thermal performance in accordance with AAMA 1502 showing a condensation resistance factor (CRF) of not less than 48.

Thermal Transmittance: Provide entrance doors that have an overall U-value of not more than 0.93 BTU per hour per square foot per degrees F. at 15 miles per hour exterior wind velocity when tested in accordance with AAMA 1503.

D. Submittals:

Product Data: Submit manufacturer's product specifications, technical product data, standard details, and installation recommendations for each type of entrance and storefront product indicated. Include the following information:

- Fabrication methods
- Finishing
- Hardware
- Accessories

Samples: Submit pairs of samples of each type and color of aluminum finish selected, on 12 inch square sheets. Where color or texture variations are anticipated, include 2 or more units in each set of samples indicating extreme limit of variations.

Shop Drawings: Submit shop drawings for fabrication and installation of entrances and storefronts, including the following:

- Elevations
- Detail sections of typical composite members
- Hardware, mounting heights
- Anchorages and reinforcements
- Expansion provisions
- Glazing details
Certification: Provide certified test results showing that entrance and storefront systems have been tested by a recognized testing laboratory or agency and comply with the performance characteristics herein specified.

E. Quality Assurance:

Manufacturer's Qualification: Provide certified test results showing that entrance and storefront systems have been tested by a recognized testing laboratory or agency and comply with the performance characteristics herein specified.

F. Project Conditions:

Field Measurements: Check openings by field measurement before fabrication to ensure proper fitting of work; show measurements on final shop drawings. Coordinate fabrication schedule with work of other trades to prevent delay to progress of Work. Where necessary, proceed with fabrication without field measurements, and coordinate fabrication tolerances with other building components to ensure proper fit.

G. Warranty:

Special Product Warranty: Submit a written warranty, executed by Contractor, Installer and Manufacturer, agreeing to repair or replace units (including reglazing) which fail in materials or workmanship within the specified warranty period. Failures include, but are not necessarily limited to, structural failures including excessive deflection, leakage or air infiltration, faulty operation, and deterioration of metals, metal finishes and other materials beyond normal weathering. This warranty is in addition to, and not a limitation of, other rights Owner may have against Contractor under terms of the Contract.

Warranty Period: for aluminum entrances and storefronts is 3 years after date of substantial completion.

II. PRODUCTS:

A. MANUFACTURERS

Manufacturer: Subject to compliance with requirements of this specifications, provide products by one of the following:

Kawneer Company, Inc.
Efco
Wausau
United States Aluminum Corp.
Almond Glass
B. MATERIALS

Aluminum Members: Provide alloy and temper recommended by Manufacturer for strength, corrosion resistance, and application of finish selected; comply with ASTM B 221 for extrusions and ASTM B 209 for sheet or plate material.

Fasteners: Provide fasteners of aluminum, nonmagnetic stainless steel, or other materials warranted by Manufacturer to be noncorrosive and compatible with aluminum components, hardware, anchors, and other components.

Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125 inch thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard noncorrosive pressed-in splined grommet nuts.

Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened.

Provide Phillips flat-head machine screws for exposed fasteners.

Concealed Flashing: Provide 26 gauge minimum dead-soft stainless steel, or 0.026 inch minimum extruded aluminum of alloy and type selected by Manufacturer for compatibility with other components.

Brackets and Reinforcements: Provide height-strength aluminum brackets and reinforcements, nonmagnetic stainless steel, or hot-dip galvanized steel complying with ASTM A 386.

Concrete/Masonry Inserts: provide concrete and masonry inserts fabricated from cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM, A386.

Compression Weather-stripping: Provide manufacturer's standard replaceable compressible weather-stripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.
Sliding Weather-stripping: Provide manufacturer's standard replaceable weather-stripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing, complying with AAMA 701.2.

Glass and Glazing Materials: Provide glass and glazing materials that comply with the requirements of another Division-8 Section of this specification "Glass and Glazing".

C. COMPONENTS

Storefront Framing System: Provide inside-outside matched resilient flush-glazed storefront framing system with provisions for glass replacement. Shop-fabricated and preassemble frame components to greatest extent possible.

Thermal-Break Construction: Fabricate storefront framing system with integrally concealed, low conductance thermal barrier, located between exterior materials and exposed interior members to eliminate direct metal-to-metal contact. Use manufacturer's standard construction that has been in use for similar projects for period of not less than 5 years.

Aluminum Door Frames: Fabricate tubular and channel frame assemblies with mechanical joints in accordance with manufacturer's standards; reinforce as necessary to support design loads indicated.

Stile-and-Rail Type Aluminum Doors:

- Frame: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or J-bolts.

- Design: Provide 1 3/4 inch thick doors, medium stile design (3 1/2 inch nominal width).

Glazing: Fabricate doors to facilitate replacement of glass, without disassembly of stiles and rails. Provide snap-on extruded aluminum glazing stops, with exterior stops anchored for non-removal.

D. HARDWARE

General: Refer to another Division-8 section of this specification "hardware" for requirements for hardware items other than those indicated to be provided by aluminum entrance manufacturer.
Provide Manufacturers: Heavy-duty hardware units as indicated, scheduled, or required for operation of each door, including the following items of sizes, number, and type recommended by Manufacturer for service anticipated; finish to match door.

Ball-Bearing Butts: Provide 5-knuckle, 2-bearings, steel ball bearing butts sized to comply with ANSI A156.1, Grade 1; provide 2 butts for doors 7 feet 6 inches or less, 3 for taller doors.

Offset Pivot Sets: Provide offset pivot assemblies complying with ANSI A156.4, Grade 1; provide exposed parts of cast aluminum alloy; provide an intermediate pivot for doors over 7 feet 6 inches high.

Surface-Mounted Overhead Closers: Provide modern-type, surface-mounted, overhead closers with cover for parallel-arm type mounting, complying with ANSI A156.4, Grade 1. Comply with manufacturer's recommendations for size of closer, depending on door size, exposure to weather and anticipated frequency of use. Include the following:

Hold-open arm
Delayed-action closing

Door Stop: Provide floor or wall mounted door stop with integral rubber bumper; comply with ANSI A156.16, Grade 1.

Keyed Cylinders: Provide mortise type, 5-pin tumbler, outside cylinder units with cast aluminum face; comply with ANSI A156.5, Grade 1.

Deadlocks: Provide mortise maximum security type deadlocks with minimum 1 inch long pivoted bolt and stainless steel strike box; comply with ANSI A156.5, Grade 1.

Lever Handles: Provide cast aluminum alloy inside lever handle units.

Panic Hardware: Provide concealed-rod type panic exit devices actuated by full-width crash bar; comply with UL 305.

Push-Pull Plates: Provide standard aluminum push-pull plates in style selected by Architect from Manufacturer's full range of options.

Thresholds: Provide extruded aluminum threshold of size and design indicated on final shop drawings, in mill finish
E. FABRICATION

General: Provide door and frame units of size and profile as indicated on final shop drawings. Show variable dimensions with maximum and minimum dimensions necessary to achieve indicated design and for coordination with work of other trades.

Prefabrication: Before shipment to project site, complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible. Disassemble components only as necessary for shipment and installation.

Preglaze door and frame units to greatest extent possible.

Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.

Welding: Comply with AWS recommendations; grind exposed welds smooth and restore mechanical finish.

Reinforcing: Install reinforcing for hardware. Install reinforcing necessary to meet indicated performance including sag resistance and rigidity.

Dissimilar Metals: Separate dissimilar metals with zinc chromate primer, bituminous paint, or other separator that will prevent corrosion or electrolytic action.

Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.

Uniformity of Finish: No integral color or texture variation between abutting extruded aluminum frame members greater than 1/2 the range indicated in sample submittal, as judged solely by Architect.

Fasteners: Use concealed fasteners.

Weather-stripping: For exterior doors, provide compression weather-stripping against fixed stops; at other edges, provide sliding weather-stripping retained in adjustable strip mortise into door edge.
At interior doors and other locations without weather-stripping, provide neoprene silencers on stops to prevent metal-to-metal contact.

Provide finger guards of collapsible neoprene or PVC gasketing securely anchored into frame at hinge-jamb of center-pivoted doors.

F. FINISHES

General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

Finish designations prefixed by "AA": Provide finishes which conform to requirements of system established by Aluminum Association for designating aluminum finishes.

Class I Color Anodized Finish: AA-M21C22A42/A44 (Mechanical Finish: as fabricated, nonspecular; Chemical Finish: etched, Medium Matte; Anodic Coating: Class I Architectural, film thicker than 0.7 mil with integral color or electrolytically deposited color) complying with AAMA 606.1 or AAMA 608.1.

Color: As selected by Architect from full range of color options.

III. EXECUTION

A. Installation:

Comply with manufacturer's instructions and recommendations for installation.

Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Provide support and anchor securely in place.

Separate aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials. Comply with requirements specified under paragraph "Dissimilar Materials" in the Appendix to AAMA 101-85.

Drill and tap frames and doors and apply surface-mounted hardware items. Comply with hardware manufacturer's instructions and drill and tap using templates. Use concealed fasteners to greatest extent possible.
Set sill members in bed of sealant, or with joint fillers or gaskets. Provide weathertight construction. Comply with requirements of a Division-7 section of this specification "Joint Sealers".

For installation requirements for glass and other panels indicated to be glazed into doors and framing, and not preglazed by manufacturer, refer to another Division-8 section of this specification "Glass and Glazing".

B. Adjusting

Adjust operating hardware to function for smooth, quiet, easy operation without binding, and for weather tight closure.

C. Cleaning

Clean completed system, inside and out, promptly after installation, exercising care to avoid damage to coatings.

Clean glass surfaces after installation, complying with requirements contained in "Glass and Glazing" section of this specification. Remove excess glazing and sealant compounds, dirt and other foreign substances.

D. Protection

Provide protective measures throughout remainder of construction period to ensure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at date of substantial completion.

IV. HANDICAPPED ACCESSIBILITY

A. All new building entrance doors will be equipped with automatic opening devices that can be accessed by a person in a wheelchair.
The purpose of this booklet is to support the Facility's building standards for door hardware. The Facility maintains the following hardware and is currently stocking replacement parts. The products listed in this booklet are to be used without substitution on new construction and modernization projects unless products are listed in this package as an alternate.

It is the intent of this booklet to provide guidelines for the architect's specification section 08710, for product groups and the hardware schedule. It remains the architect's responsibility to coordinate these products to meet the applicable building codes, life safety codes, and ADA requirements.

Section 08710 door hardware preamble must specify the following:

**Door and frame prep**

Before hardware installation, verify that all doors and frames are properly prepared to receive the specified hardware. Hollow metal frames shall be prepared for ANSI strike plates per A115.1-2 (4-7/8" high), hinge preps will be mortised and reinforced with a minimum of 10 gauge reinforcement material; minimum of 14 gauge reinforcement material for closer. Hollow metal doors shall be properly prepared and reinforced with a minimum of 16 gauge material for either mortised or cylindrical locks as specified. It is preferred that all hollow metal doors receiving door closers have 14 gauge reinforcement. If this is not possible, the use of sex bolts is mandatory. Wood doors shall be factory prepared to receive the scheduled hardware.

**Hardware installation**

The manufacturer's representative for the locking devices and closing devices must inspect and approve,
in writing, the installation of their products. Hardware installed incorrectly must be reported to the
architect prior to the architect’s final punch list.

### SPECIFICATION GUIDELINE

**Manufacturers and Products**

**Temple University**

Substitutions or Alternates not permitted unless noted below.

**Edit Date: July 2008 Revision #2**

**DOOR HARDWARE**

<table>
<thead>
<tr>
<th>Description</th>
<th>Manufacturer</th>
<th>Model / Series</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hanging Devices</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous Hinge</td>
<td>Select Products</td>
<td>SL-11HD (Exterior Aluminum and retrofit doors)</td>
</tr>
<tr>
<td>Alternate</td>
<td>Hager/Roton</td>
<td></td>
</tr>
<tr>
<td>Mortise Hinge</td>
<td>Stanley</td>
<td>FBB199 &amp; FBB191 x NRP (Exterior doors)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FBB168 &amp; FBB179 (Interior doors)</td>
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<tr>
<td></td>
<td></td>
<td>(Provide Security Torx Screws Where Required)</td>
</tr>
<tr>
<td>Alternate</td>
<td>Mc Kinney or Hager</td>
<td>Coordinate 626, 630, 652 Or 613 at time of specification</td>
</tr>
<tr>
<td><strong>Securing Devices</strong></td>
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<td></td>
</tr>
<tr>
<td>Lock Set</td>
<td>Best</td>
<td>Cylindrical 93K Series 15D Trim x Standard Keying</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Provide Lost Motion Feature At Main Campus Only)</td>
</tr>
<tr>
<td><strong>Cylindrical Lock Functions Room Type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AB Function On Entry Doors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D Function On Storage, Mechanical, Electrical &amp; Janitor Doors</td>
<td></td>
<td></td>
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<tr>
<td>R Function On Classroom Doors</td>
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<tr>
<td>L Function On Single Restroom Doors</td>
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<td></td>
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<tr>
<td>N Function On Passage Doors</td>
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<td></td>
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<tr>
<td>Note: Lock functions shall vary per project conditions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coordinate 626 Or 613 finish at time of specification</td>
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<td></td>
</tr>
<tr>
<td><strong>Electronic Locks</strong></td>
<td>Best</td>
<td>Cylindrical 93KW</td>
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<tr>
<td></td>
<td></td>
<td>Lock Functions as required</td>
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<tr>
<td><strong>Stand Alone Locksets</strong></td>
<td>Simplex</td>
<td>L1021B X 626 (Both Campuses)</td>
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<td>Alarm Lock DL2700 IC X 626 (Temp.Health Science Center)</td>
</tr>
<tr>
<td><strong>Hospital Latches</strong></td>
<td>Glynn Johnson</td>
<td>HL-6 (Temple Health Science Center)</td>
</tr>
<tr>
<td>Alternate</td>
<td>ABH</td>
<td>6100Series</td>
</tr>
<tr>
<td><strong>Bathroom Rescue Hardware</strong></td>
<td>Stanley</td>
<td>Door Pivots DAP-3</td>
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<tr>
<td></td>
<td></td>
<td>Emergency Door Stop ES-1</td>
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<tr>
<td></td>
<td></td>
<td>Holdback For ES-1 = HB-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Double Lip Strike DLS-2</td>
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</tbody>
</table>
SPECIFICATION GUIDELINE
Manufacturers and Products
Temple University
Substitutions or Alternates not permitted unless noted below.
Edit Date: July 2008 Revision #2
DOOR HARDWARE

<table>
<thead>
<tr>
<th>Description</th>
<th>Manufacturer</th>
<th>Model / Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetic Locks</td>
<td>Locknetics</td>
<td>Mag Force 390 Series with DSM and MBS options</td>
</tr>
<tr>
<td>Door Holders</td>
<td>ABH</td>
<td>2000 Series (Wall Mount)</td>
</tr>
<tr>
<td>Auxiliary Locks</td>
<td>Best</td>
<td>48H Functions as required</td>
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<tr>
<td></td>
<td></td>
<td>Best 83T Functions as required</td>
</tr>
<tr>
<td>Padlocks</td>
<td>Best</td>
<td>21B722</td>
</tr>
<tr>
<td>Cabinet /Drawer Locks</td>
<td>Best</td>
<td>5L Series</td>
</tr>
<tr>
<td>Cylinders</td>
<td>Best</td>
<td>1E74/1E72 Standard Keying as required</td>
</tr>
<tr>
<td>Key System</td>
<td>Best</td>
<td>Existing Removable/Interchangeable Core 7 pin</td>
</tr>
<tr>
<td>Electric Strikes</td>
<td>Von Duprin</td>
<td>6000 series, type and function as required, fail secure</td>
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<tr>
<td></td>
<td>Alternate</td>
<td>HES, Inc.</td>
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<tr>
<td></td>
<td></td>
<td>To be used where surface mounting is required</td>
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<tr>
<td></td>
<td></td>
<td>Coordinate 630 finish at time of specification</td>
</tr>
<tr>
<td>Exit Devices</td>
<td>Von Duprin</td>
<td>98NL x Trim (at single door, exterior)</td>
</tr>
<tr>
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<td>98EO X 98NL x Trim x KR4954 (at pairs, exterior)</td>
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<td></td>
<td>9827EO x 9827NLx Trim x LBR (at pairs, interior as requested)</td>
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<tr>
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<td>SNB with all devices</td>
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<tr>
<td></td>
<td></td>
<td>992LTrim (Where Required)</td>
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<tr>
<td></td>
<td></td>
<td>CD (cylinder dogging) on doors used for entry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Add –F on Firerated Doors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EL required on auto operator doors or where “dummy” trim is used, E trim shall be used elsewhere</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS873 Power Supply as required</td>
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<td></td>
<td></td>
<td>Coordinate 630, 626, 613 finish at time of specification</td>
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<tr>
<td></td>
<td>Alternate</td>
<td>Detex Advantex 10 Series @ (Temple Health Science Center Only)</td>
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<td>Delay Egress - Chexit</td>
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Coordinate 630, 626, 613 finish at time of specification
## DOOR HARDWARE

### Description

<table>
<thead>
<tr>
<th>Description</th>
<th>Manufacturer</th>
<th>Model / Series</th>
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<tbody>
<tr>
<td><strong>Closing Devices</strong></td>
<td></td>
<td></td>
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<tr>
<td>Surface Closers</td>
<td>LCN</td>
<td>4041 SCUSH or EDA—(Exterior Outswinging)</td>
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<td></td>
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<td>4041-EDA on interior out swing hard traffic openings.</td>
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<td></td>
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<td>4041-on interior in swing hard traffic openings</td>
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<tr>
<td></td>
<td></td>
<td>• All door frames to be reinforced</td>
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<td></td>
<td></td>
<td>SNB with all devices</td>
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<tr>
<td></td>
<td></td>
<td>Coordinate 689, 690, 691 finishes at time of specification</td>
</tr>
<tr>
<td>Hold-Open Closers</td>
<td>LCN</td>
<td>4040SE Power Track Series</td>
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<tr>
<td>/Detectors</td>
<td></td>
<td>Coordinate 689, 690, 691 finishes at time of specification</td>
</tr>
<tr>
<td><strong>Automatic Flush Bolts</strong></td>
<td>Ives</td>
<td>FB31(Automatic) (metal doors)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FB41(Automatic) (wood doors)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternate Rockwood 1842 (Automatic) (metal doors)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1962 (Automatic) (Wood Doors)</td>
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<tr>
<td><strong>Manual Flush Bolts</strong></td>
<td>Ives</td>
<td>FB458 (Manual) (metal door)</td>
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<tr>
<td></td>
<td></td>
<td>FB358 (Manual) (wood door-rated)</td>
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<td></td>
<td>Alternate</td>
<td>Rockwood 555 (Manual) (metal doors)</td>
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<tr>
<td></td>
<td></td>
<td>557 (Manual) (wood doors)</td>
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<tr>
<td><strong>Coordinators</strong></td>
<td>Ives</td>
<td>Cor 32 Series</td>
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<tr>
<td></td>
<td>Alternate</td>
<td>Rockwood 1600 Series</td>
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<tr>
<td></td>
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<td>Coordinate 626 finish at time of specification</td>
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<tr>
<td><strong>Auto Operators</strong></td>
<td>Stanley</td>
<td>Magic Force (Health Science Center)</td>
</tr>
<tr>
<td></td>
<td>Horton</td>
<td>4100LE (Main Campus)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Both devices shall have an electronic lock kit</td>
</tr>
<tr>
<td><strong>Stops &amp; Holders</strong></td>
<td></td>
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<tr>
<td>Door Stops</td>
<td>Rockwood</td>
<td>410 Series Wall Stops (Interior)</td>
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<tr>
<td></td>
<td></td>
<td>440/441CU Series (floor stops)</td>
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<td></td>
<td></td>
<td>480/463 Series (exterior)</td>
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<td></td>
<td>491/494 Series Door Holders</td>
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<tr>
<td></td>
<td>Alternate</td>
<td>Trimco 1270 Series Wall Stops (Interior)</td>
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<tr>
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<td></td>
<td>1211/1212 Series (floor stops)</td>
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<tr>
<td></td>
<td></td>
<td>1214/1209 Series (exterior)</td>
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<tr>
<td></td>
<td></td>
<td>1260 Series Door Holders</td>
</tr>
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<td></td>
<td></td>
<td>Coordinate 612, 626 finish at time of specification</td>
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</tbody>
</table>
## DOOR HARDWARE

### Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Manufacturer</th>
<th>Model / Series</th>
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</thead>
<tbody>
<tr>
<td>Overhead Stops</td>
<td>Glynn Johnson</td>
<td>455H X 652</td>
</tr>
<tr>
<td>Accessories</td>
<td>Rockwood</td>
<td>70C x 111 - 70C 4x 16 (CFC where required)</td>
</tr>
<tr>
<td>Push / Pull Plate</td>
<td>Trimco</td>
<td>1001-3 -1014-3 4 x 16 (CFC where required)</td>
</tr>
<tr>
<td>Kick Plate</td>
<td>Rockwood</td>
<td>K1050 10&quot; x 1 ½&quot; LDW x .050 x CSK (Single doors)</td>
</tr>
<tr>
<td>Alternate</td>
<td>Hager</td>
<td>194S 10&quot; x 1 ½&quot; LDW x .050 x CSK (Single doors)</td>
</tr>
<tr>
<td>Alternate</td>
<td>Trimco</td>
<td>KO050 10&quot; x 1 ½&quot; LDW x .050 x CSK (Single doors)</td>
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<tr>
<td>Mop Plate</td>
<td>Rockwood</td>
<td>K1050 4&quot; x 1 ½&quot; LDW x .050 x CSK (Single doors)</td>
</tr>
<tr>
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<td>Hager</td>
<td>194S 4&quot; x 1 ½&quot; LDW x .050 x CSK (Single doors)</td>
</tr>
<tr>
<td>Alternate</td>
<td>Trimco</td>
<td>KM050 4&quot; x 1 ½&quot; LDW x .050 x CSK (Single doors)</td>
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<td>Armor Plate</td>
<td>Rockwood</td>
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<td>194S 32&quot; x 1 ½&quot; LDW x .050 x CSK (Single doors)</td>
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<td>Alternate</td>
<td>Trimco</td>
<td>KA050 32&quot; x 1 ½&quot; LDW x .050 x CSK (Single doors)</td>
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<tr>
<td>Thresholds</td>
<td>National Guard</td>
<td>425 (1/2&quot; x 5&quot; Saddle threshold)</td>
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<tr>
<td>Alternate</td>
<td>Pemko</td>
<td>154A (1/2&quot; x 5&quot; Saddle threshold)</td>
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<td>Alternate</td>
<td>Reese</td>
<td>A205A (1/2&quot; x 5&quot; Saddle threshold)</td>
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<tr>
<td>Alternate</td>
<td>Hager</td>
<td>412S (1/2&quot; x 5&quot; Saddle threshold)</td>
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</tbody>
</table>

Substitutions or Alternates not permitted unless noted below.

Edit Date: July 2008 Revision #2
## SPECIFICATION GUIDELINE
### Manufacturers and Products
#### Temple University
Substitutions or Alternates not permitted unless noted below.

**Edit Date: July 2008 Revision #2**

**DOOR HARDWARE**

<table>
<thead>
<tr>
<th>Description</th>
<th>Manufacturer</th>
<th>Model / Series</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weather Seal</strong></td>
<td>National Guard</td>
<td>5050B x 9800C Pressure Sensitive Mounting (also used at exterior retrofit doors)</td>
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<td>Alternate</td>
<td>Pemko</td>
<td>S88D x HS1000 Pressure Sensitive Mounting (also used at exterior retrofit doors)</td>
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<td>Alternate</td>
<td>Reese</td>
<td>797B x 588D Pressure Sensitive Mounting (also used at exterior retrofit doors)</td>
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<td>Hager</td>
<td>726S x 729 Pressure Sensitive Mounting (also used at exterior retrofit doors)</td>
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<tr>
<td>Alternate</td>
<td>National Guard</td>
<td>A626A (at head and jambs – surface mount)</td>
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<td></td>
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<td>D601A (at sill on door – surface mount)</td>
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<tr>
<td></td>
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<td>Alternate Pemko 4041CP (at head and jambs – surface mount)</td>
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<td>18100CP (at sill on door – surface mount)</td>
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<tr>
<td>Alternate</td>
<td>Reese</td>
<td>958A (at head and jambs – surface mount)</td>
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<td>Hager</td>
<td>800S (at head and jambs – surface mount)</td>
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<td>802S (at sill on door – surface mount)</td>
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<tr>
<td><strong>Astragal</strong></td>
<td>National Guard</td>
<td>158NA x 9800C (Wood doors) (If required by fire code)</td>
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<td>Alternate</td>
<td>Pemko</td>
<td>355CS x HS1000 (Wood doors) (If required by fire code)</td>
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<td></td>
<td>• Astragal by door manufacturer at HM door.</td>
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<tr>
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<td>Reese</td>
<td>276C x 588D (Wood Doors) (If required by fire code)</td>
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<td>• Astragal by door manufacturer at HM door.</td>
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<tr>
<td>Alternate</td>
<td>Hager</td>
<td>837S x 729 (Wood Doors) (Where required by fire code)</td>
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<tr>
<td></td>
<td></td>
<td>• Astragal by door manufacturer at HM door.</td>
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<td><strong>Sound Seal</strong></td>
<td>National Guard</td>
<td>130NA (at head and jambs)</td>
</tr>
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<td>Alternate</td>
<td>Pemko</td>
<td>225N (at sill on door – mortise)</td>
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<td></td>
<td>315CR (at head and jambs)</td>
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<td>Reese</td>
<td>411ASL (at sill on door – mortise)</td>
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<td>DS78A (at head and jambs)</td>
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<td>Hager</td>
<td>370A (at sill on door – mortise)</td>
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<td>875S (at head and jambs)</td>
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<td>730S (at sill on door – mortise)</td>
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<td><strong>Drip Cap</strong></td>
<td>National Guard</td>
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<td>46C (4” wider than door width)</td>
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<td>Reese</td>
<td>R201A (4” wider than door width)</td>
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<td>Alternate</td>
<td>Hager</td>
<td>810S (4” wider than door width)</td>
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<tr>
<td></td>
<td></td>
<td>Coordinate finishes at time of specification</td>
</tr>
</tbody>
</table>

END OF DIVISION
08800 GLAZING

I. PRODUCTS:
   A. Glass: shall be 1/4” clear, tempered glass, unless noted and 1/4” wire glass where required by code.
   B. Mirror: To be 1/4” float glass electrolytically copper-plated.

END OF DIVISION
DIVISION 9 - FINISHES

09250 GYPSUM DRYWALL

I. PRODUCTS:

A. Abuse – Resistant Gypsum Fiber Panel: 5/8” thick, tapered edge, **Fiberock Brand Panels** – Abuse-Resistant, as manufactured by USG Corporation shall be used in ALL AREAS TO A HEIGHT OF 8 FEET A.F.F. in which GWB is the construction method being utilized. Install on 3 5/8”, 20 GA. Metal studs at 24” o.c.

B. Fire Rated Drywall Partitions: To consist of metal studs and 5/8” thick type "x" drywall on each face. One hour rated partitions - UL Des. No. U465. Two hour rated partitions - UL Des. No. U412. Three hour rated partitions - UL Des. No. U435 with 3 5/8” metal studs to be used in areas above 8 feet A.F.F.

C. Sound Proof Partitions: To have 2 ½” thermafiber insulation - STC rating 48. Soundproof partitions shall extend slab-to-slab including drywall on one face. Insulate partitions where indicated on the drawings.

D. Water Resistant Drywall Partitions: All toilets rooms, janitors closets and other areas subject to water or moisture to receive water resistant drywall.

E. Drywall Partitions with Ceramic Tile: All vertical surfaces to receive ceramic tile to be Duro-Rock.

II. EXECUTION:

A. Layout: The General Contractor shall lay out entire space by means of chalklines on floor and review with Temple University Facilities Management prior to construction of partitions.

B. All Drywall Partitions: To be finished with metal corner beads, edging, etc. and be taped, compounded, sanded and ready to receive paint or wall covering or millwork. No exposed vinyl edging or other exposed trim to be used. Provide Gypsum wallboard complying with federal specifications SS-L-30D in 48” widths and in such lengths as will result in a minimum of joints. Provide three coats of joint compound cement along with reinforcing tape. Stud spacing shall be 16” O.C. All partitions to have steel studs and tracks 25g. minimum. All door frame openings to be 20 gauge, double studded, minimum. Mid height bracing and cross
bracing as per manufacturers recommendations or unless otherwise as directed by Temple University.

C. Close Tolerances: Special attention should be given to drywall work which must be provided to close tolerances to receive mirrors, fabric, millwork or other specially applied finishes.

D. Anchoring: All partitions shall be anchored firmly as per manufacturer's specifications and/or Building Code Requirements, whichever is more stringent.

E. Blocking: The Contractor shall provide sufficient fire retardant framing or blocking for all wall openings for mechanical or architectural elements, including shelving, side lights, doors, toilet accessories etc. located in or on walls. All low partitions to have continuous fire retardant wood blocking along tops and vertical exposed ends.

F. Shaft Walls and/or Masonry Walls: Shall be furred-out to permit outlets where shown and in order to maintain the required fire ratings.

G. Spackling is to be broadknifed a minimum of 12” back from corners and both inside and outside corners are to be full dimension and square as checked with a carpenter's square.

H. Walls are to be plumb, square and flat to within the tolerance provided by the architect. Quality and controls are to be specified and tolerances are to be established for plumb on door frames, gap reveals on installed doors, ceiling grid trueness, quality of repair appearance, tooling of block joints, preciseness of cutouts in walls for electrical devices, etc.
09300  CERAMIC TILE

I.  PRODUCTS:
   A. Wall: Dal-Tile 4 1/4" x 4 1/4".
   B. Floor: Dal-Tile 2" x 2" mosaic.
   C. Base: Provide matching ceramic tile cove base.
   D. Grout: Dal-Tile Dry Wall Grout, ANSI A118.6 in color to match tile.

II. EXECUTION:
   A. Ceramic Tile: Shall be installed by thinset method in accordance with tile manufacturer recommendations or the Tile Council of America, whichever is most stringent.
I. PRODUCTS:
   A. Ceiling Tile and Grid: To be Armstrong 769A, 2x4, Color: White and Armstrong Second Look II, 2767B as an upgrade. Grid to be Armstrong Mainrunner. #83000 - WH FC, 2' cross T's, #8324 - WH FC, 4' cross T's #8340 - WH FC.

II. EXECUTION:
   A. Location of suspended ceiling grid per field measurements made by the construction superintendent.
   B. Fire protection sprinkler heads to be located in the center of ceiling tiles.
   C. Coordinate light fixture locations with electrical, mechanical, sprinklers, etc.
I. GENERAL:

II. PRODUCTS:

A. Vinyl Composition Tile: To be Armstrong Excelon, (Classic White 51911) 12" x 12" x 1/8" thick. Tile to be laid in a "monolithic" pattern unless otherwise specified on drawings. The Children’s Hospital shall use Armstrong Excelon Supreme, Carnival White, 52500 for HSC pediatrics only.

B. Sheet Vinyl Flooring: Shall be finished with "Mipolam" seamless vinyl flooring (with welded seams). Installed in accordance with manufacturer's recommendations. Color(s) shall be selected by Temple University from the manufacturer's full line of available colors, which the contractor shall submit for selection, prior to installation of finish floor, the contractor shall fill all holes, depressions, etc. and install latex underlayment as required to provide a smooth substrate for the vinyl flooring. All sheet vinyl areas to have rolled 4" base of Mipolam with welded seams.

C. Contractor to provide final stripping and refinishing of newly installed and existing (to remain) resilient flooring in accordance with the following:

1. Dust mop to remove all gum and loose dirt.
2. Apply generous amount of chemical stripping solution. Use Believe Stripper manufactured by Cantol.
3. Allow solution to set 5 minutes (keep wet).
4. Agitate stripping solution on floor using a low speed buffer and a black stripping pad.
5. Pickup stripper solution and residue with wet vac.
6. Wipe and remove all splashes from doors and baseboards.
7. Rinse floor 2 times. (Use a neutralizer solution for the second rinse)
8. Allow floor to air dry totally.
9. Apply 1 thin coat of floor sealer and allow to dry. Do not splash sealer on baseboards, walls or doors. Use Pre-Seal manufactured by Cantol.
10. Apply a second thin coat of sealer and allow to dry. Use Pre-Seal manufactured by Cantol.

11. Apply 1 thin coat of finish wall to wall. Do not get finish on baseboards, walls or doors. Use Acrymet "Plus" manufactured by Cantol.

12. Apply a second thin coat of finish staying one foot out from the walls.
I. PRODUCTS:
   A. Wall Base: All floor base to be 4” high x 1/8” thick rubber cove base, Johnsonite in 40 black, 42 sable and 48 grey.
   B. Stair Tread: All stair heads and landings to be by Roppe or Johnstonite color by Architect.
   C. Mouldings: all mouldings (joining, cove supports, transitional, edge finish, mat edging and thresholds) to be by Roppe or Johnsonite.

II. EXECUTION:
   A. Floor Preparation: Prepare concrete floor to insure first quality sheet vinyl and tile installation by means of grinding, chopping or flash patching or latex underlayment if required by conditions. Min. deviance 1/8” in 10’.
   B. Provide Temporary Protection: Of flooring between time of installation to move-in by means of heavy gage sheet plastic or other acceptable means.
CARPETING

I. PRODUCTS:
   A. All carpet to be by Lees Commercial Carpets; Style: Faculty IV; Pattern: DK166; Pil: Antron Legacy BCF Nylon by Dupont/Duracolor by Lees.
      Color: 4127, Blue Note
      Color: 4138, Starlight
      Color: 4344, Prairie

II. EXECUTION:
   A. Floor Preparations: Prepare concrete floor to insure first quality carpet installation by means of grinding, chopping or flash patching or latex underlayment.
   B. Carpet Installation: To be in accordance with manufacturer's recommendations. Carpet shall be finished with Temple University standard carpet unless otherwise indicated.
   C. Provide Temporary Protection: Of flooring between time of installation to move-in by means of heavy gage sheet plastic or other acceptable means.
   D. Seaming Plans: To be submitted for all installations involving more than one piece or for any installation with a butt seam or joint and the seaming method and material is to be listed. Flash patching is to be included, using Levelastic, to produce a substrate acceptable to the carpet Manufacturer and Temple University. Carpet adhesive is to be Healthtec Adhesives, #74, Mid-Grade, Multi-Purpose, Odorless or approved equivalent. All carpet is to be rolled and steamed after installation.
   E. Epoxy Adhesives: May only be specified or used after written approval of Temple University. If epoxy use is approved then the application must be performed during low or no use times in the building, which will customarily be weekends or late night.
I. GENERAL:
A. Painting: All paint shall be applied as recommended by the paint manufacturer for specific surfaces. Provide the following paint system for the various substrates indicated. If required, paint draw downs are to be 8 1/2" x 11".

B. Coordination: Painting Contractor to paint all non shop-finished millwork which requires painting. (e.g. closet shelving). All millwork to be back primed.

C. All Hollow Metal Door Frames: To be painted to match adjacent walls unless noted otherwise.

D. Touch-Up: Following tenant move-in, Contractor to provide touch-up painting as required by Temple University.

E. Provide Temporary Protection: Of flooring between time of installation to move-in by means of heavy gage sheet plastic or other means acceptable to Temple University.

F. The specification is to include the contractors' responsibility to accurately record precisely which color and number was used for each surface and to be submitted as "As Built" at completion.

G. All drywall and spackling, or repairs to them, are to be coated with flat primer first before applying finish coats.

H. Each coat of paint to be tinted slightly different than previous coats of paint.

I. All paint to be Finnaren & Haley or MAB selected from the University Standard paint colors. MAB equivalent products are acceptable in the following specifications.

II. EXECUTION:
A. Coating System for: Walls/Ceilings - Interior - Low luster - Water

Location: Drywall/Plaster Partitions

F & H Paint DFT

First Coat:
715100 F&H TCD Latex Primer 1.5 mils

Second Coat:
552000 F&H Odor Free Low Luster 1.5 mils

Third Coat:
552000 F&H Odor Free Low Luster 1.5 mils.
Total Minimum Dry Film Thickness 4.5 mils

B. Coating System for: Drywall/Plaster - Walls/Ceilings - Interior - Satin - Water

Location: Drywall/Plaster Soffits, Ceilings, Paint Grade Doors

F & H Paint

First Coat:
715100 F&H TCD Latex Primer 1.5 mils

Second Coat:
542000 F&H Odor Free Satin Latex 1.5 mils

Third Coat:
542000 F&H Odor Free Satin Latex 1.5 mils

Total Minimum Dry Film Thickness 4.5 mils

C. Coating System for: Drywall/Plaster - Walls/Ceilings - Interior - Gloss - Water

Location: Epoxy Paint Drywall Partitions

F & H Paint

First Coat:
715100 F&H TCD Latex Primer 1.5 mils

Second Coat:
618000 F&H Water Base Epoxy
Gloss Enamel 1.5 mils

Third Coat:
618000 F&H Water Base Epoxy
Gloss Enamel 1.5 mils

Total Minimum Dry Film Thickness 4.5 mils

Coating System For: CMU'S - Interior - Gloss - Water
Location: Epoxy Paint - CMU Partitions

F & H Paint

First Coat:
    751100 F&H Spray/Roll Ready Mixed Latex Block Filler 10.0 mils

Second Coat:
    618000 F&H Water Base Epoxy Gloss Enamel 1.5 mils

Third Coat:
    618000 F&H Water Base Epoxy Gloss Enamel 1.5 mils

Total Minimum Dry Film Thickness 13.0 mils

E. Coating System For: Metal - Non-Ferrous - Interior - Low Luster - Paint Thinner

Location: Hollow Metal Doors, Frames, Miscellaneous Metals

F & H Paint

First Coat:
    878100 F&H High Solids White Alkyd Primer 1.5 mils

Second Coat:
    530000 F&H Satin Semi Gloss Enamel 1.5 mils

Third Coat:
    530000 F&H Satin Semi Gloss Enamel 1.5 mils

Total Minimum Dry Film Thickness 4.5 mils.

F. Coating System For: Doors - Interior - Satin - Solvent

Location: Natural

F & H Paint
First Coat:
  762009 F&H Alkyd Custom Wood Stain/Min. Wax Wood Stain 0.0 mils

Second Coat:
  760999 F&H Quick Dry Sanding Sealer 1.5 mils

Third Coat:
  731999 F&H Polyurethane Clear Satin Finish 1.5 mils

Fourth Coat:
  731999 F&H Polyurethane Clear Satin Finish 1.5 mils

Total Minimum Dry Film Thickness 4.5 mils

G. Coating System For: Drywall - Walls/Ceilings - Interior - Flat - Water
Location: Dark Room Partitions Color Black

F & H Paint DFT

First Coat:
  728100 F&H Masterprime 1.5 mils

Second Coat:
  650000 F&H Stormplate 30 Acrylic House Paint 1.5 mils

Third Coat:
  650000 F&H Stormplate 30 Acrylic House Paint 1.5 mils

Total Minimum Dry Film Thickness 4.5 mils

H. Coating System for: Metal – Ferrous – Exterior – High Gloss
Paint Thinner Location:

F & H Paint DFT

First Coat:
  878100 F&H High Solids White Primer 1.5 mils
Second Coat:
85200 F&H Machine & Deck Polyurethane
High Gloss Enamel 1.5 mils

Third Coat:
852000 F&H Machine & Deck Polyurethane
High Gloss Enamel 1.5 mils

Total Minimum Dry Film Thickness: 4.5 mils

III. PRODUCTS:

A. All paint is to be by Finnaren & Haley, Inc. in one of the following colors or in MAB equivalent manufacturers paint colors as selected by Temple University Facilities Management.
   Arizona White
   Temple Bone
   Polar White
   8691W
   8771 W
   8783 M
   8681 W
   8682 W
   8172 W
   8684 W
   Tawney Beige
   Blue Whisper
   8501 W
   8474 M

Note: Black or Bottle Green used for metal picket fencing.

Alternate System For Letter C. Drywall/ Plaster - Walls / Ceilings
Interior – Gloss – Water

F & H Paint DFT

First Coat:
715100 F & H T.C.D. Latex Primer 1.5 mils

Second Coat:
675000 F & H Acrylic Polyurethane 1.5 mils

Third Coat:
675000 F & H Acrylic Polyurethane 1.5 mils
Total Minimum Dry Film Thickness 4.5 mils

Where staining problems are evident the areas should be primed with F & H 719162 Low Odor Stain Block.

Substitute System for Multi Spec, Zolatone Type products:

F & H 271500 New Wave Deco – Fleck Multicolored Finish
F & H 270500 New Wave Low Odor Clear Flat Finish
09950 WALL COVERING

I. EXECUTION:
   A. Wallcovering: Use adhesives, prepare walls and install in accordance with wallcovering manufacturer's instructions. Remove wall plates prior to installation and replace at completion. Trim salvage as required to assure color uniformity and pattern match; overlap seams and double cut for tight closures. All fabrics for wall application to be Class A flame spread ASTM E-84, treated with Scotchguard and acrylic or paper backed as recommended by the manufacturer. Provide wallcovering as specified. All vinyl wall covering shall have Tedlar coating.

II. PRODUCT:
   A. Wallcovering: All wallcovering to be ESSEX Muratone /w Tedlar, pattern series and color to be chosen by the Architect from the following:

   Aqua 8451-81
   Marble Dust 8451-04
   Lodestone 8421-54

   Note: All items must be approved by Temple University Office of Facilities Management prior to specifying.

   All gypsum wall board to be primed prior to applying wall covering.

   All wall covering to use stripable adhesive.
09960 PERFORMANCE COATINGS

I. PRODUCT:
   A. Graffiti Barrier Coating: To be chemique CPU-647 two component polyurethene graffiti barrier coating. Color: Clear

II. EXECUTION:
   A. Preparation: Test patch before general use to determine compatibility yield and surface appearance before application. Thoroughly clean and rinse surface with appropriate safe N’ easy product. Apply coating as recommended by the manufacturer for specific surfaces.
   
   B. Application: To be minimum of two coats. Re-coat time is 8-24 hours apply at 400-450 sq.ft./gallon.
   
   C. Graffiti Removal: Once coating is in place graffiti can be removed using dumond graffiti remover.

END OF DIVISION
DIVISION 10 - SPECIALTIES

10100  VISUAL DISPLAY BOARDS

I.  PRODUCTS:
   A.  Chalkboard:  To be Claridge Chalkboard Company "Vitrasteel" Porcelain Enameled Steel Chalkboard, with 26 ga. facing sheet, 7/16" industrial board cove material and .001" moisture retardant backer.  Color to be black.

   B.  Dry-Markerboard:  To be Claridge Chalkboard Company Vitrasteel Dry-Markerboard, with 26 ga. facing sheet, 7/16" industrial board cove material and .001" moisture retardant backer.  Color to be #32, white.


   D.  Frames:  Chalkboards and Dry-Markerboards to have Aluminum Frames, Series compatible with Claridge 200 with continuous chalktray and cork tackstrip at top.  Tackboard frames to be red oak, lacquer finish, hardwood frames.  Sizes to be as indicated on drawings.
I. GENERAL:

A. All toilet partitions to be ceiling hung with non-corrosive doors. Panels and pilasters of Poly-mor HD, Poly-marble HD, or Poly-granite HD compartments as manufactured by Santana Products, Inc. Scranton, Pa. with hardware as specified herein.

B. Doors and Panels: To be finished to 1" thick and all edges machined to a radius of .250” and all exposed surfaces to be free of saw marks. Dividing panels and doors shall be 55” high and mounted at 14” above finished floor. Pilasters shall extend from the finished ceiling to a point 14” above the finished floor (max. length not to exceed 9'-0”) Aluminum edging strips to be fastened to the bottom edge of all doors and panels using vandal proof stainless steel fastners.

C. Finish: Panels, doors and pilasters shall be fabricated from high density polyethylene containing a minimum of 10% recycled material manufactured under high pressure forming a single component section which is waterproof, non-absorbent and has a self lubricating surface that resists marking with pens, pencils or other writing utensils. Color and compartment finish type selected by architect.

D. The toilet partition manufacturer is responsible for the mounting of recessed accessories.

E. Hardware:

1. All doors to have no-sight integral hinge and strike system (CHTP-404) with ADA approved latch with emergency accessibility. Pilaster to be machined to accept door and hinge mechanism. Hinge mechanism consists of a 2 piece 1/2” diameter nylon pin with “Cam Action” and a 3/16” stainless steel pin inserted into lower portion of pilaster and door. A one-piece 1/2” diameter, 4” long nylon pin to be inserted into the top portion of the pilaster and door. Door closures to be factory set to accommodate all conditions and allow for a positive opening and closing action free of impediment.
   a. Each handicapped door to include: (1) door pull(1) wall stop.
   b. Door strike and keeper shall be fabricated from heavy aluminum extrusion (6463-T5 Alloy) with bright-dipped anodized finish with wrap around flange surface mounted and thru-bolted to pilaster with star-head security pin, stainless steel barrel bolts. Size of strike shall be 6” in length.
c. Door latch housing shall be fabricated from heavy aluminum extrusion (6463-T5 Alloy) with bright-dipped anodized finish, surface mounted and thru-bolted to door with star-head security pin, stainless steel barrel bolts. Slide bolt and button shall be heavy aluminum with “Tuff-Coat Black” anodized finish.

2. Ceiling attachment of pilaster shall consist of a 5/8” aluminum plate welded to a continuous aluminum wall bracket and attached to ceiling beam by way of two 3/8” “Tap Bolts”. Pilasters to be thru-bolted to ceiling hung aluminum wall bracket using star-head security pin, stainless steel barrel bolts. Aluminum attachment plate at ceiling to be covered using a 9” high 20 gauge stainless steel shoe fastened with #14 x 7/4” star-head security pin, stainless steel screws.

3. Full length continuous wall brackets shall be aluminum(6463-T5 Alloy) weighing not less than 1.5 lbs per linear foot. Brackets shall be used for all panels to pilaster, pilasters to wall and panel to wall connection. Wall brackets shall be thru bolted to panels and pilasters with star-head security pin, stainless steel barrel bolts. Attachment of brackets to adjacent wall construction shall be accomplished by #14 x 1-1/2” star-head security pin, stainless steel screws anchored directly behind the vertical edge of panels and pilasters at 13” intervals along the full length of bracket and at each 13” interval alternately spaced between anchor connections.

4. Cross bracing shall be 6” high and fabricated from high density polyethylene (HDPE) mounted horizontally directly below ceiling shoes to pilaster fronts using #14 x 1-1/2” star-head security pin, stainless steel screws.

5. Each compartment to be complete with all hardware, door hinges, latch, stop and keeper, coat hook, as well as necessary fittings and fastenings for a complete installation.

F. Existing Partitions: When modifying or adding to existing partitions match the style, size, material and color of the existing.

G. Coordinate with General Contractor location of beam support above ceiling as required. Coordinate with General Contractor location of all required reinforcing.
10260 WALL AND CORNERGUARDS

I. GENERAL
   A. Submittals
      1. Product data and specifications for each system component and installation method for corners at gypsum drywall.
      2. Shop drawings showing location and installation detail including method of attachment to adjoining construction.
      3. Samples for verification of color and end cap attachment/alignment.
      4. Maintenance data for inclusion in the operating and maintenance manuals.

   B. Environmental Requirements
      1. Installation areas must be enclosed and weatherproof before installation commences. Maintain ambient temperature above 65°F during and for 24 hours after installation.

   C. Location
      1. At all drywall outside corners.

II. PRODUCTS:
   A. Manufacturers
      1. 1 ½” x 1 ½ x 60” by Koroguard, Series G815, color to match wall color.

III. SURFACE PREPARATION:
   A. Prior to installation, clean substrate to remove dirt, debris and loose particles. Perform additional preparation procedures as required by manufacturer instructions.

IV. INSTALLATION:
   A. Install corner guards in strict accordance with manufacturer recommendations. Locating all components firmly into position level and plumb.
V. CLEANING:
   A. General

   1. Immediately upon completion of installation clean corner guards in accordance with manufacturer recommended cleaning method.
1. GENERAL:
   A. All signage in accordance with Temple University signage Specifications.
   B. There are items of signage and direction used on campus that are to be duplicated, and they are:
      1. The logo Temple "T" has very specific proportions and color and there is a Temple University graphics standards book available from Temple University Planning and Design. The proportions are not to be estimated.
      2. Informational, directional or room signage is to be consistent with Temple University signage. Temple will furnish the wording, names and numbers, which may differ from architectural drawings or present usage.
      3. Room numbers and room identifications are to be co-ordinated with the University before being assigned to drawings.

All signage must be approved by Temple University Office of Facilities Management, Planning and Design prior to specifying.
10522 FIRE EXTINGUISHERS, CABINETS AND ACCESSORIES

I. PRODUCTS:
   A. Fire Extinguishers/Cabinets: Provide and install one Class A fire extinguisher per 2500 square feet of tenant area as follows: Cosmic 5E extinguisher with semi-recessed stainless steel cabinet manufactured by Larson, Model #Cameo Series (Five-FX option in rated walls). Recess to be maximum allowed by wall rating and wall thickness. ADAC option with clear glass door. Provide One Class A fire extinguisher at each kitchenette area (included in total requirement).
10605 WIRE MESH SECURITY GRILLS

I. GENERAL:
   A. The design of the security grill should take into consideration the operation and cleaning of the windows.
   B. There shall be no gaps either between frames or at the ends of units larger than 1 ½”.
   C. Frames: All frames to consist of 10 gauge steel wire woven into 1 ½” diamond mesh, securely clinches to 1” x ½” cold rolled “C” section channels.
   D. Angles: All frames to be welded to ¼” steel angles and bolted to masonry with ½” diameter anchor bolts with tamper proof heads. The lets of the angles should be appropriate for the configuration of the opening.
   E. Finish: As specified on Drawings.
   F. Hardware, hinges
I. PRODUCTS:

A. Product: Shall be Soundmaster Model SM 8 as manufactured by Modernfold and furnished and installed by an authorized Modernfold distributor.

B. Operation: Shall be manual top supported.

C. Frame Construction: Shall consist of steel hinge plates welded to 187" (5) diameter vertical steel rods. Single row at bottom, intermediate rows approximately 42" (1067) on center, single row at top (over 10'-0" (3048) high, double-truss row at top). Trolley pin of high tensile alloy steel to be encased in structural hinge plate channel.

D. Options: No. 5 track recessed with ceiling guard and sliding jamb panel.

E. Finish: Outer covering shall be Modernfold Quiet Wall option vertically ribbed carpet. Outer covering shall be Class "A" flame spread rated.

F. Suspension System: Shall consist of continuous C channel shape track, connected to the structural support. Frame shall be supported by ball bearing trolley assemblies.

G. Sound Seals: Shall be pairs of three-layer flexible sweep strips at top and bottom.

H. Air Release System: Air trapped within the partition shall be released during entire stacking operation through .375" (10) diameter holes, which comprise a minimum of 5% lead post face area.


J. Laboratory Acoustical Performance: Of the folding partition shall have been tested in an independent acoustical laboratory in accordance with ASTM E90 test procedure, and shall have attained an STC of no less than 39. Written test report by the test facility shall be available upon request. The Quiet Wall option; partition shall have been tested in an independent acoustical laboratory in accordance with ASTM C-423 test procedure, and shall have attained a noise reduction coefficient (NRC) of no less than .55. Written test report by the test facility shall be available upon request.
K. Grip Type Hand Pulls: Shall be die cast zinc, satin chrome finish, and include a thumb release latch mechanism extruded aluminum or plastic hand pulls will not be accepted.

II. INSTALLATION AND EXECUTION

A. Preparation of opening shall be by general contractor. Any deviation or site conditions contrary to approved shop drawings shall be called to the attention of the architect.

B. Delivery to the job site shall be coordinated by general contractor. Proper storage of doors before installation and continued protection during and after installation shall be the responsibility of the general contractor.

C. Installation shall be by a local Modernfold authorized factory trained installer. Installation shall be in accordance with approved shop drawings and in accordance with ASTM E557.

D. Installation shall be guaranteed for one (1) year against defects in material and workmanship.

E. Gypsum wall board partitions at folding doors to receive sound blankets to maintain S.T.C. level the minimum of the folding door.
I. GENERAL:
   A. Accessories C, D & H listed below will be supplied by Temple University. Accessories A, B, E, F, & I shall be supplied and installed by the Contractor.

II. PRODUCTS:
      T.H. Wormly
      1218 Liberty Street
      Camden, NJ 08104-1248
      Phone: 1-856-966-8265
   B. Mirror: 18" x 24" mirror with stainless steel frame by Glass Services, No. 29-06-105.
   D. Soap Dispenser: Twinpak Push Dispenser by Sani-Fresh International.
   E. Grab Bars: Bobrick Series B-6806, 1 1/2" in diameter, satin finish in sizes as indicated on plan.
   F. Baby Changing Station: (Vertical Design) manufactured by Koala Corporation. Top of changing surface to floor to be 34" H (max.). Compatible with A.D.A. (Provide in women’s and men’s toilet room).
   H. Waste receptacle supplied by Temple University.
   I. Sanitary napkin disposal unit. Floor Model “L” swing type double entry receptacle, Hillyard item number HOS2201.
   J. Do not provide sanitary napkin dispenser and seat cover dispenser.

III. INSTALLATION:
   A. All toilet and bath accessories shall be mounted at heights and clearances compatible with the Americans with Disabilities Act Guidelines.
   B. Contractor to be responsible for all installations.

END OF DIVISION
DIVISION 11 - EQUIPMENT

11132 PROJECTION SCREENS

I. PRODUCTS:
   A. Projection Screens: All projections screens will be provided and installed by the AV Subcontractor. The General Contractor will provide conduit to the screen and blocking in the wall or ceiling to support the screen.
I. PRODUCTS:
   A. Plastic laminate, base and wall cabinets.
      Constructed of ¾” White MCP Interiors, Exteriors as per specifications.
      Five knuckle hinges and magnetic catches, 4” brushed chrome wire pulls,
      and cam locks, full extension Acouride #3832 slides. Drawers to be
      constructed of ½” White BHK – White Vinyl stock, either “Single
      Shoulder” Tongue & Groove or Rabbeted Joint bottom to be ¼” white
      MCP grooved on 4 sides. Cabinet will be either “Dado” or Tongue &
      Groove rails will be White MCP with plastic laminate edges.

      Base of cabinets to be constructed of plywood. Cabinets to be profited in
      order of line-up with connecting bolt holes predrilled. All scribe to be
      attached.

      Countertops to be constructed of ¾” plywood, with backing sheet and
      1/16” Nevamar plastic laminate on all finished surface with a red oak
      nosing.

   B. Hardwood Cabinets, Base & Wall
      Cabinets to be constructed of hardwood ¾” plywood. Drawers box to be
      ½” solid hardwood to match cabinet, Tongue & Groove or Dovetail
      construction, with ½” hardwood plywood bottom, rabbet in on 4 sides.
      Full extension drawer slides (Accuride #3832) for drawers five knuckle
      hinges, magnetic catches, 4” brushed chrome wire pulls. All edges of
      cabinets, drawers and door fronts to have 1/8” solid hardwood lipping.

      If cabinet doors to have glass, doors are to be stile and rail hardwood
      construction. Metal clips to be used for glass (not plastic).

END OF DIVISION
DIVISION 12 - FURNISHINGS

12345 LABORATORY CASEWORK AND FIXTURES

I. PRODUCTS:
   A. Laboratory Millwork/Casegoods:
      1. All new laboratory casework shall be painted metal as manufactured by St. Charles, Kewanee or Fisher Hamilton or hardwood. See Division 11455. Color(s) to be selected by Architect and approved by Temple University Office of Facilities Management on all doors and drawers.

II. GENERAL:
   A. All new metal laboratory casework (base cabinets, wall cabinets, pass-thru shelving, filler panels, storage cabinets, etc.) shall be metal casework (18 gauge steel) by St. Charles, Kewanee or Fisher. Depth of all new base cabinets to be 22" and pass-thru cabinets to be 16" unless noted otherwise.
   B. Color of new cabinets to be picked from quick ship program unless noted otherwise. Clean and repair existing cabinets that remain. Electrostatically paint existing cabinets to match new.
   C. Countertops for all laboratory Casework shall be epoxy resin with 1" overhang and a 4" integral back splash at walls (typical). Reagent shelves to be made of 1" epoxy. All joints between reagent shelves and pass-thru cabinets to be an epoxy resin seam. Vendor to verify. Color to be black, 8-6-1 (CA), (matte finish) unless noted otherwise. Where existing counter tops are adjacent to new counter tops, thickness of new counter top to match existing counter top.
   D. All services in bench and island counters to be concealed in service chase. All pipes to be supported by an adjustable Unistrut assembly.
      1. All laboratory sinks shall be stainless steel mounted from below, 24" (L) x 16" (W) x 12" (D) unless noted otherwise.
      2. 30" x 30" ChemArmor pegboard shall be provided at all sinks unless noted otherwise.
      3. Deck mounted swivel goose-neck chromed water faucets with lever handles and color coded buttons for double mixing shall be provided at each sink unless noted otherwise. Manufactures to be specified in Plumbing Section.
4. Cup sinks shall be stainless steel, 3" x 6" oval unless notified otherwise.

5. Contractor shall provide Borosillicate glass piping with appropriate trap assemblies and backflow arrestors as directed by the Plumbing Engineer or Temple University Plumbing shop.

6. Umbilical Service columns to be incorporated as part of the laboratory bench and shall not protrude beyond the footprint of the casework.
I. PRODUCTS:
   A. Window Treatment: Provide 3 1/2” wide curved vertical blinds by Louver Drape with chain operator. Color: Dessert Sand #2190 or Warm Gray #4550. Coordinate all window treatment with Temple University Office of Facilities Management.

   No window treatment to be ordered until reviewed by Temple University Housekeeping Department.
12690 ENTRANCE MAT SYSTEMS

I. PRODUCTS:
   A. Existing Entrances to receive Pedimat, PM400SM, surface mounted mat with Heavy Duty Carpet with Std. Mill rail and frame color.
   B. New Building Entrances to receive Pedimat II, PM11375RM, recessed mat with Heavy Duty Carpet with Std. Mill rail and frame color.

END OF DIVISION
DIVISION 14 - CONVEYING SYSTEMS

14200 ELEVATORS

I. GENERAL:
   A. Submittals: Submit the following:
      1. Product Data: Manufacturer's complete technical product data indicating capacities, sizes, performances, operations, safety features, controls, finishes and similar data.
      2. Shop Drawings: Plans, elevations, and details showing, dimensional data, service at each landing, and interfaces with other work including loading on structure.
      3. Samples: Submit samples of exposed finishes (excluding primed-for-paint finish).
      4. Certificates and Permits: Obtain and furnish required inspection/acceptance certificates and operating permits as required by jurisdictional authorities.
   B. Regulatory Requirements: In addition to local governing regulations, comply with ASME/ANSI A17.1, "Safety Code for Elevators and Escalators" and must fully comply with the current ADA Guidelines.
   C. Maintenance and Operation Manual: Furnish bound copies of maintenance and operating manual, including operating and maintenance instructions, emergency information, spare parts list and similar information.
   D. Demonstration: Instruct Owner's personnel in operation and maintenance of elevators.
   E. Maintenance Service: Provide 12 months of complete maintenance, on a monthly site visit/preventive maintenance basis, starting on date of Substantial Completion.
   F. Controls: All elevator controls must be non-proprietary, i.e. the elevator can be serviced by someone other than the manufacturer. Temple University must receive the diagnostic tools necessary to service the elevator.
   G. Elevator Performance: Comply with the following:
1. **Hydraulic Power Unit:** Manufacturer's standard belt-drive, nonpulsating, constant-displacement unit with single-speed electric motor, muffler and solenoid-operated valves. Locate motor, pump, tank, and control system equipment in Elevator Machine Room.

2. **Hydraulic Machines and Elevator Equipment:** Manufacturer's standard single-acting under-the-car hydraulic plunger-cylinder unit for each elevator. Provide complete with steel casing and waterproofed well cylinder.

3. **Plunger Unit:** Manufacturer's standard holeless direct-lift telescoping hydraulic plunger unit for each elevator.

4. **Power Supply:** 208 volt a.c., 3-phase, 60 Hertz, (refer to Div. 16 sections).

**H. Elevator Control System:** Provide industry-recognized automatic operation as defined in Code, which responds to momentary pressing of signal buttons and to other signals and devices.

**I. Provide Auxiliary Operations:** As follows:

1. Emergency power (each car).
2. Independent service for each car of a group (by key).

**J. Devices and Equipment:** Provide the following:

1. **Automatic Two-Way Leveling Device:** Provide with leveling tolerance of 1/4-inch for travel either direction.

2. **Load-Weighing Device:** Including automatic loaded car by-pass, automatic loaded car early-dispatch, and overload protection with audible warning.

3. **Power Door Operator:** Provide car door operator with interconnection to hoistway doors, checking action, and hand operation of car door for power failure.

4. **Door Edge Protection Device:** Provide retractable astragali device on leading edges of elevator doors to automatically reopen doors upon contact with an obstructing object.

5. **Electronic Photo-Eye Device:** Provide dual beam electronic photo-eye device to reopen doors upon interruption of beam by obstructing object. Provide with 15-second timed cut-out.
6. Signal Equipment: Provide manufacturer's standard signal equipment and graphics system, for the required control and operation of elevators. Provide stainless steel exposed metal surfaces, with illuminated translucent signals.

   a. Provide 2 car-control stations in each car.

   USUALLY DELETE ABOVE, EXCEPT FOR LARGE CARS.

   b. Provide hall bell and lanterns (up and down) for each entrance.

   c. Provide position indicator in each car.

   d. Provide flush-mounted telephone box in each car, with printed instructions on door and rough-in wiring for telephone handset.

   e. Provide position indicator over hoistway entrance at ground floor.

   f. Provide emergency alarm bell, located within building as indicated, with button in each car. Comply with Code.

K. Car Enclosures: Provide manufacturer's standard car enclosures, or units fabricated by firm specializing in elevator car enclosures. Include walls, ceiling, lighting car ventilation, car heating (if needed), doors, emergency car access panels, hardware, accessories and finish on walls, ceilings and floor. Provide the following finishes where indicated:

   1. Wall Finish: Steel paneling with baked enamel finish.

   2. Ceiling Finish: Steel paneling with baked enamel finish.

   3. Suspended Ceiling: White egg-crarte or translucent panels, complying with flammability requirements.

   4. Lighting: Fluorescent tube, pattern as shown.

   5. Floor Finish: 1/8-inch vinyl composition tile, color and pattern as selected by Architect from manufacturer's standard selections.
6. Doors/Frames: Hollow metal, fabricated of AISI Type 302/304 stainless steel with No. 4 satin finish. Match size and function of hoistway entrance. Fabricate frames integrally with front wall of car.

7. Handrails: Stainless steel, tube or bar. Provide at back wall and at side walls.


L. Hoistway Entrances: Provide manufacturer's standard hoistway entrances, or units fabricated by firm specializing in elevator hoistway entrances; comply with ASME/ANSI A17.1 requirements.

1. Construction: 16 ga. mechanically joined frames and 18 ga. flush-welded door panels; sound-deadened.

2. Frame Finish: Stainless steel, AISI Type 302/304 with No. 4 satin finish.

3. Door Finish: Stainless steel, AISI Type 302/304 with No. 4 satin finish.


M. Execution:

1. Installation: Comply with Code and shop drawing requirements. Install hoistway entrances for each elevator plumb with each other and aligned properly with hoistway. Install guide rails for uniform, close tolerance of car door with hoistway entrances. Install sills after car installation, and align with car sill.

2. Testing: Before elevators are placed into use, perform acceptance tests as required and recommended by Code and governing authorities. Review test results with Owner, and submit record copy.

END OF DIVISION
DIVISION 15 - MECHANICAL

15010 BASIC MECHANICAL REQUIREMENTS

I. GENERAL:
   A. Codes: The work shall be installed in accordance with all applicable Codes by duly licensed and authorized mechanics.
   B. Engineering: Contractor shall design the HVAC and plumbing systems and provide engineer stamped drawings, if required by Temple University.
   C. Existing Conditions:
      1. Contractor shall survey the HVAC and plumbing systems and provide engineer stamped drawings, if required by Temple University.
      2. Contractor shall coordinate with Facilities Management to determine existing conditions and the impact of new work within the project area.
      3. All services removed and not scheduled for reinstallation should be capped off at the mains.
   D. Coordination: Coordination work with other trades for items which may affect Mechanical and Plumbing requirements.
   E. Concrete Work:
      1. When equipment is specified for installation or is noted on drawings, the contractor will provide reinforced concrete pads under installed equipment.
      2. All pads for equipment shall be a minimum of 4" above the floor and shall be reinforced with a 4" x 4" wire mesh #6 gauge. These pads will be properly bonded and must be leveled to the existing floor slabs.
      3. Compressive strength on all concrete shall have a 28-day compressive strength of 3,500 lbs. per square inch. All forms will be lined with tempered hard board and evenly secured to provide true line of finished dimension for equipment bases. Corners will be beveled 1". All foundation bolts will be an integral part of the newly poured concrete and will be set in iron pipe sleeves for adjustability.
4. The contractor will furnish all hardware, foundation bolts washers, sleeves, plates and any associated equipment to secure mechanical and electrical equipment to concrete bases.

F. Piping General Information:

1. All pipe installed should never interfere with existing electric on installed electric lines enclosed in this package. Other utilities that become inaccessible, due to contractor installed piping, must be relocated as per Temple University's requested location. No piping will be installed over motors, transformers, phone equipment or electrical switchboard equipment.

2. The contractor must be warned that, on occasion, certain piping runs will interfere with Temple University's education process and patient care requirements and may have to be completed on overtime. The contractor should include this in his bid package. All pipes must be installed with all trades in mind. In the event that interference occurs with other crafts, Temple University will determine which work is to be relocated.

3. All piping and contractor work shall be installed to preserve access to all valves, traps and other parts requiring access or servicing.

4. Caution! The enclosed drawings are general and should be utilized as guidelines for the enclosed piping. They do not represent all offsets, bends, fittings, valves, traps and similar parts which may be requested or required during pipe installation. The contractor is responsible for completing a job site visit and confirming requested pipe runs before submitting bid documents. The contractor will then be responsible for providing all additional valves, traps, bends and any other similar parts in this bid document. The contractor shall submit his/her price and absorb any additional labor, parts and utility modifications, existing and new, to provide Temple with its selected pipe path. Temple University maintains the right to redirect enclosed pipe runs to protect existing utilities and to provide a better working system. Temple University will bear no responsibility for additional cost.

5. The contractor will provide the highest level of accuracy when measuring pipe in the field. Changes in direction or reduction in size shall be made with standard fitting. No mitering of pipe to form elbows or reducers will be permitted.
6. Low point on all piping will possess boiler drains while high point on closed systems must provide automatic bleeding.

G. Identification of Mechanical Equipment and Piping:

1. All equipment purchased by the owner or contractor must have a manufacturer's nameplate displaying complete information about the equipment's design and operating characteristics. In addition: switches, starters, safety switches, panels, junction boxes, breakers and all control devices should be tagged and displayed with Temple University's designated equipment I.D. number. Nameplates will be selected after the contract has been awarded and must be securely attached to the equipment.

2. Pumps, large machinery or apparatus should be painted with block characters at least 3" high.

3. All new piping in mechanical rooms or any other visible areas throughout the pipe run must be identified with legends giving the nature of service. For example, "Chilled Water Return" along with arrows indicating the direction of flow. Generally, these characters shall be no less than 2" high. On pipe 10" and above, the characters will not be less than 2" high. These legends and arrows shall be placed adjacent to each other at any change of direction and immediately no more than 30' apart. Coloring will always be ASME coded.

4. If factory equipment is shipped without identification plates, the contractor shall install, as per Temple University’s request, new I.D. plates. The contractor will also maintain clean surfaces on factory shipped equipment with I.D. plates.

5. The contractor shall clean all existing surfaces he/she is in contact with during construction and will turn over to the owner all equipment and piping in perfect condition, ready for satisfactory operation.

H. Testing Mechanical:

1. All water lines: including domestic, condenser, steam, condensate, chilled water and gas piping shall be tested and verified under hydrostatic pressure of not less than 1.5 times the operating pressure, but not less than 150 psig. The test pressure must hold for a period of 48 hours and testing must be verified by Temple University's Office of Facilities Management. Temple University
holds the right to retest upon request and any flanged or threaded connection that leaks must be removed and repiped.

I. Equipment Specifications:

1. Any equipment that is purchased by Temple University or supplied by the contractor under this agreement becomes the responsibility of the awarded contractor as soon as he/she receives these goods. If, for any reason, this equipment is damaged when rigging or in transit, the contractor must replace or repair as per Temple University's evaluation.

2. All equipment purchased by the contractor and selected and specified under this agreement will be reviewed before purchase by Temple University's Office of Facilities Management. This means that cut sheets of all equipment must be provided for review before any purchase of specified equipment.

J. Cleaning and Final Clean-Up:

1. The contractor will, at all times, keep all areas free of waste, surplus materials, dirt and rubbish which is caused by the installation of these pipes.

2. All materials that need to be stored on Temple University's campus during this installation must be reviewed for location of storage areas throughout the University or in Temple buildings.

3. When installing pipes, all foreign matter must be flushed out of the piping before testing.

4. If any equipment has been nicked or scratched during the installation, the contractor will touch up paint with matching enamel. The contractor will also remove all stickers, rust stains, labels, temporary codes, etc.

K. Manuals, Catalogs and Instruction Manuals:

1. The contractor will organize the following maintenance data into four (4) sets of manuals. The contractor shall bind this information in individual, heavy duty, 3-ring, vinyl-covered binders with pocket folders for folded sheet information. Mark identification on front and spine of each binder. Include the following information:

   (1) Engineering Instructions
   (2) Spare Parts List
(3) Wiring Diagrams  
(4) Inspection Procedures  
(5) Shop Drawings and Product Data  

2. The contractor will arrange with Temple University's Office of Facilities Management to provide instructions on the proper operation and maintenance of all equipment installed in the enclosed specifications. This will include a minimum of 16 hours on equipment that requires regular maintenance or start-up of any mechanical equipment in the enclosed specifications.

The contractor will also include a detailed review of the following in his/her four (4) submitted binders and the included 16 hours of the manufacturer's representative job site visit. The four (4) maintenance manuals are:

(1) Tools  
(2) Control Sequences  
(3) Warranties and Bonds  
(4) Spare Parts and Materials  

L. Oiling and Servicing:

1. Any equipment specified in this document that requires greasing or packing must be lubricated or prepatched before operation occurs. Prior to final acceptance, the contractor will pack all valves and lubricate all equipment necessary for operation. Contractor will also tighten belts and adjust motor coupling for proper clearance.

2. After work has been completed and prior to the operation of the enclosed specifications, the contractor will clean all strainers, set and test all electrical controls and repair damaged insulation, if such conditions should occur. The contractor and Temple University's Office of Facilities Management will meet and prepare a Punch List which must be completed for the passing of final payment to the contractor.

3. All repair work must be completed by the mechanic who worked on the entire project.

M. Painting:

1. The contractor will paint all steel not covered with insulation or galvanized with two (2) coats of rust inhibitor paint. All colors must match existing paint. This also applies to all metal such as pipe hangers, existing cut steel and steel used on the job site. The
contractor shall also paint all of his newly installed piping in color codes assigned in existing chilled water plant. Paint will be supplied by the University.

N. Guarantees:

1. All components and equipment shall have a warranty of 1 year. During this period, if it is determined that work covered during the first year warranty has failed, the contractor will replace or rebuild the work to an acceptable condition complying with the requirements of the contract documents. The contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the owner has benefited from use of the work through part of its useful service life. This 1 year warranty includes all underground and aboveground piping from leaks.

II. HVAC EQUIPMENT:

A. Manufacturer: York International Corporation or Trane or McQuaide

B. Unique System Descriptions

1. Compressors are to be reciprocating, unless authorized by Temple University.

2. Filter banks are to have pressure differential instrumentation installed and the signal is to be placed where monitoring occurs.

3. Equipment is to be placed and designed where roof replacements can occur without the removal or disruption of the equipment.

4. Refrigerant is to be HFC - 123. Seimans, Apogee System.

5. Building Management System is to be on Main Campus as required Temple University **H.S.C. Campus System is to be Johnson Controls.**

6. All of the signals of the system and system control are to return to the microprocessor located in the mechanical equipment room and repeated to the PC located in Office of Facilities Management via telephone line.

7. Air Handlers using outside air shall have freeze protection on the coils.
8. Units, where size dictates, shall have smoke detectors installed by Electric Subcontractor to be coordinated with building Fire Alarm System.

9. Joe Leotti, Office Facilities Management, shall review all HVAC selections, BMC, and instrumentation selections and applications while system is still in design and prior to submittal for review or signatures.

10. Controls and instrumentation are to be factory mounted wherever possible, then supplemented with other instrumentation where required.

11. No air conditioning/heating heat pumps will be permitted in any design.

12. Cooling Towers are to be B.A.C. or Marley.

C. Chillers

Chillers shall communicate via a twisted pair of wires to the Building Automation System and have, at a minimum, the following information.

a. Communication Status
b. Alarm Status
c. Chilled Water Entering and Leaving Temperatures
d. Condenser Water Entering and Leaving Temperatures
e. Evaporator Refrigerant Temperatures
f. Current Run/Load Capacity in %
g. Head Pressure
h. Three (3) Motor Winding Temperatures
i. Two (2) Bearing Temperatures
j. Oil Temperature
k. Evaporator & Condenser Flow Status
l. Chiller On / Off Status
j. Compressor On / Off Status

D. Unique System Descriptions - Analog readouts and signals are to be furnished on chilled water in the system piping for temperature, pressure and flow.

Control valves located outside are to be weather protected and insulated moisture tight and weather proof.

Circulating lines are to run on the interior of the building for freeze protection.
Copper piping and fittings are to be protected di-electrically from mating with dissimilar metals or from supports or hangers of dissimilar metals.

1. All fire dampers, duct detectors, dampers, and all duct related items requiring accessibility are to have convenient, inconspicuous access doors provided in duct work and ceilings. Penetrations of fire rated surfaces requires the appropriate fire rated access panel.

2. Shall be furnished with supply air temperature, mixed air temperature, return air temperature, dirty filter detection, fan on/off, damper position and cooling and heating valve positions.

E. Pumps

1. All pumps are to be Aurora Pumps horizontal split case, in-line or end suction as determined by Temple University.

F. Flexible Pump Connections:

1. All flexible pump connections shall be equal to Metraflex M.L. length, stainless steel type #321 with forged steel ANSI, 150 lb. flanged and suitable for operating pressure and temperatures of the fluid of the respective system. They shall be installed on the discharge and suction pumps outlets and at the inlet and outlet of all mechanical chilling and heating equipment.

G. Strainers for Pumps:

1. Condenser water and chilled water strainers shall be Mueller, 90 degree Suction Diffuser.

2. Each strainer will have full size bleed off, hinged cover for easy removal of strainer screen and 1/8 of an inch perforated stainless steel screen.

I. Flow Meters

1. Chilled Water

1.1 Yokogawa AE Magnetic Flow meter
Model # YT200-AA1-LSA-A1DH/SCT

1.2 Yokogawa Temperature Transmitters
Model # YT200-D3NA/FMF/SCT, equipped with appropriate Burns RTD sensors and stainless steel thermowells.
(two required for each chilled water flow meter)

1.3 Yokogawa Flow Computer Totalizers
Model # YFCT-3AA3-A1A*B/DT/SCT
(one required for each chilled water flow meter)

2. Steam, High Pressure

2.1 Yokogawa Vortex Flow meter
Model # Yfxxx-AAUA1A-S3S3*E/FMF/SCT

2.2 Yokogawa DPharp Digital Gauge Pressure Transmitter
Model # EJA430A-DAS4B-92NA/FF1/D1
(one required for each steam flow meter)

2.3 Yokogawa Flow Computing Totalizer
Model # YFCT-3AA3-A1A*B/SCT
(one required for each steam flow meter)

2.4 Yokogawa Vortab Flow Conditioner
Model # VMR-AxDOA
(one required for each steam flow meter)

3. Steam, Low Pressure

3.1 Gilflow meter

3.2 Gilflow matched differential pressure transmitter

3.3 Gilflow pressure transmitter

3.4 Gilflow flow computer

4. Meter Monitoring and Communications

4.1 Pulse output contacts from each chilled water flow computer, electric meter and steam flow computer shall be connected to a meter monitoring and communication panel. This panel shall be connected to a 120 volt power source and a dedicated phone line for remote access through Temple’s existing TimeFrame system.

J. Hangers, Supports and Fasteners:
1. All pipe lines shall be rigidly and firmly installed to pitch and provide for proper expansion and contraction. Covering protection saddles shall be used on all covered piping 2 1/2" and larger.

2. All pipe lines shall be rigidly and firmly installed to prevent swaying, vibrations and sagging by malleable or wrought steel pipe hangers of standard design, pipe clamp or fabricated steel supports of approved design. Hangers for horizontal pipes shall be adjustable cleaves type.

3. Pipes grouped close together, with bottoms at the same elevation, may be supported by means of a trapeze hanger. All hangers shall be carried by beam clamps, steel angles or clips. Vertical pipes shall be braced at intervals not exceeding 15".

4. On straight runs of pipe, hangers must be spaced not over 10' apart for screw-jointed piping.

5. Pipes run on the face of a wall shall have not less than 3/4" and not more than 1" clearance between pipe and face of wall.

6. Pipe supports and hangers, along with supporting technique designs for all piping, must be structurally reviewed by Temple University's Office of Facilities Management before installation occurs.

K. Sleeves:

1. All pipes passing through masonry construction shall be fitted with sleeves. Sleeves through walls will be secured to steel pipe. Provide a water-tight seal between pipes and sleeve in outside wall. Seal shall be link seal as manufactured by Thunderline Corporation. The contractor shall familiarize himself/herself with its installation and provide a wall sleeve to suit the pipe size.

L. Pressure Gauges:

1. Pressure gauges will be of the re-calibrated type marsh 4 1/2" - 0 - 120 (if information is not available use 0-120) glass front bottom connected flangeless care and 1/4" brass lever handle cock. 1/4" pet cock will be installed below glass and above weldate.

M. Thermometers:

1. Chilled and condenser water piping shall be scheduled 40 steel pipe.
2. Connection to pumps shall be made by reducing flanged fitting close to the pumps, if required. Provide pressure gauges and thermometers in the pump suction and discharge, strainers and check valves as indicated on drawings, if needed.

3. Provide up to thirty (30) 3/4" weldaletes on each set of chilled water and condenser water lines. Equip these tapes with thermometers and pressure gauges. Location of these tapes will be picked by Temple University after the job has been awarded.

4. Provide valve drains from low points of condenser water and chilled water.

5. All thermometers shall be 5" dial-type Wiess 3/4" well adapter stainless-steel type. Includes shock-proof glass front, fitting into stainless steel socket.

6. Well adapters must extend into the pipe lines no less than 50% of inside pipe diameter.

7. Ranges for Thermometer:

<table>
<thead>
<tr>
<th></th>
<th>Chilled Water</th>
<th>Condenser Water</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 to 120</td>
<td>0 to 160</td>
<td>0 to 240</td>
</tr>
</tbody>
</table>

8. Pet cock valves will be installed before gauges on all gauge ports on condenser and chilled water lines.

N. Valve Tags:

1. The contractor will install a 4" x 4" tag with an assigned number for each valve he installed.

   Example:   Chilled Water - CHWS #4
              Condenser Water - CWS #4

   After all valves have been tagged numerically, the contractor will then submit "as built" drawings, illustrating valve locations and newly assigned numbers.

O. Insulation:

1. The scope of the work to be performed under these specifications shall consist of furnishing all labor and materials for the insulation
covering the various system components. All work shall be performed by skilled mechanics of the insulation contractor. The work shall include, but not necessarily be limited to, the following:

a. Insulation covering all new chilled water supply and return piping, steam and condensate piping and domestic hot and cold water piping.

b. Insulation covering chilled water pumps and water chillers.

c. Patching of existing insulation surface, where damaged.

2. General Insulation:

All insulation covering shall be of the highest grade and shall be installed in a first class manner. The surface of all covering shall be smooth, even and true to line, with jackets drawn tight and secured. Staples shall not in the work. No scrap pieces of insulation shall be used where a full length section will fit. Every package or container shall have manufacturer's name brand and quality of material. All surface shall be clean, dry and free of all rust and scale when covering is applied. Covering shall be dry prior to and during the application of any finish. No covering shall be applied before the affected lines have been tested and proved tight.

3. Insulation Materials:

a. Fiberglass pipe insulation shall be molded-type with factory applied white (ASJ) fire retardant vapor barrier jacket. Lapseams shall be a minimum of 1 1/2" wide. Install a 4" sealing strip at each joint. all lapseams and sealing strips shall be sealed with Foster 85-20 spark FAS off white fire resistant vapor barriers adhesive. NO STAPLES SHALL BE USED.

b. Insulation material shall be manufactured by Owens Corning Fiberglass Corporation, Johns-Manville. Mastics and adhesive shall be manufactured by Benjamin Foster or 3M.

4. Insulation of Piping Systems:
a. Pipe insulation in the various systems shall be applied in the following thicknesses:

<table>
<thead>
<tr>
<th>PIPING SYSTEM</th>
<th>TYPE OF INSULATION</th>
<th>INSULATION THICKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic hot and cold water piping</td>
<td>Fiberglass</td>
<td>1&quot;</td>
</tr>
<tr>
<td>cooling tower</td>
<td></td>
<td></td>
</tr>
<tr>
<td>drain lines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chilled water supply and return piping</td>
<td>Fiberglass</td>
<td>1 1/2&quot; up to 3&quot; pipe</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2&quot; larger pipe</td>
</tr>
<tr>
<td>Condensate</td>
<td>Fiberglass</td>
<td>1&quot; up to 2&quot; pipe</td>
</tr>
<tr>
<td>Steam</td>
<td>Fiberglass</td>
<td>2&quot; larger pipe</td>
</tr>
<tr>
<td>Storm water piping horizontal runs, roof</td>
<td>Fiberglass</td>
<td>1&quot;</td>
</tr>
<tr>
<td>drains basin</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b. Except as noted below, all valves, flanges, unions and fillings shall be covered to the same thickness and material as the adjoining covering.

c. Unions, valves, flanged connections and flanged valves on the steam and condensate piping shall be left uncovered. In such cases, the covering in the adjoining piping shall be tapered and neatly terminated.

d. At each hanger location, provide a prefabricated, galvanized steel shield with high density fiberglass or rigid urethane insulation to support the weight of the pipe without deformation. Adjacent insulation shall be applied in a manner to preserve the vapor insulation.

c. Cover all insulated piping exposed on the roof with Chidens 016 corrugated aluminum jacket with factory attached integral poly kraft moisture barrier jacketing. Attach with bands on 9" center. Install aluminum universal jackets on all fittings.
5. Insulation of Pipe Fittings:
   
a. All pipe fittings will be wrapped in a blanket of high density fiberglass insulation. A.P.V.C. jacket will be fitted over fiberglass. Thickness and density of fitting shall match that of the adjoining insulation.

   b. All valve flanges and strainers in piping 2” and larger shall be wrapped with fiberglass pipe insulation. Various sizes of insulation shall be nested together for proper thickness corresponding to that of the adjoining piping insulation. A coat of Foster 30-35 will be applied to all new ends.

6. Insulation of Chilled Water Pumps:

   The chilled water pump shall be fitted with a galvanized sheet metal enclosure around pump. The enclosure will be split for easy removal. Parts of the enclosure will be held together with nuts and bolts. All seams will be vapor-sealed.

7. Insulation of Water Chiller:

   a. If chillers are not factory insulated, chiller heads, evaporator, economizer shell and any other portion subject to sweating shall be insulated with 1” of foam plastic insulation.

   b. Insulation shall be applied neatly and all seams cemented to prevent moisture penetration. Insulation on chiller heads shall be applied so that it can be removed easily for maintenance and reinstallation.

P. Nipples:

   Nipples will be the same material and thickness of the pipe with which they are used. Closed nipples shall not be used.

Q. Piping Materials:

   Materials for the piping system will be governed by the following specifications:

2. Copper shall conform to ASTM specification type L hard copper.

3. Flange and flanged fittings to be 150 lbs., class #2, forged steel, welding-neck type, conforming to ASTM specifications. Flanged fitting for steel pipe lines shall be 150 lbs.

S. Flanges:

1. All gasket will be ring-type, 1/16 of an inch thick, suitable for the temperature and pressure of condensed and chilled water.

2. For chilled and condensed water, flexitalic gaskets will be used.

3. In the event of a leaking flange or the necessity to disassemble installed flanges, the contractor may not reuse or repair this gasket. It must be replaced.

4. Gasket cements or sealers shall not be used.

R. Pipe Fittings:

1. The contractor will install weldaletes where temperature gauges, pressure gauges and temperature sensors are required.

2. Fittings for copper tubing shall be seamless and joints will be silver-soldered.

3. The contractor will use Tees when on copper lines or branching off for any take-off.

S. Unions:

1. Unions for steel, 1 1/2" in size and smaller shall be extra heavy, ANSE 125 lbs. pattern, brass to iron set ground joint unions.

2. All connections for steel lines 2" in size and larger shall be a pair of flanges.

3. Provide a union adjacent to each threaded end valve.
T. Electrolysis Control and Dialectic Connections:

1. Installation of copper tubing shall be accomplished in such a way as not to touch or come in contact in any way with ferrous metal. Insulation non-conductor spacers similar to lead, rubber filler or an approved equal should be installed to assure prevention of electrolysis where copper tubing, piping or fittings are anchored or supported or may come in contact with metal construction.

2. A dialectic union or fitting shall be used where copper tubing or piping is connected to ferrous pipe or equipment.

U. Piping Connections and Welding:

1. All screwed joints will be threaded with teflon tape.

2. Copper joints 1" or smaller shall be soldered with 95/5 soldered joints. Copper joints 1" or larger will be silver-soldered.

3. All welding shall be performed with the shielded metallic arc method of fusion welding in accordance with the recommendation of the American Welding Society. All welding rods will be of proper type and diameter for the joint being worked. Hot rods will not be permitted. Excessive crowning of the head, deep ripples or undercutting will not be permitted.

V. Valves:

1. All valves for various piping systems included in these specifications will be Jamesbury.

2. All valves below 2 1/2" in size will be Jamesbury ball valves.

<table>
<thead>
<tr>
<th>VALVE</th>
<th>SOLDER END</th>
<th>SCREWED END</th>
<th>FLANGED 2 1/2&quot; AND LARGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUTTERFLY</td>
<td></td>
<td></td>
<td>Jamesbury model #815L-11-2236TT ANSI Class 150, Single-Flanged, lugged valves or Watts valve equal to the Jamesbury valve. Note: Valves above 6&quot; will include Jamesbury gear operator MA010 or a DeZurik or Watts valve equal to the Jamesbury valve.</td>
</tr>
<tr>
<td>BALL</td>
<td>Both</td>
<td>Both</td>
<td>Jamesbury Series 300 VALVES Jamesbury Series 300 or Watts valve</td>
</tr>
</tbody>
</table>
3. Drain valves at end runs and low points will be no smaller than 1" and piped to an open drain.

4. The University holds the right to add drain valves at any selected location and may also request additional thermometers, pressure gauges and access ports at the contractor's expense.

5. Gate Valves
I GENERAL
   A. SCOPE OF WORK
     1. The Scope of Work provided by this contractor under this section shall include the following:
        a. Provide electric-drive horizontal split-case fire pump unit and all related components and accessories required for complete and operational system as required by codes and regulations herein specified. These shall include but not be limited to:
           • eccentric tapered suction reducer
           • concentric tapered discharge increaser
           • pressure gauges
           • circulation relief valve
           • automatic air release valve
           • ball drip valve
           • coupling guard
           • incidental items as herein specified
        b. Coordination of the work with other trades and other components of the total fire protection system, as indicated on the drawings.
        c. Shop drawing submittals as required
        d. Operating and maintenance data
        e. Certifications and field acceptance test data

   B. Purchasing of Equipment
      1. Purchase all equipment through Temple University as indicated under Section "01012" of these specifications.

   C. Definitions
      1. Fire Pump: Pump used to supply water at rated capacity and total rated head required for fire-protection service.
      2. Fire Pump Unit: Assembled unit consisting of fire pump, driver, controller, and accessories.
      3. Pressure-Maintenance Pump: Pump used to maintain water pressure in a
sprinkler system.

4. **Pressure-Maintenance Pump Unit**: Assembled unit consisting of pressure-maintenance pump, driver, controller, and accessories.

### D. General Requirements

1. Fire protection system and all related work shall comply in all respects with the rules and regulations of the following which are hereby made a part of these Specifications:

   a. All applicable National Fire Protection Association standards, particularly NFPA 20.

   b. Applicable local laws, codes and requirements of authorities having lawful jurisdiction over this work, including City of Philadelphia requirements.


   c. The requirements of the owner's insurance carrier, Factory Mutual.

   d. Pennsylvania Department of Labor and Industry "Building Regulations for Protection from Fire and Panic".

   e. National Board of Fire Underwriters Code.

### E. Submittals

1. **General**: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections, and the submittals required by NFPA 20, "Standard for the Installation of Centrifugal Fire Pumps."

2. **Product data for fire pump units and pressure pump units**. Include clearly stated rated capacities of each selected model, performance curve with each selection point indicated, driver, pump controller, furnished specialties, and accessories; plus weights (shipping and installed).

3. **Product certificates signed by manufacturers of fire pumps**, certifying that their products comply with specified requirements.

4. **Test curves of fire pump manufacturer's factory tests for each fire pump**, and certificates signed by manufacturer verifying that the test results comply with specified requirements.

5. **Shop drawings showing layout and connections for fire pump units and pressure-maintenance pump units**. Show pumps, drivers, controllers,
accessories, and piping. Include setting drawings with templates and directions for installation of foundation bolts, anchor bolts, and other anchorages.

a. Shop drawings may be incorporated into other Division 15 fire-protection piping system shop drawings.

6. Wiring diagrams detailing field-installed wiring for power, signal, and control systems.

7. Field-acceptance test data showing proper performance according to provisions specified.

8. Maintenance data for each fire pump and pressure-maintenance pump unit to include in the "Operating and Maintenance Manual" specified in Division 1.

F. Quality Assurance

1. Manufacturer Qualifications: Firms whose fire pumps, pressure-maintenance pumps, drivers, controllers, and accessories are listed by product name and manufacturer in the UL "Fire Protection Equipment Directory" and FM "Approval Guide" and that comply with requirements indicated.

2. Single-Source Responsibility: Obtain fire pump units and pressure-maintenance pump units, components, and accessories from a single source. Include a source with responsibility and accountability to answer and resolve problems regarding compatibility, installation, performance, and acceptance of units.

3. Provide listing/approval stamp, label, or other marking on equipment made to specified standards.

4. Comply with Philadelphia Fire Department standards pertaining to material, hose threads, and installation.


6. Comply with requirements of NFPA 70 "National Electrical Code" for electrical materials and installation.
7. Comply with the requirements of NFPA 72, "Installation, Maintenance and Use of Protective Signaling Systems" for electrical connections and wiring for electrically operated devices.

8. Comply with requirements of FM "Approval Guide" applicable to fire pumps, drivers, controllers, and accessories, and provide system capable of FM acceptance.


10. Design Criteria: The Drawings indicate sizes, capacities, connections, and dimensional requirements of fire pump and pressure-maintenance pump units and are based on specific manufacturer types and models indicated.

11. Installer's Qualifications: Firms qualified to install and alter fire pump systems and related components and repair and service fire pump equipment. A qualified firm is one that is experienced (minimum of 5 previous projects similar in size and scope to this project) in such work, familiar with precautions required and in compliance with the requirements of the authorities having jurisdiction. Submit evidence of qualifications to the engineer upon request.

G. Delivery, Storage, and Handling

1. Preparation for Shipping: After assembling and testing fire pumps and pressure-maintenance pumps, clean flanges and exposed machined metal surfaces and treat with an anticorrosion compound. Protect flanges, pipe openings, and nozzles.

2. Store fire pumps, pressure-maintenance pumps, drivers, controllers, and accessories in a clean dry place.

3. Retain shipping flange protective covers and protective coatings during storage.

4. Protect bearings and couplings against damage from sand, grit, moisture or other foreign matter.

5. Extended Storage Greater Than 5 Days: Dry internal parts with hot air or vacuum-producing device to prevent rusting. Upon drying, coat internal parts with protective liquid, such as light oil. Dismantle bearings and couplings, dry and coat with acid-free heavy oil, and then tag and store in a dry location.

6. Comply with manufacturer's rigging instructions for handling.

II. PRODUCTS

A. MANUFACTURERS
1. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include the following:

2. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. Horizontal Fire Pumps:
      
      • Aurora Pump, General Signal Corp. (no substitutions)

   b. Multistage Pressure-Maintenance Pumps:
      
      • Aurora Pump, General Signal Corp. (no substitutions)

   c. Regenerative-Turbine, Pressure-Maintenance Pumps:
      
      • Aurora Pump, General Signal Corp. (no substitutions)

   d. Pump Controllers and Alarm Panels:
      
      • Firetrol, Inc.
      • Hubbell Industrial Controls, Inc.
      • Joslyn Clark Controls, Inc. Subsid., Joslyn Corp.
      • Master Control Systems, Inc.
      • Metron, Inc.

B. Fire Pump Unit (FP-1)

1. Furnish and install where shown on plans, Fire Pump System complete with pump, driver, controller, and accessories. The pumping unit shall be listed by UL, and FM approved for fire service. The pumping unit shall meet all requirements of the National Fire Protection Association Pamphlet No. 20. The Fire Pump shall be of capacity as indicated on drawings. The pump shall also deliver not less than 150% of rated capacity at a pressure not less than 65% of rated pressure. The shut off pressure shall not exceed 140% of rated pressure. The pump shall operate at a maximum speed of 3560 rpm, and have a minimum case working pressure of 250 psig.

   The fire pump shall be horizontal base mounted, horizontal split case, bronze fitted, single stage, centrifugal pump.

2. The driver shall be a horizontal foot mounted, open drip-proof ball bearing type, AC induction squirrel cage motor with electrical
characteristics as indicated on the drawings. The motor shall be of such capacity that 115% of the full-load ampere rating shall not be exceeded at any condition of pump load for UL/FM approved fire pump systems. Locked rotor current shall not exceed the values specified in NFPA Pamphlet No. 20.

3. Pump and motor shall be mounted on a common base plate of formed steel. Pump and motor shall be checked for alignment after the pump base has been installed and grouted in place.

4. Casings shall be of cast iron having a minimum tensile strength of 35,000 psi. Bearing housing supports, and suction and discharge flanges shall be integrally cast with the lower half of the casing. Removal of the upper half of the casing must allow the rotating element to be removed without disconnecting the suction and discharge flanges.

5. Impellers shall be of the enclosed type and shall be of vacuum cast bronze. Impellers shall be dynamically balanced, keyed to the shaft, and held in place with threaded shaft sleeves.

6. The pump shaft shall be made of SAE 1045 steel or equal, accurately machined to give a true running rotating element. Shaft shall be protected by bronze sleeves which are key locked and threaded. A gasket shall seal between the impeller hub and the shaft sleeve to protect the pump shaft.

7. Pump shall be equipped with renewable bronze casing rings so designed that hydraulic pressure will seat them against a shoulder in the pump case around the full periphery of the wearing ring. The wearing rings will be locked by doweling to prevent rotation. The rotating element uses heavy duty grease-lubricated ball bearings and shall be equipped with water slingers. Bearing housings shall be so designed to flush lubricant through the bearing.

8. All pumps where the suction pressure is expected to average 40 psi to below, shall be provided with a lantern ring connected to the pressure side of pump by cored passage in the parting flange of the pump. Stuffing boxes shall be equipped with split bronze packing glands designed for easy removal for packing inspection and maintenance.

9. The fire pump unit shall include the following accessories, as required by NFPA standards (depending on the conditions under which the pump is to be installed).

   a. Eccentric tapered suction reducer
   b. Concentric tapered discharge increaser
c. Coupling guard
d. Pressure gauges
e. Circulation relief valve
f. Automatic air release valve
g. Ball drip valve

10. The fire pump motor control shall be UL listed and/or FM approved, where applicable. It shall be completely assembled, wired and tested by the control manufacturer before shipment from the factory, and shall be labeled "Fire Pump Controller". The controller shall be located as close as practical and within sight of the motor. The controller shall be so located or protected that it will not be injured by water escaping from the pump or connections. The controller shall be of the combined manual and automatic Wye-delta closed transition type with a circuit breaker interrupting capacity as required to interrupt available fault currents on the system at voltage indicated on the drawings per NFPA 70 and shall meet all requirements of NFPA Pamphlet No. 20. Control equipment shall be manufactured by Firetrol, Joslyn Clark, or equal.

11. Furnish with main control panel an automatic transfer switch to automatically transfer to alternate source of power upon interruption of primary power source. Automatic transfer switch is to comply with specifications per NFPA Pamphlet No. 20, with alternate power source from emergency generator. Automatic transfer switch shall be manufactured by Russelectric Co., ASCO, or Zenith, and be assembled and tested by the controller manufacturer to become a coordinated, integral part of fire pump controller.

12. The pump, driver, controller and all accessories shall be purchased under a unit contract. The pump shall be given a complete performance test with POSITIVE SUCTION PRESSURE. A certified performance curve shall be prepared and submitted. Pumps shall also be hydrostatically tested to twice the shut off pressure, but in no case less than 250 psi.

13. The pump manufacturer shall assume unit responsibility and shall provide the services of a factory-trained representative to supervise and/or be available to conduct final field acceptance tests.

14. Controller Sensing Pipes: Fabricate pipe and fittings according to NFPA 20 with nonferrous-metal sensing piping, 1/2-inch size, with globe valves for testing controller mechanism from system to pump controller as indicated. Include a bronze check valve with a 3/32-inch orifice in the clapper or a ground-face union with a noncorrosive diaphragm having a 3/32-inch orifice.

C. Pressure Maintenance Pump Unit (JP-1)
1. The contractor shall furnish and install an Aurora pressure maintenance pump with a capacity as indicated on the drawings. The pump shall be bronze fitted construction and equipped with a mechanical seal. Unit shall be close coupled and driven by a ODP motor (characteristics as indicated on the drawings). Pump shall be equipped with a relief valve.

2. The pressure maintenance pump control panel shall be NEMA II, wall mounted, and contain a fused disconnect switch, magnetic A-T-L starter, H-O-A selector switch, control transformer, overload relays, and necessary circuitry to provide automatic start and stop from panel mounted pressure switch.

3. Controller Sensing Pipes: Fabricate pipe and fittings according to NFPA 20 with nonferrous-metal sensing piping, 1/2-inch size, with globe valves for testing controller mechanism from system to pump controller as indicated. Include a bronze check valve with a 3/32-inch orifice in the clapper or a ground-face union with a noncorrosive diaphragm having a 3/32-inch orifice.

D. Pressure Maintenance Pump Accessories

1. Pressure Maintenance Pump Accessories: Match pressure maintenance pump suction and discharge ratings as required for pump capacity rating:
   a. Casing relief valve.
   b. Suction and discharge pressure gages.

E. Source Quality Control

1. Factory Tests: Hydrostatically test and test run fire pumps before shipping. Test at 150 percent of shutoff head plus suction head, but not less than 250 psig. Produce certified test curves showing head capacity and brake-horsepower of each pump.

III. EXECUTION

A. Examination

1. Examine areas, equipment foundations, and conditions with Installer present for compliance with requirements for installation and other conditions affecting fire pump performance. Do not proceed with installation until unsatisfactory conditions have been corrected.

2. Examine fire-protection piping systems. Verify actual locations of piping connections prior to installation.
B. Concrete Equipment Bases

1. Coordinate installation with concrete equipment bases for fire pumps, pressure-maintenance pumps, and controllers.

C. Installation

1. Comply with fire pump and pressure-maintenance pump manufacturer's written installation and alignment instructions and with NFPA 20 and FM standards.

2. Install pumps in locations indicated and arrange to provide access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.

3. Set base-mounted pumps on concrete equipment bases. Disconnect coupling halves before setting. Do not reconnect couplings until alignment operations have been completed.
   a. Support pump base plate on rectangular metal blocks and shims or on metal wedges having small taper, at points near foundation bolts to provide a gap of 3/4 to 1-1/2 inches between pump base and foundation for grouting.
   b. Adjust metal supports or wedges until pump and driver shafts are level. Check coupling faces and pump suction and discharge flanges to verify that they are level and plumb.

4. Install suction and discharge pipe sizes equal to or greater than the diameter of fire pump nozzles.

5. Install valves of types and at locations indicated that are same size as the piping connecting fire pumps, bypasses, test headers, and other piping systems.

6. Install pressure gages on fire pump suction and discharge at integral pressure gage tappings provided.

7. Support pumps and piping separately so that weight of piping system does not rest on pumps.

8. Install piping accessories, hangers and supports, anchors, valves, meters and gages, and equipment supports as required for complete installation.
9. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted. Furnish copy of manufacturer's wiring diagram submittal to electrical Installer.
   
a. Verify that electrical wiring is installed according to manufacturer's submittal and installation requirements of Division 16 Sections. Do not proceed with equipment start-up until wiring installation is acceptable.

D. Alignment

1. Align fire pump and driver shafts after complete unit has been leveled on foundation and after grout has set and foundation bolts have been tightened.

2. After alignment is correct, tighten foundation bolts evenly but not too firmly. Fill base plate completely with nonshrink, nonmetallic grout, with metal blocks and shims or wedges in place. After grout has hardened, fully tighten foundation bolts. Check alignment and take corrective measures required.

3. Make piping connections, check alignment, and take corrective measures required.
   
a. Adjust alignment of pump and driver shafts for angular and parallel alignment by 1 of 2 methods specified in Hydraulic Institute Standards Section "Centrifugal Pumps--Instructions for Installation, Operation and Maintenance."
   
b. Alignment Tolerances: Meet manufacturer's recommendations.

E. Connections

1. Connect fire-water supply piping to fire pumps and pressure-maintenance pumps.

2. Connect fire pump and pressure-maintenance pump discharge piping to building fire-protection water supply systems.

3. Connect fire pump controllers to building fire alarm system. Refer to Division 16 Section "Fire Alarm Systems."

4. Electrical wiring and connections are specified in Division 16 Sections.

F. Field Quality Control
1. Manufacturer's Field Service: Provide services of factory-authorized service representative to supervise field assembly of components, installation of fire pump units and pressure-maintenance pump units, including piping and electrical connections, field acceptance tests. Report test results in writing.

2. Check suction line connections for tightness to avoid drawing air into pumps.

3. Perform field-acceptance tests for each fire pump unit (fire pump, driver, and controller) and system piping when fire pump unit installation is complete. Comply with operating instructions and procedures of NFPA 20 to demonstrate compliance with requirements. Where possible, field-correct malfunctioning equipment, then retest to demonstrate compliance. Replace equipment that cannot be satisfactorily corrected or that does not perform as specified and as indicated, then retest to demonstrate compliance. Verify that each fire pump unit performs as specified and as indicated.

G. Commissioning

1. Start-up Services: Provide services of factory-authorized service representative to provide start-up service and to demonstrate and train Owner's maintenance personnel as specified below.

   a. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
   b. Train Owner's maintenance personnel on procedures and schedules related to start-up and shutdown, troubleshooting, servicing, and preventive maintenance.
   c. Review data in the "Operating and Maintenance Manual." Refer to Division 1 Section "Project Closeout."
   d. Schedule training with at least 7 days' advance notice.
   e. Provide fire hoses in number, size, and of length required to reach a storm drain or other acceptable location to dispose of fire pump test water. These fire hoses are for field acceptance tests only and are not intended to become property of the Owner.

2. Final Checks Before Start-up: Perform the following preventive maintenance operations and checks before start-up:

   a. Lubricate oil-lubricated bearings.
   b. Remove grease-lubricated bearing covers and flush bearings with kerosene and thoroughly clean. Fill with new lubricant according to manufacturer's recommendations.
c. Disconnect coupling and check electric motor for proper rotation. Rotation shall match direction of rotation marked on pump casing.
d. Check that the pump is free to rotate by hand. Do not operate the pump if it is bound or if it drags even slightly until cause of trouble is determined and corrected.

3. Starting procedure for pumps:
   a. Prime pump by opening suction valve and closing drains, and prepare pump for operation.
   b. Open sealing liquid supply valve if pump is so fitted.
   c. Start motor.
   d. Open discharge valve slowly.
   e. Observe leakage from stuffing boxes and adjust sealing liquid valve for proper flow to ensure lubrication of packing. Do not tighten gland immediately, but let packing run in before reducing leakage through stuffing boxes.
   f. Check general mechanical operation of pump and motor.

3. Provide adequate regular time and off-hour time to start-up and test all equipment and train all owners personally as per the requirements of Section 01011, 01012 and 01700 of these specifications.
I  GENERAL
  A.  General Requirements

  1.  Fire protection system and all related work shall comply in all respects with the rules and regulations of the following which are hereby made a part of these Specifications:

      a.  All applicable National Fire Protection Association standards.

      b.  Applicable local laws, codes and requirements of authorities having lawful jurisdiction over this work, including City of Philadelphia requirements.


      c.  The requirements of the owner's insurance carrier, Factory Mutual.

      d.  Pennsylvania Department of Labor and Industry "Building Regulations for Protection from Fire and Panic".

      e.  National Board of Fire Underwriters code.

  B.  Quality Assurance

  1.  Manufacturer Qualifications: Firms whose equipment, specialties and accessories are listed by product name and manufacturer in UL Fire Protection Equipment Directory and FM Approval Guide and that conform to other requirements indicated.

  2.  Listing/Approval Stamp, Label or Other Marking: On equipment, specialties and accessories made to specified standards.

  3.  Listing and Labeling: Equipment, specialties and accessories that are listed and labeled.

      - The Terms "Listed" and "Labeled": As defined in "National Electrical Code," Article 100.

  4.  Installer's Qualifications: Firms qualified to install and alter fire protection piping, equipment specialties and accessories, and repair and service equipment. A qualified firm is one that is experienced (minimum of 5 previous projects similar in size and scope to this Project) in such work, familiar with precautions required and in compliance with the requirements of the authority having
jurisdiction. Submit evidence of qualifications to the Engineer upon request.

C. Scope of Work

1. This section includes installation of interior sprinkler systems for fire protection and coordination with other trades from a point of connection with incoming water service for fire protection, approximately one foot inside the exterior building wall, or as indicated on the drawings.

2. Work provided by this Contractor under this Section:
   - Pay for and obtain all required code reviews and approvals as required by the Department of General Services, City of Philadelphia and/or Factory Mutual.
   - Complete automatic wet pipe sprinkler system extent as shown on Drawings and described herein.
   - Coordination of work with all trades and other components of the total fire protection system, including flow and tamper switches to be wired by the electrical contractor.
   - Shop drawings and hydraulic calculations (Including auto-cad generated "as-built" drawings see division 1 for requirements).
   - Operating instructions and valve diagrams.
   - Waterflow and valve supervisory switches.
   - Obtain water supply flow test data as required for hydraulic calculations.
   - Inspections, Testing and Certification of entire sprinkler/standpipe installation.
   - Purchasing of all equipment through Temple University as per Section "01012" of these specifications.
   - Coring and firesafing of sprinkler system piping penetrations.

D. Applicable Standards

1. BOCA National Building Code (most current adopted issue.)

2. City of Philadelphia Fire Prevention Code (most current adopted issue.)

3. NFPA Standards (most current adopted issue).
   - No. 13 - Installation of Sprinkler System.
   - No. 24 - Installation of Private Fire Service Mains and their Appurtenances.
   - No. 72 - Protective Signaling Systems.
4. Requirements of the City of Philadelphia Department of Licenses and Inspections.

5. Owner's Insurance Carrier (Factory Mutual).

E. Shop Drawings

1. Product Data: Submit manufacturer’s technical product data for backflow preventer, control valves, sprinkler zone control valve, sprinklers, siamese fire department connection, pressure switch, flow switch, inspector's test valve, drain valve, check valve, hangers, sprinkler cabinet, pipe, fittings, mechanical couplings, escutcheons and all other essential equipment.

2. Prepare shop drawings at minimum scale of 1/8” = 1'-0” for plans, and 1/4” = 1'-0” for details. Show all piping, sprinklers, hangers, roof construction and occupancy of each area, including ceiling and roof heights, room names and number, etc.

3. Installation drawings shall be based on actual building survey of the architectural, structural, heating, ventilating, plumbing and electrical systems as installed.


5. Shop drawings must first be submitted to and approved by Philadelphia Department of Licenses and Inspections prior to submitting shop drawings to this office for review.

6. Shop drawings submitted to this office for review must bear the stamp of approval by Philadelphia Department of Licenses and Inspections.

F. Certificates of Approval

1. Upon completion of the work, furnish to the owner certificates of approval from the Philadelphia Department of Licenses and Inspections and Factory Mutual that all work has been inspected and tested by their representatives and is in strict accordance with their requirements.

G. General Design/Density Requirements

1. Sprinkler system components and related design densities shall be in accordance with the requirements of NFPA 13.

2. Sprinkler spacing, sprinkler temperature rating and sprinkler
discharge density for hydraulically calculated areas shall be as indicated in the schedules on the drawings.

3. Required gpm for hose stream shall be accounted for in hydraulic calculations as required by NFPA 13.

H. Water Flow Test

1. The water pressure requirements for the sprinkler system shall be hydraulically calculated in accordance with NFPA 13 requirements.

2. Contractor shall arrange to conduct a water flow test in the immediate vicinity of the project building with Philadelphia Water Department before proceeding with hydraulic calculations.
   
   ● The test shall be conducted at such time so that a true representation of water supply characteristics will be assured.
   ● If summer testing cannot be accomplished prior to performing the calculation, historical data for summer pressure and flow characteristics shall be used.

I. Test Reports

1. Test Reports: Submit copies of completed field inspection and test forms described in Part 3 of this Section.

J. Maintenance and Operating Data

1. Furnish 5 copies of maintenance and operating data manuals for the complete system. System will not be accepted until maintenance and operating data is submitted and approved by Engineer.

K. Warranty

1. Guarantee: The system suppliers shall guarantee all wiring, equipment, piping, and design for these systems to be free of defects for a period of one year from date of substantial completion.

L. As-Builts

1. Computer generated auto-cad as-built drawings shall be submitted by the contractor before final testing. System will not be accepted until as-built drawings are submitted and approved by the Engineer. (Refer to division 1 for "as-built" requirements.)
II PRODUCTS

A. Acceptable Manufacturers

1. The following is a list of approved manufacturers for the sprinkler system and related fire protection equipment. Inclusion on this list does not preclude the responsibility to comply with the intent of the specification in totality.

a. Grooved Couplings for Steel Piping:
   - Grinnell Supply Sales Co., Grinnell Corp.
   - Gustin-Bacon Div., Tyler Pipe Subsid., Tyler Corp.
   - Stockham Valves and Fittings, Inc.
   - Victaulic Company of America.

b. Fire Protection Service Valves:
   - Gem Sprinkler Co.Div., Grinnell Corp.
   - Kennedy Valve Div., McWane, Inc.
   - Nibco, Inc.
   - Stockham Valves and Fitting, Inc.

c. Specialty Valves
   - Firematic Sprinkler Devices, Inc.
   - Gem Sprinkler Co. Div., Grinnell Corp.
   - Globe Fire Sprinkler Corp.
   - Reliable Automatic Sprinkler Co., Inc.
   - Victaulic Company of America
   - Viking Corp.

d. Waterflow Indicators and Supervisory Switches:
   - Gem Sprinkler Co. Div., Grinnell Corp.
   - Potter Electric Signal Co.
   - Reliable Automatic Sprinkler Co., Inc.
   - System Sensor Div., Pittway Corp.
   - Victaulic Company of America
   - Watts Regulator Co.

e. Sprinklers:
   - Gem Sprinkler Co. Div., Grinnell Corp.
   - Reliable Automatic Sprinkler Co., Inc.
   - Viking Corp.

f. Fire Department Connections:
   - Badger-Powhatan, Figgie International Co.
   - Croker Div., Fire-End and Croker Corp.
   - Elkhart Brass Mfg. Co., Inc.
2. Materials – General Requirements
   a. Products: UL listed (and FM approved) for fire protection service.
   b. Definitions: For materials used for fire protection systems, by NFPA.

B. Piping and Fittings

1. Piping Indoors shall be:
   a. Piping two inches diameter (2") or under shall be Schedule 40, black or galvanized steel pipe and in accordance with ASTM A 53, designed for 175 psig working pressure, and having the manufacturer's name or brand, along with the applicable ASTM standard, marked on each length of pipe.
   b. Schedule 40 steel pipe shall be joined by screwed joints, by welded joints or by mechanical grooved couplings, joined by a UL and FM approved combination of couplings, gaskets and grooves. Grooves may be rolled or cut and they shall be dimensionally compatible with the coupling.
   c. Piping over two inches (2") diameter shall be Lightweight Schedule 10 black or galvanized steel piping conforming to ASTM A 135 and designed for 175 psig working pressure. Piping shall be accepted for sprinkler installation only as permitted by NFPA 13.
   d. Schedule 10 black steel sprinkler pipe shall be joined by...
welded joints or by UL and FM approved mechanical couplings of the rolled groove type. Grooves for the rolled groove type shall be rolled only (cut grooving will not be allowed) and they shall be dimensionally compatible with the coupling.

e. Welding of sprinkler piping in place inside the building shall not be permitted. Sections of branches, cross mains, or risers may be shop welded only.

f. Wall thickness for schedule 10 piping shall be in accordance with piping specification section of NFPA 13.

g. All sprinkler piping in dry system or that is exposed to the weather, or used in a corrosive atmosphere (where noted on drawings) shall be galvanized.

2. Fittings:

1. Threaded fittings shall be cast iron, Class 125 or Class 250, black and in accordance with ANSI B16.4 or malleable iron, Class 150 or Class 300, black and in accordance with ANSI B16.3.

   a. Thread seal compounds and tape used for threaded piping and fittings, shall meet or exceed the requirements of and be applied in accordance with NFPA 13.

   b. Flanged fittings shall be cast iron, black and in accordance with ANSI B16.1. Gaskets shall be full face of 1/8" minimum thickness red sheet rubber. Flange bolts shall be hexagon head machine bolts with heavy semi-finished hexagon head nuts, cadmium-plated, having dimensions in accordance with ANSI B18.2.

   c. Weld fittings shall be steel, standard weight, black and in accordance with ANSI B16.9, ASTM A 234, or ANSI B16.11, ANSI B16.5 or ANSI B16.11.

   d. Grooved couplings and mechanical fittings shall be UL listed and FM approved malleable iron, in accordance with ASTM A 47 or ASTM A 536. Coupling gasket material shall be butyl rubber.

2. Sprinkler system piping and fittings shall be rated at 175 psi in accordance with NFPA 13 requirements as indicated above. However, if the sprinkler contractor's hydraulic calculations indicate portions of the system will be subject to pressures in excess of 175 psi, the piping and fittings in those sections shall be designed and rated for 250 psi.

   a. All sprinkler system piping and fittings shall be designed
for 175 psi and, if necessary, limited to 175 psi by the use of approved pressure reducing devices in accordance with City of Philadelphia and NFPA requirements as specified herein.

C. Valves

1. General: Provide valves that are UL listed and FM approved for fire protection service in accordance with NFPA 13, 14 and 24 and as follows:

   a. All valves shall be suitable for 175 PSI working water pressure except valves subject to pressures in excess of 175 psi, which shall be rated for 250 or 300 psi. All control valves shall open by counterclockwise rotation.
   b. Riser and sectional control valves shall be butterfly type as herein specified.
   c. All sprinkler system floor control valves shall be rated for 175 psi and shall be indicating type butterfly valves with integral supervisory switch.
   d. Each interior OS&Y gate control valve shall be provided with adequate means for mounting an electrical supervisory contact unit which is specified herein.
   e. Drainage and test valves shall be all bronze, globe, angle or gate valves.
   f. Check valve in the fire department connection piping shall have a ball drip with discharge to the outside of the building.
   g. All butterfly valve gear operators and OS&Y gate valves shall be chained and locked on an individual basis. The Sprinkler Contractor shall supply chains for each and every control valve installed on the project. One (1) month before their requirements, the Sprinkler Prime Contractor shall notify Temple University of the number of locks required on the project. The University's Locksmith will supply to the Contractors, the correct quantity of locks to be installed on the chains.

2. Gate Valves

   a. 175 psi rated OS&Y valve with flanged ends, iron body, bronze trim, rising stem, solid wedge disc, Stockham model G-634.
b. 300 psi rated OS&Y valve with flanged ends, iron body, bronze trim, rising stem, solid wedge disc, Stockham model F-670.

3. Butterfly Valves

a. 175 psi rated butterfly valve with grooved ends, flag indicator and internal supervisory switch, Grinnell Gruvlok series 7700 FP.
b. 175 psi rated butterfly valve with wafer or lug style configuration, flag indicator and internal supervisory switch, Grinnell series 8000 FP.
c. 300 psi rated butterfly valve with grooved ends, flag indicator and internal supervisory switch, Grinnell Gruvlok series 7700 HFP.

4. Check Valves

a. 175 psi rated check valve with anti-water hammer features, handhole cover and 1/2" drain connection. Grinnell models F52, F520 or F5201 as required.
b. 250 psi rated wafer check valve with anti-water hammer features, Grinnell model F512 with 1/2" NPT drain connection.

D. WaterFlow Switches

1. Vane type waterflow detectors shall be installed on the sprinkler system piping as designated on the drawings and/or as specified herein. Detectors shall be designed for mounting on either vertical or horizontal piping, but shall not be mounted in a fitting or within 12 inches of any fitting that changes the direction of waterflow, and shall have a sensitivity setting to signal any flow of water that equals or exceeds the discharge from one sprinkler head. Detector switch mechanisms shall incorporate an instantly recycling pneumatic retard element in the adjustable range of 0 to 70 seconds. Switches shall have a minimum rated capacity of 7 amp 125V AC - .25 amp 24V DC and two normally open contacts and shall be actuated by a polyethylene vane extending into the waterway of the piping. Detectors shall be weatherproof dust tight construction and shall provide a 1/2 inch conduit entrance and shall be finished in red baked enamel. Vane type waterflow detectors shall be UL listed and FM approved.

E. Supervisory Devices
1. Supervisory switches shall be installed on each OS&Y gate control valve in the system.

2. Switches shall be mounted so not to interfere with the normal operation of the valve and shall be adjusted to operate within two revolutions of the valve control or when the stem has moved no more than 1/5 of the distance from its normal position. The mechanism shall be contained in a weatherproof die cast aluminum housing, which shall provide a 3/4 inch tapped conduit entrance and incorporate the necessary facilities for attachment to the valve. Switch housings shall have a minimum rated capacity of 1 amp. 125V AC - .25 amp., tamperproof and arranged to cause a switch operation if the housing cover is removed or if the unit is removed from its mounting. Valve switches shall be UL listed and FM approved.

F. Sprinklers

1. General: Provide sprinklers throughout all areas of the building as indicated on the drawings and in accordance with the requirements of NFPA 13.

   a. Sprinklers shall be "standard response" type throughout. "Quick response" sprinklers shall not be permitted.

2. Temperature Rating: Unless otherwise specified, provide sprinklers with ordinary temperature rating as defined in NFPA 13.

   a. Where maximum ceiling temperature exceeds 100°F, sprinklers shall have temperature ratings in accordance with the requirements of NFPA 13. This shall include sprinklers affected by their proximity to heating coils, radiators, unit heaters, skylights or glass where sprinklers are exposed to the direct rays of the sun, commercial cooking equipment, or in electric equipment rooms, electric closets, telephone closets, etc.

3. Corrosion and Mechanical Protection: Provide corrosion-resistant sprinklers where they are exposed to weather, moisture or corrosive vapors. Protect sprinklers installed where they might receive mechanical injury or are less than 7 feet above the floor level with approved guards in accordance with NFPA 13.

4. Spare Sprinklers: In addition to the sprinklers actually installed, furnish spare sprinklers of each type and temperature rating used, as required by NFPA 13. Sprinklers shall be placed in a baked
enamel steel cabinet, mounted on a wall of a secured location (to be determined by the owner). The cabinet shall be located where the ambient temperature will at no time exceed 100°F.

a. The cabinet shall contain sprinkler wrenches and other tools as required to remove and install the sprinklers.
b. NFPA 13 section 2-2.7 shall be met regarding quantities of sprinklers and other provisions of this section.

5. Sprinkler types:

a. General
   - Sprinkler types specified below are listed to establish standards of quality and materials of construction and are not intended to exclude similar products by other acceptable manufacturers, listed at the front of this Section.

b. Specific
   - Type 1: Grinnell model F976 designer, pendent, adjustable royal flush concealed automatic glass bulb sprinkler. 1/2" orifice, 5.6 K-Factor, brass sprinkler with factory white finish on cover plate. 155°F rating on sprinkler, 135°F rating on cover plate. UL and FM approved.
   - Type 2: Grinnell Universal model A, pendent, adjustable recessed automatic glass bulb sprinkler. 1/2" orifice, 5.6 K-Factor, chrome sprinkler with chrome plated escutcheon. 155°F rating on sprinkler UL and FM approved.
   - Type 3: Grinnell Universal model A, pendent glass bulb automatic sprinkler. 1/2" orifice, 5.6 K-Factor, brass finish. 155°F rating on sprinkler. UL and FM approved.
   - Type 4: Grinnell Universal model A, upright, glass bulb automatic sprinkler. 1/2" orifice, 5.6 K-Factor, brass finish. 155°F rating on sprinkler. UL and FM approved.
   - Type 5: (Sidewall)
     Style A- Grinnell Universal model A/Q71 horizontal glass bulb sprinkler with 1/2" orifice, 5.6 K-factor, chrome finish, 155° rating on sprinkler, UL and FM approved.
Style B - Grinnell Universal model A/Q71 glass bulb automatic glass bulb sprinkler with 1/2" orifice, 5.6 K-factor chrome finish, 155° rating on sprinkler, UL and FM approved.

Style C - Grinnell Universal model A vertical upright or pendent sidewall automatic glass bulb sprinkler with 1/2" orifice, 5.6 K-factor, chrome finish, 155° rating on sprinkler, UL and FM approved.

G. Inspector’s Test

1. Provide inspector's test connections, as specified in NFPA NO. 13, at required points for testing each waterflow alarm device. Special discharge nozzle shall have same size orifice as majority of sprinkler heads installed.

2. Provide 1 inch sight glass where inspector's test discharge cannot be readily observed while operating valve.

H. Drains

1. Provide drain valves as required by NFPA 13 and extend drains through outside walls wherever possible, or as indicated on the drawings.

2. Plugs used for auxiliary drains shall be brass.

3. All drain piping downstream of drain valves shall be galvanized.

4. All auxiliary drains and test connections shall be piped to terminate outside of the building wherever possible, or as indicated on the drawings.

I. Ceilings and Wall Plates

1. Install chrome finished ceiling and wall plates wherever exposed sprinkler piping passes through ceiling, and walls in finished areas. (Plates to be supplied by general contractor)

J. Siamese Fire Department Connection

1. New siamese fire department inlet connections to be provided in
conjunction with new wet sprinkler system, work shall be free standing style, cast brass body with drop clappers, 2-way, size 4" x 2-1/2" x 2-1/2" with lettered plate indicating "AUTO SPKR". All exposed parts shall be polished chrome plated. Threads shall be female National Hose (NH) standard thread intake fittings in accordance with City of Philadelphia Fire Department Standards. Potter-Roemer, Inc. fig. 5761.

K. Fire Pump Test Connection

1. Potter-Roemer, Inc. fig. 5867-7, free standing outlet in rough chrome body with polished chrome plated trim, male snoots, caps and chains and removable swivel hose gate valves. I.D. plate shall be lettered "Pump Test Connection".

L. Hangers and Supports

1. General:
   a. Provide pipe supports, sway braces, hangers, and clamps conforming to NFPA 13 that are listed by UL and approved by FM.
   b. Piping shall be substantially supported with approved adjustable hangers and shall be erected in a manner permitting proper drainage of all fire lines and equipment. Hangers shall be UL and FM approved clevis type, as manufactured by Grinnell, Fee and Mason or National Pipe Hanger Corporation. Expansion shields will not be permitted for the support of hangers. Hangers shall be of type approved by the NFPA, but in no case shall the quality of the hangers be less than herein specified. Spacing of hangers shall conform to NFPA requirements.
   c. Support all vertical risers at each floor with riser clamps and structural steel members as necessary to firmly secure the risers from existing building construction. Riser clamps placed on floor construction in finished areas will not be permitted. Riser clamps placed on floor construction in pipe chases or pipe spaces will be acceptable.
   d. Provide lag screws and lag bolts where wood construction is encountered.

M. Sprinkler System Fire Alarm Connections

1. The Sprinkler Contractor shall furnish and install all required new pressure or flow switches, supervisory (tamper) switches, relays, alarm circuit closers, and other equipment necessary to actuate the
building fire alarm system, alarm bell, and for trouble conditions operation. The sprinkler contractor shall coordinate the locations, quantity and type of all devices to be wired with the electrical contractor as indicated on the sprinkler contractor's approved shop installation drawings. All wiring will be included under the Electrical Contract work. The Sprinkler Contractor shall provide the proper wiring diagrams and other pertinent data for wiring into the fire alarm system, and for trouble conditions operation.

N. Backflow Preventers

1. Double check assembly backflow preventers, ASSE 1048, FM approved, UL listed, with OS & Y gate valves on inlet and outlet. Include 2 positive - seating check valves and test cocks for continuous pressure application.
   a. Install supervisory switches for OS & Y valves.
   b. Refer to Philadelphia Water Department Standards for additional information and dimensional requirements.

III. EXECUTION

A. Installation

1. General: Install the wet sprinkler system in accordance with the drawings and specifications. Install the system such that no parts interfere with doors, windows, heating, plumbing, air conditioning systems or electrical equipment.

   Do not run wet system sprinkler piping over electrical panels and/or equipment. Coordinate the locations of sprinklers and piping with elements in the ceiling such that it does not interfere with the ceiling configuration and with the relocation of and interchangeability of ceiling components.

2. Pipe: Install piping as shown on the drawings, complete, and in accordance with NFPA 13. Install piping straight and true to bear evenly on hangers and supports. Keep the interior and ends of new piping affected by Contractor's operation thoroughly cleaned of water and foreign matter. Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter.

   a. Refer to Division 15 Section 15050, "Basic Mechanical Materials and Methods", for basic piping installation.
b. Locations and Arrangements: Drawings (plans, schematics and diagrams) indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
   - Deviations from approved "working plans" for sprinkler piping require written approval from the Engineer.

c. Use approved fittings to make changes in direction, branch takeoffs from mains and reductions in pipe sizes.

d. Install unions adjacent to each valve in pipes, 2" and smaller. Unions are not required on flanges devices or in piping installations using grooved couplings.

e. Install flanges or flange adapters on valves, apparatus and equipment having 2-1/2" and larger connections.

f. Install sprinkler zone control valves, test assemblies and drains adjacent to sprinkler system risers when sprinkler piping is connected to standpipes.

3. Siamese Fire Department Connection: Install siamese fire department connection no higher than three feet above finished grade level.

4. Sprinklers: Space, locate, and position sprinklers in accordance with NFPA 13 requirements.

5. Accessories: Provide all test and drain lines as required by NFPA 13. Provide pressure gauges, signs and other such standard appurtenances as required for a complete installation in accordance with NFPA 13.

6. Provide a nameplate data sign at the main controlling valve and each sprinkler floor control valve identifying the system as a hydraulically designed system indicating the location and basis for design in accordance with NFPA 13.

   a. In addition, provide signs at inspector's test valve, drain valve, alarm test valve and alarm bypass valve.

   b. Install pressure gages on riser of feed main, at each sprinkler test connection and at top of each sprinkler riser. Include pressure gages with connection not less than 1/4" and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal and install where they will not be subject to freezing.

7. Drains: Connect all drain piping to drain locations as indicated.
a. All sprinkler piping shall be so installed that it can be thoroughly drained, and where practicable shall be arranged to drain and terminate outside of the building.

b. The main drain valve shall be piped and arranged to terminate such that a full discharge test will not overflow or otherwise flood the drainage receptor or sump into which it is directed.

c. All drips and drains shall conform to NFPA 13.

d. All drain outlets discharging to the outside shall be located no higher than one foot above grade level, and shall be provided with a splash block.

e. Install ball drip valves to drain piping between fire department connections and check valves and where indicated. Drain to floor drain or outside building.


a. There shall be not less than one hanger for each section of pipe.
   • Where sprinklers are spaced less than 6 ft. apart, hangers spaced up to a maximum of 12 ft. shall be permitted.
   • Starter lengths less than 6 ft. shall not require a hanger, unless on the end line of a sidefeed system or where an intermediate cross main hanger has been omitted.

b. The distance between a hanger and the centerline of an upright sprinkler shall not be less than 3 in.

c. The unsupported length between the end sprinkler and the last hanger on the line shall not be greater than 36 in. for 1" pipe or 48 in. for 1-1/4" pipe, and 60 in. for 1-1/2" or larger pipe. Where any of these limits is exceeded, the pipe shall be extended beyond the end sprinkler and shall be supported by an additional hanger.

d. Sprinkler piping should be adequately secured to restrict the movement of piping upon sprinkler operation. The reaction forces caused by the flow of water through the sprinkler could result in displacement of the sprinkler, thereby adversely affecting sprinkler discharge.
   • When the maximum pressure at the sprinkler exceeds 100 psi and a branch line above a ceiling supplies sprinklers in a pendent position below the ceiling, the hanger assembly supporting the pipe supplying an end
sprinkler in a pendent position shall be of a type that prevents upward movement of the pipe.

- When the maximum pressure at the sprinkler exceeds 100 psi, the unsupported length between the end sprinkler in a pendent position or drop nipple and the last hanger on the branch line shall not be greater than 12” for steel pipe. When this limit is exceeded, the pipe shall be extended beyond the end sprinkler and supported by an additional hanger. The hanger closest to the sprinkler shall be of a type that prevents upward movement of the piping.

e. The length of an unsupported armover to a sprinkler shall not exceed 24” for steel pipe.

- Where the maximum pressure at the sprinkler exceeds 100 psi and a branch line above a ceiling supplies sprinklers in a pendent position below the ceiling, the length of an unsupported armover to a sprinkler and drop nipple shall not exceed 12” for steel pipe.

- Where the limits of the unsupported armover lengths are exceeded, the hanger closest to the sprinkler shall be of a type that prevents upward movement of the piping.

f. Wall-mounted sidewall sprinklers shall be restrained to prevent movement.

g. On cross mains there shall be at least one hanger between each two branch lines.

- In bays having two branch lines, the intermediate hanger shall be permitted to be omitted provided that a hanger attached to a purlin is installed on each branch line located as near to the cross main as the location of the purlin permits. Remaining branch line hangers shall be installed in accordance with NFPA 13 requirements.

9. Inspector's Test Valve: Provide inspector's test valve in accordance with NFPA 13, and provide for discharge into the express drain system at the riser or to a location outside of the building as indicated on the drawings.

10. Welding: Retrieve all welding "cut-out" discs in accordance with NFPA 13 requirements and attach the disc to the piping at the point at which it was cut. Perform all welding in the shop; field welding is not permitted.

B. Acceptance and Testing Requirements
1. Acceptance and testing shall be performed in strict accordance with the requirements of NFPA 13.
   a. This shall include flushing of underground mains and lead-in connections to system risers.
   b. All acceptance and testing procedures shall be performed in the presence of the Owner's representative.
      • Written notice of all such tests and procedures shall be made available to the Owner's representative, a minimum of forty-eight hours in advance.

2. Final Inspection and Testing: Advise when hydrostatic and alarm tests have been completed and all necessary corrections made, so as to permit final inspection and testing.
   a. At the final inspection, a material and test certification shall be provided in accordance with NFPA 13.
   b. Final inspection shall include full flow testing through both the main drain and the inspector's test connections.
   c. Provide all equipment, services and labor to properly perform and supervise required tests.
   d. All OS & Y control valves shall be operated as a part of the final inspection and testing procedure.
   e. Verify that specialty valves, trim, fittings, controls and accessories have been installed correctly and operate correctly.
   f. Verify that excess pressure pumps and accessories have been installed correctly and operate correctly.
   g. Verify that specified tests of piping are complete.
   h. Check that damaged sprinklers and sprinklers with paint or coating not specified, have been replaced with new, correct type of sprinklers.
   i. Check that sprinklers are correct type, have correct finish and temperature ratings, and have guards where required for applications.
   j. Check that potable water supplies have correct type of backflow preventer.
   k. Check that hose valves and fire department connections have threads compatible with local fire department equipment and have correct pressure rating.
   l. Fill wet-pipe sprinkler system with water.
   m. Check for correct type and size hose valves.
   n. Energize circuits to electrical equipment and devices.
   o. Start and run pumps.
p. Adjust operating controls and pressure settings.

C. Demonstration

1. Demonstrate equipment, specialties and accessories. Review operating and maintenance information with owner representative.
2. Schedule demonstration with at least 7 days’ advance notice.
I. **GENERAL:**
   
   A. Systems are to be provided with sectionalizing valves to allow isolation of portions of systems without outage and drainage of entire systems to perform work. Valves up to 2-1/2" diameter are to be Nibco, fully ported, and 3" diameter and above are to be DeZurik Butterfly Valves, lugged, 150#, High Performance, stainless steel with Teflon seats and seals. **THERE ARE TO BE NO SUBSTITUTIONS.**
   
   B. A curb key for each of the various valves are to be furnished as part of the Plumbing Contractor's Contract.
   
   C. A permanent marker on the building exterior (identifying the underground service and line diameter) and a permanent marker on the footpath, (a valve box cover will suffice) shall identify and be used to locate future excavations for buried services. This applies to fire water lines, potable water entrance, gas line, sanitary sewer, etc.
   
   D. Cleanouts are to be accessible from public areas, such as: corridors, building exterior, etc. Floor cleanouts are preferred to wall cleanouts.
   
   E. Floor drains, of sufficient number, are to be installed in each toilet room, mechanical equipment area, laundry areas, commissary, concession stand, or area where washdown, spillage or large amounts of water from ruptured lines could accumulate.
   
   F. All new buildings and additions to existing buildings to have water hydrants on each elevator.
   
   G. All new buildings and additions to existing buildings to have domestic water lines to recessed hand boxes for future irrigation of landscaped areas adjacent to building. Coordinate with Temple University Grounds Department.
   
   H. **PIPING AND VALVES**
      
      1. Steam Service - Piping shall be ASTM A - 106B, Sch. 80, seamless, beveled ends, random lengths, as specified.

      Roof Valves - 300#, steel, OS&Y, flanged, Gate Valves, rising stem, replaceable seats, stellite coated seats, stainless wetted parts, teflon packing.

      Manual Controlling Valves - 300#, steel, flanged, globe valve, replaceable seats, Teflon packing.
2. Condensate - Piping shall be ASTM A - 53B, S/80, ERW, Threaded ends to 1 - 1/2" and plain ends 2" and above, random lengths as specified.

Root Valves - 150#, steel, gate valves, OS&Y, flanged, rising stem, replaceable seats, stainless steel wetted parts, Teflon packing.

Manual Controlling Valves - 150#, lugged, Butterfly valve, High Performance, stainless steel wetted parts, Teflon seat and seals, DeZurik.

3. Pressurized Air - Piping to be ASTM A-120, ERW, Threaded ends to 1 - 1/2" and plain ends 2" and above.

Valves up to 1-1/2" are to be screwed Ball valves, 150#, stainless steel, Teflon seats and seals, Jamesbury.

Valves 2" and above to be 150#, lugged, Butterfly valve, High Performance, stainless steel wetted parts. Teflon seats and seals, DeZurik.

4. Valving in General - Valve Actuators over 2" diameter are to be pneumatically operated, 3-15 PSIG signal, but the entire system does not have to be pneumatic, the actuators must be.

2 1/2" and above to be 150#, lugged, Butterfly valve, High Performance, stainless steel internal parts, Teflon seats and seals, DeZurik, lever operated up to and including 4" and gear operated 6" and above.

Inaccessible valves are to be provided with reach rods or chainwheel operators.

Valving for venting and draining is to be routed to an accessible location for expedient operation and drainable to the sanitary sewer or to a disposal location.

Valves locations are to be identified with numbered tags on ceiling grid or attached to valves and drawings are to reflect those same numbers.

Must be maintained and where access is limited the valve orientation is to be shown on the drawing.
5. Piping in General - Flexibility and stress are to be compensated with piping arrangement or expansion loops before resorting to expansion compensation.

Low points are to have drains and high points are to have vents. Vents and Drains regardless of the system contents. Drains and vents are to be accessible, in every case. Drains and vents are to be routed to either a sanitary sewer or to a disposal location. Unless the line size prohibits, ALL vents and drains are to be minimum of 3/4", sized for draining a system in emergency conditions.

Sufficient room shall be designed to permit maintenance of installed piping systems, which includes working space between piping lines or piping lines to obstacles, this space includes the insulation allowance.

Traps are to be Sarco Brand, size and style as designed.
I. PRODUCTS:

A. Backflow Preventers: Are to be Conbraco, series 40 - 200, reduced pressure zone type. Fire Water entrances are to be double check assembly, Conbraco, series 40 - 100.

B. Electric Drinking Fountains: To be Elkay, suitable to ADA requirements, model EHFSA-8. Where only one drinking fountain is provided on a floor there shall be one mounted at ADA height and one mounted higher for people with difficulty bending or stooping.

C. Fixtures: All fixtures to be Kohler as follows:

1. Toilets:
   b. Floor mounted ADA: Highline Waterguard Toilet, K-3527-EB.
   c. Wall mounted: Kingston Waterguard Toilet, K4-330-ET.

2. Urinals:
   b. Limited space installation: Derry Urinal, K-5007-T.

3. Basins:
   b. ADA: Morningside Wheelchair, K-12634.

D. Showers: Speakman S-1490 (Sentinal Mark II)

E. Flush Valves to be manufactured by Sloan:
   (a) Sloan sensor operated royal model flushometer #111 ES-S with EL-154 transformer (120 vac/24 vac 50 va).
   (b) Sloan sensor operated royal model flushometer #186-1 ES-S with EL-154 transformer (120 vac/24 vac 50va).
F. Faucets to be manufactured by Sloan.
   (a) Sensor operated electronic hand washing faucet model #ETF-600-A-LT with transformer #EL-154 (120 vac/24 vac 50/60 HZ (50VA) – Box mount).
   (b) Sensor operated electronic gooseneck hand washing faucet Model #ETF-700-A-LT with transformer #EL-154 (120 vac/24 vac, 50/60 HZ (50 va) box mount).

G. Mop Receptor to be by Florestone, Model MSR-2424.

   1. Faucet for Mop Receptor to be Model MR-371, Florestone.
   2. Mop Hanger to be Model MR-372, Florestone.
   3. Stainless Steel Rim Guard, #304, 20 ga., 4 at 24".

H. Wall hydrants to be Model No. Z1320 by Zurn Industries, Inc.
I. PRODUCTS:
   A. Medical Gases: All gas, air and/or vacuum lines shall be equipped with valves every 36" o.c. with removable serrated nozzle host fittings (typical). Provide gas, air and/or vacuum lines to lab benches, new and existing (where they do not presently exist).

   ** Solenoid Valves in Natural Gas Service are to open electrically and spring to close.
I. PRODUCTS:
   A. Supplemental Cooling: Provide supplemental and/or 24 hour cooling as indicated or required by room function: Copy Rooms, Word Processing, Computer Rooms, Telephone Equipment Rooms as manufactured by Trane or Liebert only.
I. PRODUCTS:
   A. Exhaust Fans: Provide exhaust fans manufactured by PennVent in all Copy Rooms, Kitchens, Conference Rooms, Toilet Rooms, Lounges and as indicated in the Construction Contract Documents.
I. PRODUCTS:
   A. Air Ducts: All air duct systems shall be constructed of two gauges heavier than standard gauges of galvanized steel sheets, with bracing, reinforcement and construction details in accordance with the latest ASHRAE Handbook and SMACNA HVAC duct construction standards.

END OF DIVISION
DIVISION 16 - ELECTRICAL

16010 BASIC ELECTRICAL REQUIREMENTS

I. GENERAL:

A. Lighting and Electrical: Provide all materials and labor for the complete electrical work as shown on the drawing and as specified. Any applicable device or work incidental or necessary to make the work complete shall be provided without additional expense to the owner.

B. Codes: The work shall be installed in accordance with all applicable Codes by duly licensed and authorized mechanics. Any existing electrical work within project area not complying with existing Code requirements shall be corrected. Provide all emergency and exit lights, smoke and heat detector and alarm systems as required by Code.

C. Engineering: The Contractor shall be responsible for determining circuiting of all electrical outlets and fixtures and shall provide engineer stamped if drawings, if required.

D. Coordination: All electrical work to be coordinated with all other trades. Lighting fixtures shown attached to millwork are by Electrician. No walls or ceiling shall be closed up before an inspection by Temple University Facilities Management has given its approval.

E. Dedicated, Isolated Circuits: The term "dedicated circuit" shall mean a unique circuit wired directly to breaker box with no other outlets or equipment attached. There shall be a maximum of 3 PC's with hard drive and printers per 20 amp circuit. The term “isolated circuit” is a circuit which is dedicated and will carry a continuous ground to a branch circuit panel. All “isolated circuits” to be orange.

F. Conduit is to be used for all wiring. Main Campus armoured cable may be used only in office walls and within 8’ of light fixtures. All Hospital spaces to be conduit only for all wiring.

G. Scheduling of Work:

1. Utility shutdowns that need to be scheduled must be coordinated with Temple University's Engineering Department in the Facilities Management Office and requires a (1) week notice to Temple University before the shutdown. This will include any utility, existing or new, that needs to be secured during this project. Any premium time or additional cost to accomplish these shutdowns that need to be scheduled after normal working hours must be
absorbed by the contractor and considered to be included in the bid. All shutdowns of any operating facility or services including plumbing, refrigeration, heating, air conditioning, electrical or other installations must be preceded by a written request.

2. All existing utility shutdowns that need to be scheduled will be assumed to occur during nights, holidays or on weekends. The contractor will assume all damages that occur if he fails to notify Temple University's Office of Facilities Management and secures an existing utility. The contractor will be charged directly off of the total project cost for any damages occurring during these unscheduled shutdowns.

3. Temple University reserves the right to have other contractors perform work in any areas on campus while this project is underway.

II. EXECUTION:

A. Lamps: All lamps for new and existing fixtures shall be furnished by the Contractor.

B. Temporary Electrical: Provide all temporary power and lighting, as required to meet all OSHA Standards.

C. Switch Location: Unless otherwise noted, all switches shall be set 4'-0" from centerline of plate to floor, and those at door 7" from door buck opening to centerline of first toggle, if conditions and configuration permit.

D. Outlet Locations: Unless otherwise noted all electrical, telephone and signal outlets shall be mounted vertically 18" above the floor. Alternate mounting heights are expressed with a number adjacent to the symbol which represents mounting height in inches above finished floor to center of the outlet.

E. Circuiting, Switching: Private office and rooms shall be switched separately from the door location. General areas, secretarials/staff areas shall be switched from a central area. Where more than one switch occurs in the same location, they shall be installed in gang type box under one cover plate. Dimmer switches, thermostats, fan controls or other switches which cannot be installed under same gang-type cover plate shall be closely spaced and aligned horizontally with light switches. Circuiting if indicated on reflected ceiling plan is for concept only. Electrical Engineer/Contractor shall determine the actual number of circuits and switching devices required according to code and standard practice. There shall be a maximum of 6 duplex outlets per 20 amp circuit for general use.
F. Telephone/Signal Outlets: Provide wall mounted telephone and signal outlets consisting of a wall box with conduit and pull string to a location under raised floor as above accessible ceiling.

G. Side by Side Outlets: Unless otherwise noted, all side-by-side outlets shall be mounted vertically, 2" from edge of plate to edge of plate.

H. Plenum Installation: All wiring is to be protected in 2 Code-conforming manner. Contractor to encase all wiring, including power, telephone and signal, in return air plenum ceiling space, in conduit as required. Where cabling is run free-air, plastic rated cable shall be used.

I. Electrical for Other Trades: Provide all power as required for other work, including but not limited to, HVAC, exhaust fans, appliances, task lighting in conjunction with millwork items, etc. Outlets for appliances as indicated in the drawings.

J. Finishes Of All Cover Plates: To be brushed aluminum US26D. Unless otherwise specified by Temple University.

K. Locations Of All Floor Outlets: To be laid-out by the Contractor and specified by Temple University. Any field variations to be approved by Temple University Facilities Management.

L. Low-Voltages: Provide all wiring, transformers, etc. for low voltage system.

M. Coordination: Contractor is responsible to coordinate work with other trades.

III. ELECTRICAL EQUIPMENT

A. High Voltage Switchgear: All factory provided wiring and all buswork is to be solid copper.

Switchgear is to be designed for ease of maintenance and selected so that all gear is "racked out" through the front of the gear.

Instrumentation is to include:
Digital - Voltmeter per Phase
Ampmeter per Phase
Power Factor Meter
Watthour Meter - Instantaneous
Totalizing Watthour Meter
Switchgear cubicles are to be equipped with LED type colored lamps to indicate a breaker is "open," another for "closed" and another for "tripped."

All switch gear should be factory provided with approved lightening provisions.

B. High Voltage Cable and Connections: High voltage cable is to be Pirelli brand, no substitution, Eprotenax Insulation type MV - 90, 15KV service, 133% Insulation Level, 1/c Copper, EPR Based Insulation, Shielded, PVC Jacket, stranded Class B Copper Conductor properly sized.

High Voltage Connectors to be Elastimold Load Breaks or, no substitution. Terminations are to use the properly sized and selected Elastimold Stress Cones.

All cable not contained in conduit is to be fireproofed with the appropriate fireproofing wrap.

C. Manholes: Manholes are to be designed to support heavy truck traffic, precast or poured in place, minimum clear height inside of 8'-0", pulling irons in the center of all four walls, minimum 36" diameter cover stamped to indicate electric with security bolting manhole located off-center above ladder for safety, ladder to be embedded steel rungs, depressed sump hole to one side of the ladder for pumping. Provide electric power for the sump pump at an elevation of 36" from bottom of manhole. Breakout panels on all 4 sides.

Exterior of manhole and all assembly joints are to be waterproofed. Frame and cover to be suitable for heavy truck traffic and the cover to indicate "ELECTRIC."

D. All subterranean power service feed conduits are to be S/40, PVC and sized one full conduit size above what the code requires but in no case less than 5" diameter for power cables and one full conduit size above what is required for all other services but in no case less than 2" diameter.

E. Interior/exterior motor drives over 1/2 HP: Motors are to be properly sized, TEFC, Service factor of 1.25, motor winding insulation Class "H" ball or roller bearings, bearings permanently lubricated, PF minimum of .9, guarded couplings. Motors are to be equipped with Phase Reversal Protection and Single Phase Protection.

F. Wiring: All Wiring is to be copper, properly sized, "THHN" insulation and additionally, wire shall be in conduit.
G. Light Switches and Receptacles - 115VAC: These units are to be selected for 20 amp service, copper, all connections made on termination screws. **Hospital Grade is to be installed where medical services are provided. Receptacles of amperages higher than 20 will be specified.**

H. Fuses: Replaceable element fuses are not to be used. Dual element fuses are to be used, where fusing is necessary.

I. Lighting and Power Distribution Panels: These panels are to have a Main Breaker, all copper buswork and connectors, minimum 25% excess breaker capacity after sizing panel, but in no case less than ten (10) extra breakers.

J. Photocell controlled circuits are to be used in conjunction with a time clock. Photocell to be wired to override the timer clock.

K. Units where size dictates, shall have smoke detectors installed by Electric Subcontractor to be coordinated with building Fire Alarm System.
I. PRODUCTS:

A. WIREMOLD 3000 Series in lengths and outlets spacing as indicated on the drawings.

B. WIREMOLD 4000 Series to be used for combined electric and data.

C. CONDUIT GENERALLY:

1. The contractor, when installing conduits, fittings and supports, will install these devices with the intention that they must be accessible at a future date.

2. The contractor will run conduits to conform with the design of internal spaces and will uphold the "cosmetic code" that is applied in the original design. This means that all conduits will be run plumb and square with all building lines. The contractor will run these lines as close as possible to walls, columns and structural members. The pipe will always be concealed unless it is run in an equipment room. All wiring devices and controls shall be flush mounted in walls except on equipment rooms and areas noted otherwise.

3. If the contractor has a sub-contractor running the electrical conduit, it will be the contractor's responsibility to coordinate the electrical craftsmen with all the other tradesmen on this project. In the event that interference with the work or schedules of other tradesmen occurs, Temple University will determine which craft will continue working and which work must be relocated, regardless of which trade installed his lines first. This will occur at no additional cost to the University.

4. All conduit and wire ways will be installed to maintain a minimum of 3" from hot water piping. All newly installed conduits must insure sufficient distance from other work to permit a clearance of no less than 1" between raceways and ducts, cold water piping, valves, fittings and any newly installed utilities.

5. When underground P.V.C. electrical lines are specified in the enclosed documents, the contractor will install these lines in a concrete envelope in compliance with all national and local codes relating to the transmission of 15 K.V.

6. The contractor will provide red dye in the concrete that is poured cover the 15 K.V. underground P.V.C.
16535 EMERGENCY LIGHTING

I. PRODUCTS:
   A. Exit Signs: All exit signs to be Dualite E-Z snap exit signs in white casing with a red LED light and universal mount.

16515 INTERIOR LIGHTING FIXTURES

I. PRODUCTS: The following products are to be used unless otherwise specified by Temple University.
   A. Fluorescent Fixtures - Lay-In
      1. Prismatic
         2’x4’ Simkar no. TY-SR Series lay-in Troffer or 2’x4’ 4-32W Lamps Metalux no.
   B. Fluorescent Downlights: Shall be Lightolier 8056 CL with compact fluorescent FL light fixture.
   C. Fluorescent Wallwasher: Shall be Lightolier 8044 CL with compact fluorescent side mounted PL light fixture.
   D. Track Lighting: Shall be as specified on drawings LIGHTOLIER "Lytespan" System with "Advent" track (2-circuit) and Model 6222 "Bell Lytespots", polished chrome with 402, S-11 Intermediate Base lamps. Unless otherwise indicated, provide 1 fixture/2 lineal feet of track.
   E. Accent Downlights: Shall be LIGHTOLIER 2061, white with 50W bulb, 2053 housing, low voltage.
   F. Strip Fluorescent: Shall be SIMKAR "CH" series, rapid start in lengths as indicated or required. Use 115V or 277v as appropriate to the specific building electrical system.
   G. Replace all magnetic ballasts within room to electronic ballasts. Relamp all light fixtures. Replace lens noted on drawings.
   H. Exterior Lighting: There are 2 types of exterior standard light fixtures.
      1. Glowtop by Gardco (Thomas Gardco Lighting) MAG 18, Distribution 3, 100 MH, multitap. BLP, with festoon and 2 flood lites on each pole. Flood lights to have MK PTA, MK Tab for
DF7, SRS 4.5-18Y with one festoon. (2) DF7 VFL 250 MH mount. (1) set VPAB $\frac{3}{4}'' \times 3'' \times 3''$.

I. All parapet mounted lighting to be in white housing lamps for exterior lighting.

II. LIGHTING GUIDELINES

A. Approvals

1. Incandescent lighting fixtures may not be specified unless approved in writing by the University. Any specification of incandescent fixtures without this written approval will be redesigned and re-specified at the expense of the Design Professional.

2. Lighting fixtures that cannot be serviced by a 12ft. ladder shall not be specified unless approved in advance in writing by the University. Any specification of a fixture that cannot be serviced by a 12ft. ladder will be redesigned and re-specified at the expense of the Design Professional.

3. Every job that involves new lighting fixtures should be reviewed as early as possible with the Energy Manager. Final drawings and specifications must be approved, in writing, by the Energy Manager.

4. The above review/approval requirement applies to jobs done in house as well as work done by outside architects and engineers.

B. Lamps

1. The standard fluorescent lamp size is a 4' long, 32 watt "$T8$" (1" dia.).

2. Fluorescent Lamp Specifications

   a. Acceptable manufacturers are: Phillips, Osram/Sylvania, and GE. Phillips is preferred.

   b. The typical four-foot fluorescent lamps shall be Phillips F32-T8-TL-841.

   c. All lamps shall be T8, rapid-start, medium bipin type (except 96" lamps which are single-pin, instant-start).
d. Color temperature shall be 4100K, with 80 CRI minimum.

e. Average rated lamp life shall be no less than 20,000 hours.

f. Fluorescent lamps shall comply with Table 1, FLUORESCENT LAMP PERFORMANCE REQUIREMENTS.

Table 1
T8 FLUORESCENT LAMP PERFORMANCE REQUIREMENTS

<table>
<thead>
<tr>
<th>Lamp Length</th>
<th>24&quot;</th>
<th>36&quot;</th>
<th>48&quot;</th>
<th>96&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Watts</td>
<td>17</td>
<td>25</td>
<td>32</td>
<td>59</td>
</tr>
<tr>
<td>Minimum Mean Lumens</td>
<td>1,230</td>
<td>1,980</td>
<td>2,650</td>
<td>4,050</td>
</tr>
</tbody>
</table>

C. Ballasts

1. In most cases the ballasts should be electronic type. Standard magnetic ballasts are not acceptable unless otherwise specified by Temple University (such as areas in the hospital or research labs where there is concern over radio frequency interference with electronic equipment).

2. Ballast Specifications


b. Ballasts shall be UL listed, Class P.

c. In buildings with Simplex power-line-single-carrier clock systems the only acceptable manufacturer is Q-Technology, Inc. Alternate ballasts will be considered only if they are approved by Simplex and meet all of our other performance specifications.
d. Ballasts shall be either soft-start or rapid-start type. Unless noted otherwise on the drawings, instant-start ballasts are not acceptable.

e. Ballasts shall be parallel design so that when one lamp burns out the others remain lit. Unless noted otherwise on the drawings, series design ballasts are not acceptable.

f. Tandem-wiring (whipping), where one ballast drives lamps in more than one fixture, is not acceptable. Unless noted otherwise on the drawings, every fixture shall have a ballast.

g. Ballast performance shall comply with Table 2, ELECTRONIC BALLAST PERFORMANCE REQUIREMENTS.

### Table 2
**ELECTRONIC BALLAST PERFORMANCE REQUIREMENTS**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sound Level</td>
<td>Shall not exceed Class A ambient noise levels and must meet FCC Rules &amp; Regulations, Part 18.</td>
</tr>
<tr>
<td>Frequency</td>
<td>25 KHz minimum</td>
</tr>
<tr>
<td>Line Transients</td>
<td>ANSI/IEEE C 62.41, Category A</td>
</tr>
<tr>
<td>Temperature Rise</td>
<td>Less than 15øC rise over 40øC ambient</td>
</tr>
<tr>
<td>Crest Factor</td>
<td>1.50 maximum 1.35 minimum</td>
</tr>
<tr>
<td>Power Factor</td>
<td>.99 minimum</td>
</tr>
<tr>
<td>Ballast Factor</td>
<td>1.30 maximum (efficacy): 1.15 minimum</td>
</tr>
<tr>
<td>Harmonic Distortion</td>
<td>10% THD maximum</td>
</tr>
<tr>
<td>Flicker</td>
<td>2% maximum</td>
</tr>
<tr>
<td>EMI &amp; RFI</td>
<td>Must comply with EMI and RFI limits in CFR 47 Part 18, Section A</td>
</tr>
<tr>
<td>Voltage</td>
<td>Ballast shall withstand voltage fluctuations</td>
</tr>
</tbody>
</table>
Fluctuation: of +/- 25% and maintain constant light output for voltage fluctuations of +/-10%

D. Reflectors

1. Reflector Specifications

a. Preferred manufacturers of silver film reflectors are 3M (Silverlux).

b. Aluminum reflector material shall be Alcoa EverBrite.

c. All reflectors shall be custom designed for the greatest possible light output from the fixture in which they will be used.

d. Two-piece reflectors, and one size fits all reflectors are unacceptable.

e. Lamps must be centered in the reflector channels for maximum light output.

f. All reflectors shall be UL listed as ballast enclosures.

g. For easy ballast accessibility, all reflectors shall be snap in tab style, requiring no tools for reflector removal.

h. All reflector kits shall contain socket raceways made of white painted 0.030 inch steel and shall be properly sized for the intended troffer application.

i. All reflectors shall be installed in accordance with the manufacturer's recommendations. Reflector installation shall include new raceways, UL listed lamp sockets (tombstones), and approved fasteners.

j. For retrofit installations, vendor must provide independent photometric test reports of both an original four lamp luminaire and the identical luminaire retrofit with the proposed reflector retrofit configuration. Included in the reports shall be:

(1) The overall efficiency of both luminaries
(2) Luminous intensity values and curves illustrating the shape of the light distribution for both luminaries

(3) Luminance summaries for both luminaries showing reduction in glare

(4) Visual Comfort Probability ratings under standard conditions for both luminaries

(5) Coefficient of Utilization tables for each luminaire to allow analysis of actual room conditions.

k. Before and after any lighting retrofit installation, vendor must take measurements directly under and halfway between the luminaries, in no less than 50% of the affected rooms, and provide light level readings in footcandles that are representative of the average before and after light levels.

l. The performance of all reflectors (silver and aluminum) and reflector installations shall be warranted for a minimum of ten years from the date of installation.

m. Installers of new fixtures or reflector retrofit kits shall assume liability for any removal, fabrication and installation costs not covered by the manufacturer's warranty.

E. Disposal

1. Lighting Demolition Specifications

a. All debris, including ballasts and lamps, shall be disposed of in accordance with all applicable federal, state and local regulations.

b. Contractor is responsible for all disposal costs.

c. Contractor shall supply all required waste containers. No demolition debris, including lamps and ballasts, may be deposited in the University's waste containers.

d. Contractor shall be responsible for any damage resulting from the removal or retrofitting of lighting fixtures.
e. Contractor shall be responsible for all cleanup costs and after every workday shall leave the area clean and ready for normal office/classroom activity.
16620 EMERGENCY GENERATORS

I. GENERAL:
   A. Caterpillar of Kohler equipment, fueled by Natural Gas. Needs a remote status indicator, remote goes to the guard room with a remote to the Firemen's entrance. The On/Off Status shall be tied into the Building Maintenance System.
I. GENERAL:
   A. Manufacturer is Simplex, Model 4020 or 4100.
   B. All initiating devices shall be addressable except where located in parking garages and existing locations.
   C. Each device shall be clearly identified at the Fireman’s Annunciator Panel.
   D. The Fire Management System may be located by choice, however, there must be an annunciator panel at the building entrance where the firemen enter that instructs what device is in or initiated the alarm and where the device is located. Temple University to approve location.
   E. The Fire Alarm System shall notify Security and shall not dial up the Philadelphia Fire Department.
   F. Elevator recall is required, even if not required by code.
   G. The electrician is responsible for wiring all flow and tamper switches associated with the sprinkler system.
   H. There is to be a two (2) wire “Dry Line” from the panel modem to the office of Facilities Management, located at 10th & Montgomery. This line should be shown on all engineers prints.
   I. Stopper II Covers on all pull stations.
   J. All drawings, specifications, calculations, hydraulic studies, coverages and densities, sprinkler head layouts, piping arrangement, devices, locations, etc., etc., whether mechanical or electrical, are to be reviewed by Temple University’s underwriter, prior to submittal to the city for L & I review and approval.
   K. All fire exit doors in sprinklered buildings and fully automated fire alarm system need to have delay egress devices unless the doors are used as a point of entry also. Outputs are required to unlock all delay egress devices in case of fire.
   L. All delayed egress devices are to have proper signage denoting the delay.

II. PRODUCTS:
   A. Delay egress devices are to be: Von Duprin "Chexit" where outside access is required. Locknetics "101+" is to be used where outside access
is not required. In cases where a combination of access exists all devices are to be the Chexit. All delay egress devices are to be wired to the Fire Alarm System to unlock during a fire.
16722 BUILDING SECURITY EQUIPMENT

1.0 GENERAL:

1. All security systems are to be compatible with Temple’s existing reporting systems.

2.0 INTRUSION ALARM SYSTEM

2.1. Alarm control panel – Bosch

A. D7412GV2 with DX4020 communication option.

1- All wire used for initiating devices shall be 4 conductor, 22 AWG copper, stranded. Solid wire will not be accepted under any circumstance.

2-Where possible all wiring shall be run concealed. Any exposed wiring shall be run in EMT in mechanical areas and in wire mold (painted to match surface to which it is applied) in finished areas.

3-The requirement for metal raceway above ceilings shall be in areas with large amounts of money, hospitals and other high security areas.

4-Where wire is run "free air" in ceilings it shall be secured to existing conduit or building structure not to any water pipe or steam pipe.

5-Security wires are to have no splices along their entire length.

6-End of line resistors must be placed on all zones. Resistors on used zones shall be placed at the end of the line in the initiating device. On unused zones the resistor shall be placed inside of the control panel.

7-No more that 1 initiating device shall occupy 1 zone unless authorized by Temple University Office of Facilities Management.

8-Temple shall be responsible for all programming of panels.

9-All alarm panels shall be located within the "protected area".

10-All alarm panels shall be supplied with a tamper switch.

11-All alarm panels shall be supplied with a 12VDC 7AH gel-cell backup battery.

2.2. Keypad – Bosch

A. D1255

1-All keypads shall have a 4 conductor, 22AWG copper, stranded communication cable "home run" back to the alarm panel.

2-Keypads shall be mounted level and secure at a height of 54” to the center. In cases where wire mold is used, keypads shall be mounted with a surface mount wire mold box (painted to match).
3. Location shall be near as possible to the entry/exit door of the space. In cases the keypads is used to unlock the door it shall be located outside the protected area, all other times it shall be located inside.

2.3. Motion Detectors

A. Honeywell IntelliSense DT435:

1. All detectors shall have a 4 conductor, 22AWG copper, stranded wire for power and alarm.

2. Motion detectors shall be securely mounted at a height of 7'-6" to the bottom. In cases where wire mold is used, detectors shall be mounted with a surface mount wire mold box (painted to match).

3. In locations where large amounts of money, drugs or other valuables are to be housed use DT460 "anti-masking" motion detectors with the tamper switch in the detector wired to a separate zone from the alarm contacts.

2.4. Door Contacts

A. GRI 202012 with 3/4" Collar:

1. Door contacts should be avoided when possible.

2. No surface mount, roller or plunger type contacts will be accepted.

3. Any use of door contacts must be approved by Temple University Office of Facilities Management.

2.5. Infrared Beam Detectors

A. Honeywell IntelliSense TB360S:

1. Use of IR beams shall be determined on a case by case basis by Temple University Office of Facilities Management.

2.6. Panic Buttons

A. USP – HUB3B Desk mount

B. USP – 654 Wall mount (Mount on single gang blank cover with box).

2.7. Miscellaneous:

A. The use of audio detectors, glass break detectors, vibration sensors, window bugs or foil tape will not be accepted for any reason.

B. Any keys, books, spare part kits etc. shall be turned over to Temple University Office of Facilities Management.

2.8. Delay Egress Locks:

A. Von Duprin Chexit

1. In all cases the fire release input shall be wired into the fire alarm system.

2. In all cases the door alarm output shall be wired into an intrusion alarm.
3-Every door shall have signage stating:

   Emergency exit only, alarm will sound.
   Push crash bar until alarm beeps.
   Door will unlock in 15 seconds.
   This exit is being video taped.

3.0 VIDEO SYSTEMS – Digital (IP Network)

3.1. General:
   A. Where possible all data cables shall be run concealed. Any exposed wiring shall be run in EMT in mechanical areas and in wire mold (painted to match surface to which it is applied) in finished areas.
   B. The requirement for metal raceway above ceilings shall be in areas with large amounts of money, hospitals and other high security areas.
   C. Where wire is run "free air" in ceilings they shall be secured to existing conduit or building structure not to any water pipe or steam pipe.
   D. Data cables are to have no splices along their entire length.

3.2. Outdoor Camera: IQinVision Sentinel Series
   A. IQ852V6NPSS – These units can operate on POE without the need of the Pelco power supply.

   A. IQA12N1-B5 – these units can operate on POE without the need of the Pelco power supply.

3.4. All cameras shall be programmed locally for:
   A. Time stamp disabled.
   B. Timeserver protocol set to none
   C. Image quality set to fine.
   D. Image crop set to 1280x1024
   E. Network set to 100mbs full duplex.
   F. Location as name.
   G. Other settings as required.

3.5. Power Supplies: Pelco
   A. MCS series with circuit breakers. Exact model will depend on the number of cameras. Only required if no POE is available.

3.6. Ethernet Cable:
   A. Outdoor, General Cable GenSpeed 6000 category 6, part #7136100
   B. Indoor, Superior Essex, Nextgain® Enhanced Category 6A, color blue, plenum-rated, PN 54-246-2B
C. Cables are to be pulled from the camera to the designated Telecomm closet, all terminations are to be done by Temple.

3.7. Video Recorder / Server:
   A. The PC used as the Server shall have at a minimum:
   B. Latest Intel chipset motherboard.
   C. P4 dual core processors 3.0Ghz.
   D. 2 gigabytes of RAM.
   E. 80 gigabyte 7200 rpm SATA system drive set as drive C:.
   F. Microsoft Windows 2003 Server operating system.
   G. Five 500gig 7200 rpm Western Digital SATA hot swappable hard drives.
   H. Setup as a four drive RAID 5 with one spare.
   I. 4U rack mountable case complete with rails.
   J. Dual 10/100 network interface ports. One shall remain disabled and used as a spare.

3.8. Software:
   A. Milestone XProtec Enterprise.
      1-All camera licenses shall be added to the existing Milestone SLC.
      2-Servers shall be programmed to add to the existing multi-server Milestone system.
      3-Servers shall be set to be slaves to all other servers.
      4-Servers shall have the existing user database copied to or rewritten in it.
      5- Servers shall have the existing view database copied to or rewritten in it.
      6-Servers shall be setup to allow remote desktop connections.

   B. After all cameras are programmed in, a new view/s shall be added to the existing copied all servers.

   C. All cameras shall be programmed in Milestone for:
      1-2 images per second.
      2-Record conditionally, on motion with 2 second pre alarm.
      3-Set for 3AM archiving for a minimum of four days.
I. GENERAL:
   A. Temple University Department of Telecommunications (TUDT) has established standards identifying the minimum requirements for the University and Health System Telecommunication spaces.

   B. This document will detail the typical physical design requirements for:
      1. Entrance facilities
      2. Telecommunications Switchrooms
      3. Floor serving Telecommunications closets

   A. This document is only to be used as a guide. Consult TUDT for the latest revision of this document. NOT FOR CONSTRUCTION.

   B. Consult the TUDT when planning the renovation or construction of spaces that will require Telecommunications support.

   C. Various factors will determine the size and requirements of Telecommunications Space. Space requirements will vary according to:
      ● User programs
      ● Density of users
      ● Physical area of space to be served
      ● Potential for expansion
      ● Proximity to other Telecommunications Spaces
      ● Technology requirements
      ● Location within the Campus

   D. Telephone/Data Link drop locations are to be shown on the electrical drawings or a dedicated drawing. Contractor is to furnish all roughins, which shall include: cutting in a box with Rigid or EMT conduit to a location in the ceiling or space where Telephone Services can conveniently access the roughin. Roughins include the building entrance or foundation penetration, drops to user devices, entrance/exit from service rooms, switch rooms, equipment rooms, etc. All roughins shall contain a pull string.

   E. Telephone equipment rooms are to have power supplies furnished for operating their system, dedicated circuits for dedicated HVAC Units and 120 VAC duplex receptacles in equipment closets and an appropriate number in larger rooms.
II. STANDARDS REFERENCED:
A. Standards for Telecommunications Spaces
   1. ANSI/TIA/EIA Standards.
      2. ANSI/TIA/EIA-568-A-1—Propagation Delay and Delay Skew Specifications for 100 ohm 4-pair Cable
      3. ANSI/TIA/EIA-569-A-2 – Commercial Building Standards Updates
      4. ANSI/TIA/EIA-568-A—Commercial Building Standard for Telecommunications Pathways and Spaces
      5. ANSI/TIA/EIA-606—The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
      6. ANSI/TIA/EIA-607—Commercial Building Grounding and Bonding Requirements for Telecommunications
      7. ANSI/TIA/EIA TSB-67—Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems
      8. ANSI/TIA/EIA TSB-75—Additional Horizontal Cabling Practices for Open Office

B. BICSI® PUBLICATIONS
   1. BICSI® Telecommunications Distribution Methods Manual (TDMM)
   2. BICSI® Telecommunications Cabling Installation Manual (TCIM)

C. OTHER DOCUMENTS
   1. NEC – National Electric Code, latest edition
   3. ANSI – American National Standards Institute
   4. ICEA – Insulated Cable Engineers Association
   5. NEMA – National Electrical Manufacturers Association
   6. ASTM – American Society for Testing and Materials

III. TELECOMMUNICATIONS SPACE REQUIREMENTS:
Each Telecommunications space variation serves a specific function. Some of the functions can overlap if planned in a conscientious manner. This section will detail the typical design requirements of these specific rooms:

   • Entrance facilities
   • Telecommunications Switchrooms
   • Floor serving Telecommunications Closets

A. ENTRANCE FACILITIES
a. Entrance Facilities house the Outside Plant Cable (OSP) transitioning from the exterior of the building to the building’s interior. The Building Distribution Frame (BDF) is located in this room. Space for over voltage protection and cable splicing will be allowed for in this space.
b. The OSP cable will typically enter the building via buried conduit pathways from a location outside this room.

1. ENTRANCE FACILITY SPACE DIAGRAM
   a. See the “Drawing” section at the end.

2. ENTRANCE FACILITY ROOM SIZE
   a. An Entrance Facility size will vary depending on the size of the building. It must accommodate a 6 to 10 foot wall space for termination of over voltage protection and building riser distribution cable. It must accommodate one to two equipment racks.

3. CLEARANCES
   a. Working space and clearances around Telecommunications equipment is (3’-6”) three feet six inches.

4. CABLE PATHWAYS
   a. Overhead cable support shall be provided to support cable and splice enclosures at no less than 7’-6” AFF.
   b. Slots and Sleeves.
      1) These are the most common methods for routing cable through building walls and floors. Circular sleeves are preferred because they are easier to firestop. A minimum of three trade size 4 sleeves shall be provided to the building riser core.
      2) Allow for a minimum of four (4) four inch (4”) conduits to enter the room through the wall or floor from the outside of the building. Space for more ducts shall be allowed for due to potential growth.

5. ELECTRICAL REQUIREMENTS
   a. Distribution panels that serve telecommunications equipment shall be separate from those that serve lighting fixtures.
   b. Two dedicated 20 AMP circuit(s) shall be provided to each equipment rack. Flexible cable or conduit shall be used to route circuit to base of rack. Quad outlet boxes shall be mounted to the base of the rack in the rear.
   c. Provide a convenience outlet on frame wall mounted at 18” AFF.

6. ELECTROMAGNETIC INTERFERENCE
   a. Do not locate sensitive electronic equipment next to electrically noisy equipment that can cause electromagnetic interference (FMI). Keep
electrical feeders and branch circuits away from sensitive equipment and its associated telecommunications cabling and equipment.

7. **LIGHTING**
   a. Entrance Facilities shall have adequate and uniform lighting that provides a minimum equivalent of 500 lux (50 footcandles) when measured 1 m (3.3 ft.) above the finished floor.
   b. Locate light fixtures a minimum of 2.6m (8 ft. 6 in) above the finished floor.
   c. Locate light switches near the door to Entrance Facility.
   d. Coordinate the lighting layout with the equipment layout and the overhead cable trays to ensure the light is not obstructed.
   e. Power for the lighting shall be on a separate circuit.

8. **BONDING AND GROUNDING**
   a. A dedicated Telecommunications ground busbar system shall be installed to serve the OSP cable and Data equipment. Each system shall have its own busbar.
   b. The grounding system shall not rely on plumbing systems.
   c. Bonding conductors shall be routed with a minimum number of bends. The bend place in the conductor shall be sweeping.
   d. Make all bonding connections with listed bolts, crimp pressure connectors, clamps, or lugs. Exothermic welding may be used.
   e. Busbars shall be directly bonded with, minimally, a 6-AWG copper conductor.

9. **ENVIRONMENTAL REQUIREMENTS**
   a. Temperature 64°F to 75°F.
   b. Relative Humidity 30 percent to 55 percent.
   c. Heat Dissipation 750 to 5,000 BTUs per hour per cabinet.
   d. A filtration system is required to minimize particle levels in the air.
   e. Keep changes in temperature and humidity to a minimum.

10. **WALLS**
    a. The cross-connect fields or terminating space for the Entrance Facility shall be on the longest wall.
    b. All walls shall have trade size ¾ inch A-C (fire retardant) plywood backboard, 2.5m (8 ft.) high by the length of the wall.
    c. The backboards shall be rigidly installed and shall be free of obstructions that would impede the installation of a cross-connect field. Use flush hardware and supports to mount plywood. Ensure that the strength and placement of the hardware are sufficient to handle the total anticipated load (static and dynamic) and mounting of cabling components.
    d. Plywood shall be void-free and either fire-rated or treated on all sides with at least two coats of nonconductive fire-resistant paint (Light in color).
    e. All Entrance Facility walls shall:
1) Extend from the finished floor to the structural ceiling (slab to slab).
2) Be covered with two coats of fire-retardant white paint.
3) Be fire-rated as required by the applicable codes and regulations.

11. FLOORS
   a. Keep dust and static electricity to a minimum in by installing floor tile. Rooms shall have a minimum floor loading of 2.4 kPA (50 lbf/ft^2).

12. CEILING
   a. Typically does not require a finished ceiling.

13. ENTRANCES
   a. Doorways must be fully opening, lockable doors that are at least 0.91-m (3-ft) wide and 2-m (6-ft., 8-in.) tall. A double door (1.8-m [6-ft.] wide by 2.3-m [7-ft. 6-in.] tall) is recommended.
   b. Doorsills are center posts are not acceptable.
   c. The door(s) shall open outward if allowed by code.
   d. Access shall allow for future equipment changes.
   e. The room shall have a single entry door if allowed by code.

14. SECURITY
   a. Access to the Entrance Facility will be limited to authorized personnel only.
   b. The room shall be keyed to the appropriate TUDT key. The door lock shall be always open from the inside and always locked from the outside.

15. FIRE PROTECTION
   a. A “dry pipe” sprinkler system shall be installed to avoid water damage.

16. OTHER SERVICES
   a. Entrance Facility spaces must be dedicated to the telecommunications function and related support facilities.

B. TELECOMMUNICATIONS SWITCHROOMS
   A. Switchrooms house telecommunications and network equipment and distribute main backbone cables to other telecommunications Spaces. The Main Distribution Frame (MDF) is located in this room. This space may well typically serve as the Entrance facility for the building it is located in.

   B. The Outside Plant cables shall not directly enter the Switchroom from the exterior of the building.
C. Switchrooms:
1) Distribute Voice, Data and CATV services to multiple buildings.
2) Contain terminations, interconnections, and cross-connections for telecommunication distribution cables.
3) Include workspace for telecommunication personnel.
4) Are built and laid out according to stringent requirements because of the nature, cost, size, and complexity of the equipment involved.

1. TYPICAL SWITCHROOM DIAGRAM
   a. See the “Drawing” section at the end.

2. EQUIPMENT ROOM SIZE
   a. A Telecommunications Switchroom shall be sized at a minimum of 24 feet by 40 feet.

3. CLEARANCES
   a. Working space and clearances around Telecommunications equipment is (3’-6”) three feet six inches.
   b. Working space and clearances in front of the voice detail wall shall be a minimum of (4’-6”) four feet six inches.
   c. A minimum of a (4) foot aisle will separate the cabinets from the equipment positioned around the perimeter of the room.

4. CABLE PATHWAYS
   a. Overhead Cable Trays.
      1) Overhead cable tray (overhead racking) is installed over each row of equipment and to the point where cables will enter the room. The overhead cable tray is typically 12 inches in width. It is attached to ceiling using threaded rod and may be anchored to the walls. The tray shall be no less than 7’-6” AFF.
   b. Access (Raised) Floor Systems
      1) If the Equipment Room has the space for Raised floor, it shall be installed. The minimum height shall be no less than 18 inches.
   c. Slots and Sleeves
      1) These are the most common methods for routing cable through building walls and floors. Circular sleeves are preferred because they are easier to firestop. A minimum of three trade size 4 sleeves shall be provided to the building riser core.
      2) Allow for a minimum of (8) eight (4) four-inch ducts that will be
required for cable pathways entering and exiting the building. Space for more ducts shall be allowed for due to potential growth.

5. ELECTRICAL REQUIREMENTS
   a. The feeders that supply the power for telecommunications equipment in Equipment Rooms shall be dedicated only to supplying that equipment. Power shall be led off of a UPS unit.
   b. Power required for other equipment in the room, (e.g., fluorescent lighting, motors, air conditioning equipment) shall be supplied by a separate feeder, conduit, and distribution panel.
   c. Consult TUDT for expected loads when designing new Equipment Rooms.
   d. Convenience outlets shall be space at no less than (8) eight-foot intervals around the room. Outlets shall not be placed on the MDF wall.
   e. For PBX equipment, consult manufacturer’s electrical specifications.
   f. For special use cabinets and equipment consult with TUDT.
   g. Data equipment cabinets require (2) two 20 AMP circuits in quid boxes. The circuits may be directly wired to the cabinet power strips.
   h. Optical fiber cabinets require (1) 20 AMP circuits in quad boxes. The circuits may be directly wired to the cabinet power strips.

6. ELECTROMAGNETIC INTERFERENCE
   a. Do not locate sensitive electronic equipment next to electrically noisy equipment that can cause electromagnetic interference (EMI). Keep electrical feeders and branch circuits away from sensitive equipment and its associated telecommunications cabling and equipment.

7. LIGHTING
   a. Equipment Rooms are to have adequate and uniform lighting that provides a minimum equivalent of 700 lux (70 footcandles) when measured 1 m (3.3 ft.) above the finished floor level.
   b. Locate light fixtures a minimum of 2.6 m (8 ft., 6 in.) above the finished floor.
   c. Locate light switches near the entrance(s) to the Equipment Room.
   d. Coordinate the lighting layout with the equipment layout and the overhead cable trays to ensure the light is not obstructed.
   e. Power for the lighting shall be on a separate circuit.
   f. Provide emergency lighting as required by applicable building codes.

8. BONDING AND GROUNDING
   a. A dedicated Telecommunications ground busbar system shall be installed to serve the OSP cable, PBX equipment and Data equipment. Each system shall have its own busbar.
   b. The grounding system shall not rely on plumbing systems.
c. Bonding conductors shall be routed with a minimum number of bends. The bends placed in the conductor shall be sweeping.

d. Make all bonding connections with listed bolts, crimp pressure connectors, clamps, or lugs. Exothermic welding may be used.

e. Busbars shall be directly bonded with, minimally, a 6-AWG copper conductor.

9. ENVIRONMENTAL REQUIREMENTS

a. Provide primary and redundant stand alone HVAC units, with independent controls for the Equipment Room.

b. The HVAC system that serves the Equipment Room shall be tuned to maintain a positive air pressure differential with respect to surrounding areas. If environmental conditions warrant, provide equipment to control humidity and air quality.

c. Temperature 64°F to 75°F.

d. Relative Humidity 30 percent to 55 percent.

e. Heat Dissipation 750 to 5,000 BTUs per hour per cabinet.

f. A filtration system is required to minimize particle levels in the air.

g. Keep changes in temperature and humidity to a minimum.

h. HVAC sensors and controls must be located in the equipment room.

Ideally, the sensors are placed 1.5 m (5 ft.) above the finished floor.

10. WALLS

a. The cross connect fields or terminating space for the Switchroom shall be on the longest wall.

b. The wall adjacent to the left shall also have a trade size ¾ inch A-C (fire retardant) plywood backboard, 2.5 m (8 ft) high by the length of the wall.

c. The backboards shall be rigidly installed and shall be free of obstructions that would impede the installation of a cross-connect field. Use flush hardware and supports to mount plywood. Ensure that the strength and placement of the hardware are sufficient to handle the total anticipated load (static and dynamic) and mounting of cabling components.

d. Plywood shall be void-free and either fire-rated or treated on all sides with at least two coats of nonconductive fire-resistant paint (light in color).

e. Convenience outlets shall not be placed on this wall. They shall be placed on the adjacent walls.

f. All Switchroom walls shall:

1) Extend from the finished floor to the structural ceiling (slab to slab).

2) Be covered with two coats of fire-retardant paint (light in color).

3) Be fire-rated as required by the applicable codes and regulations.

11. FLOORS
a. Keep dust and static electricity to a minimum in by installing floor tile.  
b. The floor rating under distributed loading must be greater than 4.8 Kpa (100 lbf/ft 2) and the rating for concentrated loading must be greater than 8.8 kN (2,000 lbf) in areas intended to support telecommunication equipment. 
c. Distributed floor loading of equipment cabinets may range as high as 12.0 kPa (250 lbf.ft. 2).

12. CEILING  
a. The recommended height from the finished floor to the finished ceiling in an Equipment Room is at least 8 feet., 6 inches. However TUDT would prefer to have a ceiling height of 10 feet to accommodate overhead cable tray. When a ceiling distribution system is used design closets with adequate pathways or openings through beams and other obstructions into the accessible ceiling space.  
b. Ceiling protrusions (e.g. sprinkler heads) must be placed to assure a minimum clearance of 8 feet.  
c. If the room has a clean and open non-obstructed area to the upper deck, a finished ceiling is not required. If this is not the case a drop ceiling is acceptable.

13. ENTRANCE  
a. Doorways must be fully opening, lockable doors that are at least 0.91-m (3-ft) wide and 2-m (6-ft., 8-in) tall. Since large equipment is often located in the Switchroom, a double door (1.8-m [6-ft.] wide by 2.3-m [7-ft., 6-in] tall) is recommended.  
b. Doorsills and center posts are not acceptable.  
c. The door(s) shall open outward if allowed by code.  
d. Access shall allow for future equipment changes.  
e. The room shall have a single entry door if allowed by code.

14. SECURITY  
a. Access to the Equipment Room (Switchroom) will be limited to authorized personnel only.  
b. The room shall be keyed to the appropriate TUDT key. The door lock shall be always open from the inside and always locked from the outside.  
c. The room will also have an electronic access system. Typically this will be a combination of a card key and an electronic door strike.  
d. Allow a (4) four-foot by (4) four-foot wall space to mount the security controls.

15. FIRE PROTECTION  
a. Switchrooms require a fire suppression system.  
b. TUDT utilizes a dry FM200 system.  
c. Allow space by the door to mount the fire suppression system control
button panel.

16. OTHER SERVICES
a. Telecommunications closets must be dedicated to the telecommunications function and related support facilities.

C. TELECOMMUNICATIONS CLOSETS
A. Telecommunications Closets differ from Equipment Rooms and Entrance Facilities in that they are floor-serving facilities that provide a connection point between backbone and horizontal distribution pathways.
B. There shall be a minimum of one telecommunications closet per floor.
C. There is no maximum number of telecommunications closets that may be provided within a building.
D. All telecommunications spaces should be stacked above each other to create a Maintainable vertical riser space within the structure for the backbone cables.
E. All Telecommunications Closets should be centrally located.
F. The horizontal cable lengths shall be a maximum of 295 feet, using the hallway space as the path route between the user outlet and the Telecommunications closet.
G. The Telecommunications closets must be accessible from a hallway or other common area.

1. TYPICAL TELECOMMUNICATIONS CLOSET DIAGRAMS
a. See the “Drawing” section at the end.

2. TELECOMMUNICATIONS CLOSET SIZES
a. Closets vary in size depending on their function and the size of the usable floor space they serve.
b. The TUDT typical minimum sizes are:
   1) Walk in closets, which are (5) five feet by (7) seven feet.
   2) Shallow closets, which are (3) three feet deep by (8) eight feet wide.

3. CLEARANCES
a. Provide the following clearances for equipment and cross-connect fields in the telecommunications closets.
b. Allow a minimum of (3’) feet of clear working space between the equipment rack and voice detail (cross-connect fields) wall.

4. CABLE PATHWAYS
   a. Conduits, raceways, and ducts are used to distribute backbone cabling to each telecommunications closet. If possible, locate sleeves, slots and/or conduits on the left side of the closet this placement enhances the use of wall space from left to right. Trays and conduits located within the ceiling shall protrude into the closet a distance of (1) one inch to (3) three inches without a bend, and above (8) feet high.
   b. Locate slot/sleeve systems to the left of the entrance into the room.
   c. Interconnect multiple telecommunications closets on a floor with a minimum of one trade size (3) three inch or a pathway that provides equivalent capacity.

5. ELECTRICAL REQUIREMENTS
   a. Distribution panels that serve telecommunications equipment shall be separate from those that serve lighting fixtures.
   b. Two dedicated 20 AMP circuit(s) shall be provided to each equipment racks. Flexible cable or conduit shall be used to route circuit to base of rack. Quad outlet boxes shall be mounted to the base of the rack in the rear.
   c. Provide a convenience outlet on frame wall mounted at 18” AFF.

6. ELECTROMAGNETIC INTERFERENCE
   a. Do not locate sensitive electronic equipment next to electrically noisy equipment next to electrically noisy equipment that can cause electromagnetic interference (EMI). Keep electrical feeders and branch circuits away from sensitive equipment and its associated telecommunications cabling and equipment.

7. LIGHTING
   a. Provide a minimum equivalent of 500 lux (50 footcandles) measured 1 m (3.3 ft) above the finished floor.
   b. Do not use dimmer switches.
   c. Locate light fixtures a minimum of 2.6 m (8ft., 6in) above the finished floor.
   d. Emergency lighting is recommended. Place emergency lighting to ensure that the loss of power to normal lights will not hamper an emergency exit from the Telecommunications Closet.

8. BONDING AND GROUNDING
a. Provide a Telecommunications ground busbar system.
b. The grounding system shall not rely on plumbing systems.
c. Bonding conductors shall be routed with a minimum number of bends. The bends placed in the conductor shall be sweeping.
d. Make all bonding connections with listed bolts, crimp pressure connectors, clamps, or lugs. Exothermic welding may be used.
e. Multiple busbars placed in a building shall be directly bonded with, minimally, a 6-AWG copper conductor. A single busbar is acceptable in a Telecommunications Closet.

9. ENVIRONMENTAL REQUIREMENTS
a. For Telecommunication Closets, the temperature range shall be between 64°F to 80°F and the humidity range shall be 30% to 55% relative humidity.
b. Maintain positive pressure with a minimum of one air change per hour in the Telecommunications Closet.
c. Air-handling equipment must dissipate the heat generated by active devices outside of the space and a means of discharging collected moisture outside of the Telecommunications Closet space.

10. WALLS
a. The cross-connect fields or terminating space for the Telecommunications Closet shall be on the longest wall.
b. All walls shall have trade size ¾ A-C (fire retardant) plywood backboard, 2.5 m (8 ft.) high by the length of the wall.
c. The backboards shall be rigidly installed and shall be free of obstructions that would impede the installation of a cross-connect field. Use flush hardware and supports to mount plywood. Ensure that the strength and placement of the hardware are sufficient to handle the total anticipated load (static and dynamic) and mounting of cabling components.
d. Plywood shall be void-free and either fire-rated or treated on all sides with at least two coats of nonconductive fire-resistant paint (Light in color).
   1) All walls shall:
      a) Extend from the finished floor to the structural ceiling (slab to slab).
      b) Be covered with two coats of fire-retardant white paint
      c) Be fire-rated as required by the applicable codes and regulations.
   2) Reserve side-walls for:
      a) Splice cases.
      b) CATV
      c) Miscellaneous items
11. **FLOORS**
   a. Keep dust and static electricity to a minimum by installing floor tile. Rooms shall have a minimum floor loading of 2.4 kPA (50 lbf/ft²).

12. **CEILINGS**
   a. Typically does not require a finished ceiling.

13. **ENTRANCES**
   a. Doorways must have fully-opening, lockable doors that are at least 0.91-m (3 ft.) wide and 2-m (-ft, 8-in) tall, a double door (1.8-m [6-ft] wide by 2.3-m [7-ft., 6-in] tall) is recommended. Shallow closets must have (2) two outward opening doors.
   b. Doorsills and center posts are not acceptable.
   c. The door(s) shall open outward if allowed by code.
   d. Access shall allow for future equipment changes.
   e. The room shall have a single entry point if allowed by code.

14. **SECURITY**
   a. Access to the Telecommunications Closet will be limited to authorized personnel only. The room shall be keyed to the appropriate TUDT key. The door lock shall be always open from the inside and always locked from the outside.

15. **FIRE PROTECTION**
   a. To avoid water damage, a “dry pipe” sprinkler system shall be installed.

16. **OTHER SERVICES**
   a. Telecommunications Closets must be dedicated to the telecommunications function and related support facilities.
   b. CATV station distribution cables are part of telecommunications and will be terminated in the floor serving closets.

**III. DRAWINGS**

A. Entrance Facility
   A. Typical Switchroom
   B. Typical Switchroom (Alternate Layout)
   C. Typical Walk-In Telecommunication Closet
   D. Typical Shallow Telecommunication Closet

MM/gl
4/6/98
Rev.03/29/10- TM
[TU STANDARD SPECIFICATIONS3.DOC]
A/C PAINTED FIRE RETARDANT PLYWOOD MOUNTED ON THE WALL FROM FINISH FLOOR TO EIGHTH FEET AFF.

START OF VOICE DETAIL

PROVIDE A 20 AMP DUPLEX CONVENIENCE OUTLET 18 INCHES AFF.

2'-0"

8'-0"

6" INCH FINGER TRAY MOUNTED MIN. 7'-6" AFF.

TILE FLOOR

THREE (4) FOUR INCH SLEEVES FOR BACKBONE RISER.

WALL SLEEVES AT 8'-0" AFF. QUANTITY OF SLEEVES BASED ON CABLE DENSITY.

19 INCH RELAY RACK SECURED TO THE FLOOR AT (4) POINTS. PROVIDE (2) TWO DEDICATED 20AMP CIRCUITS.

TYPICAL SHALLOW TELECOMMUNICATIONS CLOSET

3' x 8'
# Standard Energy Specifications

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1. **Overview & General Requirements**

   This document contains Temple University OFM Energy Office's standard specifications for energy conservation in building design and for energy metering.

   The intent is to provide an in-depth, standardized, specification for use by engineers and contractors performing design and construction of new buildings at Temple University.

   These standard specifications shall apply to all new building construction. The type and quantity of meters required will be determined during the design development phase of the new building project.

   Where installed, metering shall comply with the requirements of these specifications.

2. **Scope & Sections**


   2.2. **Section 3 - Steam Metering**, covers steam metering requirements for buildings served by a central steam plant or another building's steam service. The requirements also apply to non-university tenant spaces (as determined by the overall new building project scope) that will be served by the new building's utilities.

   2.3. **Section 4 - BTU Metering**, covers chilled water and heating hot water metering requirements for buildings served by a central chilled water plant, another building's chilled water service, or another building's heating hot water system. The requirements also apply to non-university tenant spaces (as determined by the overall new building project scope) that will be served by the new building's utilities.

   2.4. **Section 5 - Domestic Cold & Hot Water Metering**, covers sub-metering of domestic cold and hot water, applying specifically to non-university tenant spaces and specialized process loads.
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Standard Energy Specifications
General
Description and Requirements

2.5. Section 6 - Electric Metering, covers electric service metering (for buildings connected to the university-owned 13.2 kV distribution system) and building load sub-metering requirements. Specific differences between non-university tenant space electric sub-metering and other electric sub-metering are specified in this section.

2.6. Section 7 - Meter Monitoring System, provides requirements for automatic meter reading systems to ensure compatibility with the Temple's existing systems.

3. Contacts

For questions or additional information, please contact:

Temple University OFM Energy Office:

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Assistant Energy Manager  
Phone: 215-204-6778  
E-Mail: daniel.donnelly@temple.edu

Kurt Bresser  
Energy Manager  
Phone: 215-204-4515  
E-Mail: kurt.bresser@temple.edu
| Standard Energy Specifications | General Description and Requirements |
1. Design & Specification Standards


1.2. All designs and specifications shall meet and incorporate the requirements of any successor to, or replacement for, ANSI/ASHRAE/IESNA Standard 90.1-2001 and the IECC 2003, or more restrictive standards, as required by law.

1.3. All mandatory provisions of ANSI/ASHRAE/IESNA Standard 90.1-2001 and IECC 2003 shall be met.

1.4. All prescriptive provisions of ANSI/ASHRAE/IESNA Standard 90.1-2001 and IECC 2003 shall be met, except as provided by the Energy Cost Budget Method.

2. Energy Cost Budget Method

2.1. The energy cost budget method described in ANSI/ASHRAE/IESNA Standard 90.1-2001 shall be performed for all designs with the following additional requirements:

2.1.1. Calculations shall be performed for all 8,760 hours of the year.

2.1.2. Software used for simulation shall meet the requirements of ANSI/ASHRAE/IESNA Standard 90.1-2001, Section 11.2 and shall be approved by the Temple University Facilities Energy Office.

2.1.3. Climatic data shall be based on ASHRAE Weather Year for Energy Calculations Version 2 (WYCE2) dataset or the US Department of Energy, National Renewable Energy Laboratory’s Typical Meteorological Year Version 2 (TMY2) dataset and shall utilize National Weather Service Station data for Philadelphia, PA (WBAN ID 13739).

2.1.4. Unless otherwise prescribed by law, current purchased energy rates shall be obtained from the Temple University Facilities Energy Office. The purchased energy rates shall not be utilized for actual fiscal energy budgeting purposes.
3. Efficiency Standards Compliance Documentation

3.1. Efficiency standards compliance documentation shall be prepared by the design professionals.

3.2. All efficiency standards compliance documentation shall be submitted for review to the Temple University Facilities Energy Office prior to final preparation of project bid documents (or earlier, if practicable).

3.3. The following compliance documents (per the examples shown in the User's Manual for ANSI/ASHRAE/IESNA Standard 90.1-2001) shall be prepared and submitted for review:

3.3.1. Building Envelope Compliance Document Part I & II
3.3.2. HVAC Mandatory Provisions Part II
3.3.3. HVAC Prescriptive Provisions Part III
3.3.4. Service Water Heating Compliance Documentation
3.3.5. Lighting Compliance Documentation (Space-by-Space Method)
3.3.6. Energy Cost Budget Compliance Report

4. Energy Consumption & Demand Data

4.1. Energy consumption data shall be prepared by the design professionals.

4.2. Energy Consumption data shall be supplied for the typical meteorological year (as described in the Energy Cost Budget Method above) and for design conditions.

4.3. Energy consumption data shall be submitted for review to the Temple University Facilities Energy Office prior to final preparation of project bid documents (or earlier, if practicable).

4.4. Energy consumption data shall be submitted in a Microsoft Excel spreadsheet file (worksheet, workbook, or comma-separated variable file) showing data for each of the 8,760 hours in the year.
Standard Energy Specifications
Energy Conservation Design

4.5. Energy consumption may be indicated by thousands or millions of units but must be clearly labeled. (KWH, mmBtu, etc.)

4.6. The file shall contain the following data:

4.6.1. Hourly electricity consumption in watt-hours.

4.6.2. Electricity demand data, in watts, based on a 30-minute fixed demand window. The maximum of the two 30-minute demand windows shall be the maximum demand for the reported hour.

4.6.3. Hourly saturated steam consumption (for buildings served by central plants) in British Thermal Units or pounds of steam at a specified pressure.

4.6.4. Hourly chilled water consumption (for buildings served by central plants) in British Thermal Units or ton-hours.

4.6.5. Space heating system fuel consumption as follows:

4.6.5.1. Natural gas consumption in British Thermal Units or cubic feet at a specified higher heating value per cubic foot for single (natural gas) fuel equipment.

4.6.5.2. Fuel oil consumption in British Thermal Units or gallons at a specified higher heating value per gallon for single (fuel oil) fuel equipment.

4.6.5.3. Total fuel input in British Thermal Units for dual fuel (natural gas & fuel oil) equipment.

4.6.6. Process (domestic hot water, kitchens, labs, etc.) heating system fuel consumption as follows:

4.6.6.1. Natural gas consumption in British Thermal Units or cubic feet at a specified higher heating value per cubic foot for single (natural gas) fuel equipment.

4.6.6.2. Fuel oil consumption in British Thermal Units or gallons at a specified higher heating value per gallon for single (fuel oil) fuel equipment.
4.6.6.3. Total fuel input in British Thermal Units for dual fuel (natural gas & fuel oil) equipment.

4.6.7. Water consumption in gallons or cubic feet.

4.7. In addition, the simulation software files used to prepare the energy analysis of the building design shall be submitted to the Temple University Facilities Energy Office for performance monitoring and benchmarking purposes.
1. **Steam Meter Sizing, Selection, and Installation Design**

   1.1. Steam meter sizing shall be performed prior to meter selection.

   1.2. In order to correctly size the steam meter, the minimum, maximum, and normal operating flow rates and pressures shall first be determined by the design engineer.

   1.3. Using the minimum, maximum, and normal operating flow rates and pressures, as determined by the design engineer, the steam meter vendor shall size the steam flowmeter for maximum turndown.

   1.4. The results of the steam meter vendor's sizing shall be utilized by the design engineer to design the physical installation per the steam meter manufacturer's installation instructions, standard drawings, and ANSI/ASME B31.1 Code for Pressure Piping.

   1.5. Meter run piping shall be the same pipe size as the nominal meter size. The meter run shall be complete with (at least) the minimum required straight runs of upstream and downstream piping, as indicated on the standard drawings and manufacturer's installation instructions. Reductions and/or enlargements of the piping shall occur before and/or after the meter run.

   1.6. Bypasses around steam meters are not required.

   1.7. Shedder bars on vortex flowmeters used for steam service shall be installed in the horizontal position when installed in horizontal pipe runs.

2. **Steam Metering Equipment (All information shall be verified with manufacturer prior to equipment procurement)**

   2.1. **Steam, High Pressure** – Steam shall be metered on the high pressure side of the pressure reducing station(s) utilizing the following components:

      2.1.1. Yokogawa Digital Vortex Flowmeter
          Model No. DY$_{xxx}$-DBMBA1-2N/FF1/SCT
          (one per service required)

      2.1.2. Yokogawa DPharp Digital Gauge Pressure Transmitter
          Model No. EJA430A-DAS4B-92NA/FF1/D1
          (one required for each steam flowmeter)
2.1.3. Yokogawa Two Valve Manifold  
Model No. MJY2VIS-4-HM  
(one required for each steam flowmeter)

2.1.4. Yokogawa 415 Series Gas & Steam Flow Computer  
Model No. 415A.24A  
(one required for each steam flowmeter)

2.1.5. Yokogawa Vortab Flow Conditioner  
Model No. VMR-xx-xx-3-5  
(one required for each steam flowmeter, 2 in. and larger)

3. Meter Monitoring System

3.1. Pulse output contacts from each steam flow computer shall be connected to a meter monitoring system panel. This panel shall be connected to a 120-volt power source and a dedicated phone line for remote access through Temple’s existing TimeFrame system.

3.2. See Section 7, Meter Monitoring System, for additional requirements.

4. Mechanical Installation

4.1. Installation of steam meters requires prior written approval of installation drawings showing the piping arrangement, dimensions and orientation of all metering equipment, pressure transmitters, gauges, valves, and fittings.

4.2. All meter installations shall be performed according to the manufacturer’s instructions, recommended best practices, and ANSI/ASME B31.1 Code for Pressure Piping.

4.3. Pipe reductions or enlargements in horizontal steam lines shall be performed with eccentric reducers.

4.4. All flange gaskets on metering equipment shall be in accordance with ASME B16.20 for spiral wound gaskets with outer centering ring. Flange gaskets shall be Garlock FLEXSEAL® Style RW, with flexible graphite filler material, or approved equal.
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Standard Energy Specifications  
Steam Metering

4.5. All flange bolting shall be ASTM A193 Grade B7 with ASTM A194 Grade 2H hex nuts. Bolt length shall be in accordance with ASME B16.5. Neither studs nor threaded rod shall be used.

4.6. All slip-on flanges shall be back-welded.

4.7. All bolt threads shall be lubricated with anti-seize thread compound.

4.8. Make up flanges prior to completing last weld in connecting piping. Alignment of piping shall be correct without forcing, drifting, or bending.

4.9. Make up joints with spiral wound gaskets by taking up bolts until flange faces touch centering rings. Record torque required for flange closure and re-apply after piping warm-up.

4.10. After piping has been maintained at operating temperature for 48 hours, recheck bolting to restore initial bolt tension.

4.11. Electric welding machine grounding conductors shall be connected in a manner that will prevent welding current flow through the vortex flowmeter or pressure transmitter to prevent damage to the equipment's electronics during installation.

5. Electrical Installation

5.1. All wire and cable shall be enclosed in electrical metallic tubing (EMT), electrical throughway or raceway, or watertight flexible electrical metallic tubing (sealtite) with a separate ground. Flexible electrical metallic tubing shall only be used in places where EMT cannot be installed. No wire or cable shall be left exposed, including in plenums and shaft-ways, upon completion of the installation.

5.2. Signal cables shall not be installed in conduit or raceway that also carries power wiring. Separate conduits or raceways shall be installed for any signal cable(s) required by this project.

5.3. Signal cables installed between the flowmeters, pressure transmitters, flow computers, and the meter monitoring system equipment shall be Belden No. 87760 or approved equal.
5.4. When using Belden No. 87760 cable, the red conductor shall be used for +VDC and the black conductor shall be used for -VDC.

5.5. Wiring shall be terminated with spade-type solderless crimp terminals at the vortex flowmeter and the pressure transmitter.

5.6. AC power wiring shall enter the Yokogawa Model 415 flow computer on the lower, left bottom of the flow computer enclosure. Signal wiring shall enter the flow computer on the lower, right bottom of the flow computer enclosure, separate from the AC power wiring.

5.7. Signal cables connected between the flow computer, the vortex flowmeter, and the pressure transmitter shall have their cable shields grounded at the vortex flowmeter and the pressure transmitter. Cable shields shall be cut and taped off at the flow computer end.

5.8. Signal cables connected between the flow computer and the meter monitoring system panel shall have the cable shields grounded at the meter monitoring system panel. The cable shields shall be cut and taped off at the flow computer end.

6. **Steam Metering System Commissioning**

6.1. The services of the steam meter manufacturer's service technician shall be retained, (by the installing contractor), to program, initialize, test, or otherwise commission, each steam metering system.

6.2. Pulse outputs from steam meter flow computers shall not be setup to exceed a pulse rate of 10 Hz with a 50% duty cycle and a 10 ms de-bounce at maximum load.

6.3. The work of the steam meter manufacturer's service technician shall be coordinated with the meter monitoring system equipment technician in Section 7 of the Standard Energy Specifications.

6.4. The steam meter manufacturer's service technician, upon completion of steam metering system commissioning, shall submit hard-copy documentation of each meter's programmable settings, including, but not limited to, spans, multipliers, and the value of each pulse in pounds, or fractions/multiples thereof.
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Steam Metering

7. Approvals

7.1. The only valid approvals for metering are those given by a representative of the Temple University OFM Energy Office.

7.2. No metering equipment shall be purchased or installed without prior written approval.

7.3. No approvals will be given without complete shop drawings.

7.4. Steam meters shall not be installed without prior written approval of an installation drawing.

7.5. No metering equipment shall be energized without an inspection report signed by a representative of the Temple OFM Energy Office.

8. Shop Drawing Submittals

8.1. No approvals will be given without complete shop drawing submittals.

8.2. A complete shop drawing submittal shall include the following:

8.2.1. A schedule showing the quantity and the full load rating in lbs/hr and pressure of all steam consuming equipment including steam pressure reducing valves, control valves, converters, and heating coils.

8.2.2. A schematic piping diagram of the building’s steam piping system showing all pipe sizes, connected equipment, and rated equipment capacity.

8.2.3. Total minimum and maximum expected steam loads.

8.2.4. Meter sizing & selection criteria including the input and output of the manufacturer’s selection/sizing program.

8.2.5. Complete model numbers of the selected equipment.

8.2.6. Meter equipment technical specifications and physical dimensions.

8.2.7. Dimensioned and detailed installation drawings for each metering system.
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Section 3

Standard Energy Specifications
Steam Metering

9. Contacts

Yokogawa Steam Metering:

Cemtech Energy Controls
PO Box 385
Broomall, PA 19008
Phone: 610-353-4400
Fax: 610-353-6850

Temple University OFM Energy Office:

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Assistant Energy Manager
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E-Mail: daniel.donnelly@temple.edu

Kurt Bresser
Energy Manager
Phone: 215-204-4515
E-Mail: kurt.bresser@temple.edu

10. Standard Drawing(s) and Excerpts from Manufacturer's Instruction Manual
Temple University OFM
Section 3

Standard Energy Specifications
Steam Metering

<table>
<thead>
<tr>
<th>Nominal Size, PPH</th>
<th>Minimum, PPH</th>
<th>Maximum, PPH</th>
<th>Flowmeter Length, ft</th>
<th>Vortab Length, ft</th>
<th>Minimum Total Meter Run Length, ft</th>
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<tr>
<td>0.05</td>
<td>0.1</td>
<td>0.15</td>
<td>0.8</td>
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<td>6.0</td>
<td>7.0</td>
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</tr>
</tbody>
</table>

*Requires 20 nominal pipe diameters of straight run upstream of flowmeter, Vortab not available.
Temple University OFM
Section 3

Standard Energy Specifications
Steam Metering
## Standard Energy Specifications

### Steam Metering

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Description</th>
<th>Bill of Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>150 lb, O.D. x Length in (In.)</td>
<td>-</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>1/2 in.</td>
<td>-</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>1 1/2 in.</td>
<td>-</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td>1 1/2 in.</td>
<td>-</td>
</tr>
<tr>
<td>E</td>
<td>1</td>
<td>1 1/2 in.</td>
<td>-</td>
</tr>
<tr>
<td>F</td>
<td>1</td>
<td>1 1/2 in.</td>
<td>-</td>
</tr>
<tr>
<td>G</td>
<td>1</td>
<td>1 1/2 in.</td>
<td>-</td>
</tr>
<tr>
<td>H</td>
<td>1</td>
<td>1 1/2 in.</td>
<td>-</td>
</tr>
<tr>
<td>I</td>
<td>1</td>
<td>1 1/2 in.</td>
<td>-</td>
</tr>
<tr>
<td>J</td>
<td>1</td>
<td>1 1/2 in.</td>
<td>-</td>
</tr>
<tr>
<td>K</td>
<td>1</td>
<td>1 1/2 in.</td>
<td>-</td>
</tr>
<tr>
<td>L</td>
<td>1</td>
<td>1 1/2 in.</td>
<td>-</td>
</tr>
</tbody>
</table>

**Diagram:**

- **Vertical Steam Line**
- **Horizontal Steam Line**
- **Standard Steam Pressure Transmitter Mechanical Installation**
3. INSTALLATION

3.1 Precautions Regarding Installation Locations

(1) Ambient Temperature
Avoid an area which has wide temperature variations. When the installation area is subjected to heat radiation from process plant, ensure adequate heat prevention or ventilation.

(2) Atmospheric Conditions
Avoid installing the vortex flowmeter in a corrosive atmosphere. When the vortex flowmeter must be installed in a corrosive atmosphere, adequate ventilation must be provided.

(3) Mechanical Shock or Vibration
The vortex flowmeter is of sturdy construction, but select an area subject to minimize mechanical vibration or impact shock. If the flowmeter is subject to vibrations, it is recommended that pipeline supports to be provided as shown in Figure 3.1.

(c) Handle the vortex flowmeter carefully when measuring dangerous liquids, so that the liquids do not splash into eyes or on face. When using dangerous gases, be careful not to inhale them.

3.2 Piping
See Table 3.1 about Valve Position and Straight Pipe Length and so on.

(4) Precautions Regarding Piping
(a) Ensure that the process connector bolts are tightened firmly.
(b) Ensure that no leak exists in the process connection pipeline.
(c) Do not apply a pressure higher than the specified maximum working pressure.
(d) Do not loosen or tighten the flange mounting bolts when the assembly is pressurized.
# Temple University OFM Section 3

## Standard Energy Specifications

### Steam Metering

### 3. INSTALLATION

<table>
<thead>
<tr>
<th>Description</th>
<th>Figure</th>
</tr>
</thead>
</table>
| **Piping support:**  
  Typical vibration immunity level is 1G for normal piping condition.  
  Piping support should be fixed in case of over 1G vibration level.         |        |
| **Installation direction:**  
  If a pipe is always filled with liquids, the pipe can be installed  
  vertically or at an inclined angle.                                       |        |
| **Adjacent pipes:**  
  The process pipeline inner diameter should be larger than the YEWFL0 inner diameter.  
  Use the following adjacent pipe.  
  - Nominal size 15mm up to 50mm: Sch 40 or less.  
  - Nominal size 80mm up to 300mm: Sch 80 or less.                         |        |
| **Reducer pipe:**  
  Ensure the upstream straight pipe length to be 10D or more, and the  
  downstream straight pipe length to be 5D or more for per reducer pipe.  
  (D: nominal YEWFL0 diameter)                                               |        |
| **Expander pipe:**  
  Ensure the upstream straight pipe length to be 10D or more, and the  
  downstream straight pipe length to be 5D or more for per expander pipe.   |        |
| **Bent pipe and straight pipe length:**  
  Ensure the upstream straight pipe length to be 10D or more, and the  
  downstream straight pipe length to be 5D or more for per bent pipe.       |        |
| **Valve position and straight pipe length:**  
  - Install the valve on the downstream side of the flowmeter.  
    The upstream straight pipe length dependent on the elements  
    located on the upstream such as reducer/expander, bent and  
    etc., refer to description as above. Keep 5D or more for  
    downstream straight pipe length.                                       |        |
|  
  - In case the valve has to be installed on the upstream of the  
    flowmeter, ensure the upstream straight pipe length to be 20D  
    or more, and the downstream straight pipe length be 5D or more.        |        |
| **Fluid vibration:**  
  For a gas line which uses a position-type or roots-type blower  
  compressor or a high-pressure liquid line (about 1MPa or more) which  
  uses piston-type or plunger-type pump, fluid vibrations may  
  be produced.  
  In this case, install valve on the upstream side of YEWFL0.  
  For inevitable fluid vibration, put a vibration damping device such as  
  throttling plate or expansion section in the upstream side of  
  YEWFL0.                                                                  |        |
| **Piston-type or plunger pump:**  
  Install the accumulator on the upstream side of YEWFL0 to reduce  
  fluid vibrations.                                                        |        |
# Standard Energy Specifications

## Steam Metering

### 3. INSTALLATION

<table>
<thead>
<tr>
<th>Description</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Valve position (T-type piping exist):</strong></td>
<td></td>
</tr>
<tr>
<td>When pulsation causes by a T-type piping exist, install the valve on the</td>
<td></td>
</tr>
<tr>
<td>upstream of the flowmeter.</td>
<td></td>
</tr>
<tr>
<td>Example: As shown in the figure, when the valve V1 is turned off, the fluid</td>
<td></td>
</tr>
<tr>
<td>flow through B as to meter A the flow is zero. But due to the pulsating</td>
<td></td>
</tr>
<tr>
<td>pressure is detected, the meter is zero point become fluctuating. To avoid</td>
<td></td>
</tr>
<tr>
<td>this, change the valve V1 location to V1'.</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Valve Diagram" /></td>
<td><img src="image" alt="Valve Diagram" /></td>
</tr>
</tbody>
</table>

| **Pressure and Temperature Taps:**                                         |        |
| Pressure tap outlet: install this tap between 2D and 7D on the downstream  |        |
| side of a flowmeter. Temperature tap outlet: install this on the downstream|        |
| side 1D to 2D away from a pressure tap.                                     |        |
| ![Pressure and Temperature Taps Diagram](image)                           | ![Pressure and Temperature Taps Diagram](image) |

| **Mounting Gasket:**                                                      |        |
| Avoid mounting gaskets which protrude into the pipe line. This may cause   |        |
| inaccurate readings. Use the gaskets with bolt holes, even if YEWFLO is the |        |
| wafer type. When using a spiral gasket(without bolt holes), confirm the     |        |
| size with the gasket manufacturer, as standard items may not be used for   |        |
| certain flange ratings.                                                    |        |
| ![Mounting Gasket Diagram](image)                                         | ![Mounting Gasket Diagram](image) |

| **Heat-Insulation:**                                                      |        |
| When an integral-type flowmeter or a remote type detector is installed     |        |
| and the pipe carrying high-temperature fluids is heat-insulated, do not    |        |
| wrap adiabatic materials around the installation bracket of the converter. |        |
| ![Heat-Insulation Diagram](image)                                         | ![Heat-Insulation Diagram](image) |

| **Flushing of the pipe line:**                                            |        |
| Flush and clean scale, incrustation and sludge on the inside of pipe for   |        |
| newly installed pipe line and repaired pipe line before the operation. For  |        |
| flushing, the flow should flow through bypass-piping to avoid damaging the |        |
| flowmeter. If there is no bypass-piping, install short pipe instead of the |        |
| flowmeter.                                                                 |        |
| ![Flushing of the pipe line Diagram](image)                              | ![Flushing of the pipe line Diagram](image) |
3.3 Precautions Regarding Installation

(1) Gas or Steam Measuring Precautions
   - Piping to Prevent Standing Liquid
     Mount YEWIFO in a vertical pipeline to avoid liquid traps. When YEWIFO is installed horizontally, raise that part of the pipeline in which the YEWIFO is installed.

   (Good)
   |     |
   v   Flow

   (No Good)
   |     |
   v   Flow

   Figure 3.2

   (2) Liquid Measurement Precautions
     To insure accurate measurement, the YEWIFO must always have a full pipe.
   - Piping Requirements for Proper Operation
     Allow the flow to flow against gravity. When the flow is moving with gravity, lift the down-stream pipe length above the YEWIFO installation level to maintain full pipeline.

   (Good)
   |     |
   v   Flow

   (No Good)
   |     |
   v   Flow

   (H) h=0
   Flow

   (Good)
   |     |
   v   Flow

   (No Good)
   |     |
   v   Flow

   Figure 3.3

   - Piping for Avoiding Bubbles
     Flows containing both gas and liquid cause problems. Avoid gas bubbles in a liquid flow. Piping should be carried out to avoid bubble generation. Install the valve on the downstream side of the flowmeter because pressure drop across the control valve may cause gas to come out of the solution.

   (Good)
   (Control Value)
   (No Good)

   Flow

   (Good)
   (X)

   Flow

   Figure 3.4

   (3) Multi-Phase Flow
     YEWIFO can measure gas, liquid and steam when there is no change in state. However, accurate measurement of mixed flows (e.g. gas and liquid) is not possible.

   (Good)
   (No Good)

   Flow

   Mist flow
   (No Good)

   (Good)
   (No Good)

   Liquid Flow

   Stratified flow
   (No Good)

   Gas Flow

   Bubble flow

   Figure 3.5
3. INSTALLATION

3.5 Cryogenic and High process Temperature Version Insulation

When you are using cryogenic type and high process temperature version of YEWFLO Vortex Flowmeter (Option code/HT/LT), refer to illustrated insulation method as shown in Figure 3.8.

(1) Installing Cryogenic Vortex Flowmeter

For cryogenic applications, use stainless steel mounting bolts and nuts to install the flowmeter. These can be ordered separately from YOKOGAWA. Cover the flowmeter body with heat insulating material so that the flowmeter can be maintained at ultra-low temperatures (refer to the Figure 3.8).

(2) Maintenance for Cryogenic Applications

DY/LT uses special materials that produce vortex flowmeter for cryogenic applications. When you are replacing a shudder bar, specify cryogenic type shudder bar. To avoid condensing in the terminal box, ensure that the wire connecting port is well sealed.

(3) Installing High Process Temperature Vortex Flowmeter

Cover the flowmeter body with heat insulating material so that the flowmeter can be maintained at high temperatures (Refer to the figure 3.8)

(4) Maintenance for High Process Temperature Applications

DY/HT uses special materials that produce vortex flowmeter for High Process Temperature applications. When you are replacing a shudder bar or a gasket, specify High Process Temperature type.

---

Section 3

Standard Energy Specifications

Steam Metering

4) Pipeline Diameter and digital YEWFLO

The process pipeline inner diameter should be slightly larger than the vortex flowmeter inner diameter, schedule 40 or lower pipe should be used for 1/2 to 2 inch flowmeters and schedule 80 or lower pipes for 3 to 8 inch flowmeters.

(No Good)  
\(D_1 < D_2\)

(Good)  
\(D_1 ≥ D_2\)

Figure 3.6

5) Waterproof Construction

The vortex flowmeter is of NEMA/IX waterproof construction. However, it cannot be used under water.

3.4 Piping to Improve Durability

(1) Pipe cleaning

- Flushing of pipe line (Cleaning)
  Flush and clean scale, incrustation and sludge on the inside of pipe wall for newly installed pipe line and repaired pipe line before the operation.
- Fluid Carrying Solids
  Do not measure fluids that carry solids (e.g., sand and pebbles). Make sure users periodically remove solids adhering to the vortex shudder.
- Obstruction of flow fluids may cause to make a chemical reaction and the fluid will be crystalized and hardened, and be deposited on the pipe wall and shudder bar.
  In those cases, clean shudder bar.

(2) Bypass piping

Installing a bypass, as illustrated in the figure below, permits the YEWFLO to be checked or cleaned conveniently (vortex shudder, etc.).

Figure 3.7

Figure 3.8

Heat insulating material
Bracket
1. **BTU Meter Sizing, Selection, and Installation Design**

   1.1. BTU meters shall be utilized to measure consumption of chilled water and heating hot water.

   1.2. BTU meter sizing shall be performed prior to meter selection.

   1.3. In order to correctly select the BTU metering system, the minimum, maximum, and normal operating flow rates and pressures shall first be determined by the design engineer.

   1.4. Using the minimum, maximum, and normal operating flow rates and pressures, as determined by the design engineer, the BTU meter vendor, in coordination with the design engineer, shall select the BTU flowmeter size for reasonable maximum velocity and pressure drop.

   1.5. The results of the BTU meter vendor's sizing shall be utilized by the design engineer to design the physical installation per the BTU meter manufacturer's installation instructions, standard drawings, and ANSI/ASME B31.1 Code for Pressure Piping.

   1.6. Meter run piping shall be the same pipe size as the nominal meter size. The meter run shall be complete with (at least) the minimum required straight runs of upstream and downstream piping, as indicated on the standard drawings and manufacturer's installation instructions. Reductions and/or enlargements of the piping shall occur before and/or after the meter run.

   1.7. Bypasses around BTU meters are not required.

   1.8. The piping system shall be designed to prevent the development of air bubbles in the fluid flowing through the flowmeter during normal operation.

2. **BTU Metering Equipment (All information shall be verified with manufacturer prior to equipment procurement)**

   2.1. **BTU Metering, 8-in. nominal size and smaller** – Chilled water and heating hot water meters shall utilize the following components:

   2.1.1. Yokogawa ADMAG AE Magnetic Flowmeter
           Model No. AExxxMG-AA1-LSA-A1DH/BR/SCT
2.1.2. Yokogawa Temperature Transmitters
Model No. YTA310-DA2NN/FU1/SCT/D2, with integrally mounted
Burns Engineering Model No. TSE-200L-10A-N2C-xxx-
RT3/03/WT30, 100 Ohm Pt RTD assembly in a 316 SS reduced-tip
thermowell with 3-in. lagging extension and a 3/4-in. NPT process
connection. Insertion depth shall be determined by pipe size.
(two complete assemblies required for each BTU meter)

2.1.3. Kessler-Ellis Products (KEP) Multi-Function Flow Computer
Model No. MS-748-L-1-0-V-MB
(one required for each BTU meter)

2.2. **BTU Metering, 10-in. nominal size and larger** – Chilled water and heating
hot water meters shall utilize the following components:

2.2.1. Yokogawa ADMAG AM Magnetic Flow Tube
Model No. AM_{xxx}DG-AA1-LS-000A/ SCT
(one per service required)

2.2.2. Yokogawa ADMAG Magnetic Flowmeter Converter
Model No. AM11-DHA1A-000*A/SCT
(one required for each BTU meter)

2.2.3. Yokogawa Magnetic Flowmeter Signal Cable
Model No. AM011-2-L_{xxx}F*A
Required length to be determined by field measurements.
(one required for each BTU meter)

2.2.4. Yokogawa Temperature Transmitters
Model No. YTA310-DA2NN/FU1/SCT/D2, with integrally mounted
Burns Engineering Model No. TSE-200L-10A-N2C-xxx-
RT3/03/WT30, 100 Ohm Pt RTD assembly in a 316 SS reduced-tip
thermowell with 3-in. lagging extension and a 3/4-in. NPT process
connection. Insertion depth shall be determined by pipe size.
(two complete assemblies required for each BTU meter)
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Standard Energy Specifications
BTU Metering

2.2.5. Kessler-Ellis Products (KEP) Multi-Function Flow Computer
   Model No. MS-748-L-1-0-V-MB
   (one required for each BTU meter)

3. Meter Monitoring System

3.1. Pulse output contacts from each BTU flow computer shall be connected to a
     meter monitoring system panel. This panel shall be connected to a 120-volt
     power source and a dedicated phone line for remote access through Temple’s
     existing TimeFrame system.

3.2. See Section 7, Meter Monitoring System, for additional requirements.

4. Mechanical Installation

4.1. Installation of BTU meters requires prior written approval of installation
     drawings showing the piping arrangement, dimensions and orientation of all
     metering equipment, pressure transmitters, gauges, valves, and fittings.

4.2. All meter installations shall be performed according to the manufacturer’s
     instructions, recommended best practices, and ANSI/ASME B31.1 Code for
     Pressure Piping.

4.3. All flange gaskets on metering equipment shall be in accordance with ASME
     B16.20 for spiral wound gaskets with outer centering ring. Flange gaskets
     shall be Garlock FLEXSEAL® Style RW, with flexible graphite filler
     material, or approved equal.

4.4. All flange bolting shall be ASTM A193 Grade B7 with ASTM A194 Grade
     2H hex nuts. Bolt length shall be in accordance with ASME B16.5. Neither
     studs nor threaded rod shall be used.

4.5. All slip-on flanges shall be back-welded.

4.6. All bolt threads shall be lubricated with anti-seize thread compound.

4.7. Make up flanges prior to completing last weld in connecting piping.
     Alignment of piping shall be correct without forcing, drifting, or bending.

4.8. Make up joints with spiral wound gaskets by taking up bolts until flange faces
     touch centering rings. Record torque required for flange closure and re-apply
     after piping warm-up.
4.9. After piping has been maintained at operating temperature for 48 hours, recheck bolting to restore initial bolt tension.

4.10. Electric welding machine grounding conductors shall be connected in a manner that will prevent welding current flow through the flowmeter or temperature transmitters to prevent damage to the equipment's electronics during installation.

5. **Electrical Installation**

5.1. All wire and cable shall be enclosed in electrical metallic tubing (EMT), electrical throughway or raceway, or watertight flexible electrical metallic tubing (sealtite) with a separate ground. Flexible electrical metallic tubing shall only be used in places where EMT cannot be installed. No wire or cable shall be left exposed, including in plenums and shaft-ways, upon completion of the installation.

5.2. Signal cables shall not be installed in conduit or raceway that also carries power wiring. Separate conduits or raceways shall be installed for any signal cable(s) required by this project.

5.3. Except as specified below, all signal cables installed between the magnetic flowmeters/flow converters, temperature transmitters, flow computers, and the meter system equipment shall be Belden No. 87760 or approved equal.

5.4. When using Belden No. 87760 cable, the red conductor shall be used for +VDC and the black conductor shall be used for -VDC.

5.5. Wiring shall be terminated with spade-type solderless crimp terminals at the magnetic flowmeters, flow converters, and the temperature transmitter.

5.6. BTU Meters, nominal size 10-in. and larger, utilizes a special magnetic flow converter between the flow meter and the flow computer. Two signal cables (one Belden No. 8720 and one special Yokogawa dedicated signal cable) are connected between the flow meter and the magnetic flow converter. Each of these two cables shall be installed in separate conduits.

5.7. BTU Meters, nominal size 8-in. and smaller, require 120 VAC, 1Ø power at the flowmeter. AC power to the flowmeter shall be installed a separate conduit from the flowmeter signal cable.
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BTU Metering

5.8. AC power wiring shall enter the Kessler-Ellis Products (KEP) Multi-Function Flow Computer on the lower, right bottom of the flow computer enclosure. Signal wiring shall enter the flow computer on the lower, left bottom of the flow computer enclosure, separate from the AC power wiring.

5.9. Signal cables connected between the flow computer, the magnetic flowmeter/flow converter, and the temperature transmitters shall have their cable shields grounded at the magnetic flowmeter/flow converter and the temperature transmitters. Cable shields shall be cut and taped off at the flow computer end.

5.10. Signal cables connected between the flow computer and the meter monitoring system panel shall have the cable shields grounded at the meter monitoring system panel. The cable shields shall be cut and taped off at the flow computer end.

6. BTU Metering System Commissioning

6.1. The services of the BTU meter manufacturer's service technician shall be retained, (by the installing contractor), to program, initialize, test, or otherwise commission, each BTU metering system.

6.2. Pulse outputs from BTU meter flow computers shall not be setup to exceed a pulse rate of 10 Hz with a 50% duty cycle and a 10 ms de-bounce at maximum load.

6.3. The work of the BTU meter manufacturer's service technician shall be coordinated with the meter monitoring system equipment technician in Section 7 of the Standard Energy Specifications.

6.4. The BTU meter manufacturer's service technician, upon completion of BTU metering system commissioning, shall submit hard-copy documentation of each meter's programmable settings, including, but not limited to, spans, multipliers, and the value of each pulse in BTUs, or fractions/multiples thereof.

7. Approvals

7.1. The only valid approvals for metering are those given by a representative of the Temple University OFM Energy Office.
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Standard Energy Specifications  
BTU Metering  

7.2. No metering equipment shall be purchased or installed without prior written approval.  

7.3. No approvals will be given without complete shop drawings.  

7.4. BTU meters shall not be installed without prior written approval of an installation drawing.  

7.5. No metering equipment may be energized without an inspection report signed by a representative of the Temple OFM Energy Office.  

8. Shop Drawing Submittals  

8.1. No approvals will be given without complete shop drawing submittals.  

8.2. A complete shop drawing submittal shall include the following:  

8.2.1. A schedule showing the quantity and the full load rating in BTU/H and operating pressure of all BTU consuming equipment including heating coils, cooling coils, reheat coils, perimeter radiation, fan coil units, and unit heaters for each metering system.  

8.2.2. A schematic piping diagram of the building's heating hot water and/or chilled water piping system(s) showing all pipe sizes, connected equipment, and rated equipment capacity.  

8.2.3. Total minimum and maximum expected heating and/or cooling loads.  

8.2.4. Meter sizing & selection criteria including the input and output of the manufacturer’s selection/sizing program.  

8.2.5. Complete model numbers of the selected equipment.  

8.2.6. Meter equipment technical specifications and physical dimensions.  

8.2.7. Dimensioned and detailed installation drawings for each metering system.  

9. Contacts  

Yokogawa BTU Metering:
Temple University OFM
Section 4

Standard Energy Specifications
BTU Metering

Cemtech Energy Controls
PO Box 385
Broomall, PA 19008
Phone: 610-353-4400
Fax: 610-353-6850

Temple University OFM Energy Office:

Daniel P. Donnelly          Kurt Bresser
Assistant Energy Manager    Energy Manager
Phone: 215-204-6778         Phone: 215-204-4515
E-Mail: daniel.donnelly@temple.edu E-Mail: kurt.bresser@temple.edu

10. Standard Drawings(s) and Excerpts From Manufacturer's Instruction Manual
NOMINAL PARAMETERS FOR YOKOGAWA ADMAG MAGNETIC FLOWMETER
OPERATING AT 50 PSIG WATER. VERIFY ALL PARAMETERS WITH MANUFACTURER.

<table>
<thead>
<tr>
<th>AE&lt;sub&gt;xx&lt;/sub&gt; or AM&lt;sub&gt;xxx&lt;/sub&gt;</th>
<th>Nominal Size, In.</th>
<th>Maximum Span, GPM</th>
<th>Flowmeter Laying Length (&quot;A&quot; Dimension), In.</th>
<th>Minimum Total Meter Run Length, In.</th>
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</table>

ADMAG AE: Maximum operating temperature 248° F.
PFA Lining: Maximum operating pressure 285 PSIG.
ADMAG AM: Maximum operating temperature 320° F.
PFA Lining: Maximum operating pressure 275 PSIG.

STANDARD BTU METER MECHANICAL INSTALLATION
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4. INSTALLATION

⚠️ WARNING

This instrument must be installed by expert engineer or skilled personnel. The procedures described in this chapter are not permitted for operators.

4.1 Piping Design Precautions

⚠️ IMPORTANT

Please design the correct piping referring to the followings to prevent damage for flowmeter and to keep correct measuring.

(1) Location

⚠️ IMPORTANT

Please install the flowmeter to the location where it is not exposed to direct sunlight and ambient temperature is -10 to +60°C (14 to 140°F).

* The minimum ambient temperature -20°C is available only for these sizes 40 to 100mm with SUS304 flange.

(2) Noise Rejection

⚠️ IMPORTANT

The instrument should be installed away from large electrical motors, transformers and other power sources in order to avoid interference with the measurement.

(3) Length of Straight Run

To keep accurate measuring, JIS B7554 “Electro Magnetic Flowmeters” explains about upstream piping condition of Magnetic Flowmeters.

We recommend to our customers about the piping conditions shown in Figure 4.1.1 based on JIS B7554 and our piping condition test data.

Figure 4.1.1 Minimum Length of Required Straight Run

⚠️ NOTE

1. Nothing must be inserted or installed in the metering pipe than may interfere with the magnetic field, induced signal voltages, and flow velocity distribution.

2. These straight runs may not be required on the downstream side flowmeter. However, if the downstream valve or other fittings cause channeling on the upstream side, provide a straight run of 2 D to 3 D on the downstream side.

(4) Liquid Conductivity

⚠️ IMPORTANT

Please avoid to install the flowmeter at location where liquid conductivity is likely to be non-uniform. Because it is possible to have bad influences to the flow indication by non-uniform conductivity when a chemical liquid is injected from upstream side close to the flowmeter. When this occurs, it is recommended that chemical application ports are installed on the downstream side of the flowmeter. In case chemicals must be added upstream side, please keep the pipe length enough so that liquid is properly mixed.

Figure 4.1.2 Chemical Injection
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BTU Metering
(5) Liquid Sealing Compound

⚠️ IMPORTANT
Please give attention in using Liquid Sealing Compound to the piping, because it brings bad influences to measurement by flowing out and cover the surfaces of electrode and earth-ring.

(6) Service Area
Please select the location where there is enough area to service installing, wiring, overhaul, etc.

(7) Bypass Line
It is recommended to install the Bypass Line to facilitate maintenance and zero adjustment.

Figure 4.1.3 Bypass Line

(8) Supporting the Flowmeter

⚠️ CAUTION
Please avoid to support only the flowmeter, but fix pipes at first and support the flowmeter by pipes to protect the flowmeter from forces caused by vibration, shock, expansion and contraction through piping.
For small sized flowmeters, please provide a mounting base so that the flowmeters are fixed in the piping. See the section 4.3 Mounting.

(9) Piping Condition

⚠️ IMPORTANT
The piping should be designed so that a full pipe is maintained at all times to prevent loss of signal and erroneous readings.

Please design the piping so that a fluid is always filled in the pipes. The Vertical Mounting is effective for fluids that is easily separate or slurry settles within pipes.
In this case, please flow a fluid from bottom to up.

Figure 4.1.4 Filling the Pipe with Liquid

(10) No Air Bubbles

⚠️ IMPORTANT
Please give attention to prevent bad influences or measuring errors from air bubbles that gathers inside measuring pipes.

In case the fluid includes air bubbles, please design the piping that prevent to gather air bubbles. In case valves are installed upstream of the flowmeter, it is possible that a valve causes air bubbles, please install the flowmeter upstream side of a valve.

Figure 4.1.5 Avoiding Air Bubbles

(11) Mounting Direction

⚠️ IMPORTANT
When the electrodes are vertical to ground, the electrode is covered with air bubbles at upper side or slurry at downside, and it may cause the measuring errors.
Please be sure to mount the converter upper side of piping to prevent water penetration into converter case.

Figure 4.1.6 Mounting Direction
Standard Energy Specifications
BTU Metering
(12) Grounding

**IMPORTANT**

Improper grounding can have an adverse effect on the flow measurement. Please ensure that the instrument is properly grounded.

The electromotive force of the magnetic flowmeter is minute and it is easy to be affected by noise. And also that reference electric potential is the same as the measuring fluid potential. Therefore, the reference electric potential (terminal potential) of the Flow Tube and the Converter/Amplifier also need to be the same as the measuring fluid. And moreover, that the potential must be the same with ground.

Please be sure to ground according to Figure 4.1.7.

600V vinyl insulated electric cable
(2mm in diameter or larger)

![Grounding](image)

**Figure 4.1.7 Grounding**

**4.2 Handling Precautions**

**WARNING**

The Magnetic Flowmeter is a heavy instrument. Please be careful to prevent persons from injuring when it is handled.

**4.2.1 General Precautions**

(1) Precaution for Carrying

The Magnetic Flowmeter is packed tightly. When it is unpacked, please give attention to prevent damages to the flowmeter. And to prevent the accident during carry to the installing location, please carry it near the location keeping packed as it delivered.

**CAUTION**

In case the Magnetic Flowmeter lifts up, please refer to Figure 4.2.1. Please never lift up by using a bar through the flowmeter. It damages liner severely.

**Figure 4.2.1 Lifting Flowmeters**
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Standard Energy Specifications
BTU Metering
(2) Precaution for Shock

⚠️ CAUTION

Care should be taken not to drop the flowmeter or subject it to excessive shock. This may lead to liner damage which will cause inaccurate readings.

(3) Flange Protection Covers

⚠️ IMPORTANT

Please keep the protection cover (e.g., corrugated paper or anything possible to protect) attached with flange except when mounting to the pipe.

(4) Terminal Box Cover

⚠️ IMPORTANT

Please never leave the terminal box cover open until wiring to prevent insulation deterioration.

(5) Long-term Non-use

⚠️ IMPORTANT

It is not preferable to leave the flowmeter for long-term non-use after installation. In case the flowmeter is compelled to do that, please take care of the flowmeter by the followings.

- Confirmation of Sealing Condition for the Flowmeter:
  Please confirm the sealing conditions of the terminal box screw and wiring ports.
  In case of the Conduit Piping, provide the drain plugs or waterproof glands to it to prevent that moisture or water penetrates into the flowmeter through the conduit.
- Regular Inspections:
  Please inspect the sealing condition (as above mentioned) and inside of the terminal box. And when it is suspect that water penetration into the inside flowmeter (e.g., rain fall), please inspect when it happened.

4.2.2 Flow Tube Piping

⚠️ CAUTION

Mis-aligned or slanted piping can lead to leakage and damage to flanges.

- Please correct mis-alignment or slanted piping and improper distance between mounting flanges before install the flowmeter. (Please refer to Figure 4.2.2)
- Inside a pipeline which is newly installed, some foreign substances (such as welding scrap or wood chips) may exist. Please remove them by flushing piping before mounting the flowmeter.

Figure 4.2.2 Slant and Mis-alignment of Flowmeter Piping

4.2.3 Alteration of LCD Display Orientation

LCD display orientation can be altered according to piping configurations if horizontal or vertical, just by removing four screws, adjusting unit orientation and fixing the screws tightly again as shown in Figure 4.2.3.

Figure 4.2.3 Procedure of Altering LCD Display Orientation

⚠️ NOTE

Orientation of display unit is limited as either way of the two shown in this figure.
1. Domestic Hot & Cold Water Meter Sizing, Selection, and Installation Design

1.1. Water meters shall be utilized to measure consumption of domestic hot & cold water.

1.2. Water meter sizing shall be performed prior to meter selection.

1.3. In order to correctly select the water meters, the maximum and normal flow rates, temperatures, and pressures shall first be determined by the design engineer.

1.4. Using the maximum and normal flow rates, temperatures, and pressures, as determined by the design engineer, the water meter vendor, in coordination with the design engineer, shall select the water meter size so that the maximum allowable water meter flow rate is not exceeded and to obtain acceptable pressure drop under normal operating conditions.

1.5. After meter selection, the design engineer shall design the physical installation per the water meter manufacturer's installation instructions, standard drawings, the International Plumbing Code, and the Plumbing Code section of the Philadelphia Building Construction and Occupancy Code.

1.6. Meter run piping shall be the same pipe size as the nominal meter size. The meter run shall be complete with (at least) the minimum required straight runs of upstream and downstream piping, as indicated on the standard drawings and manufacturer's installation instructions. Reductions and/or enlargements of the piping shall occur before and/or after the meter run.

1.7. A fully isolating bypass piping arrangement shall be included on all water meter installations.

2. Water Metering Equipment (All information shall be verified with manufacturer prior to equipment procurement)

2.1. Hot & Cold Water Meters, 1.5-in. nominal size and smaller – Hot & cold water meters shall utilize the following components:

2.1.1. Badger RCDL Industrial Nutating Disk Meter with bronze body, 250° F. option, and equipped with a Badger RTR Transmitter/Register. Register scale & transmitter units of measure shall be in cubic feet or
2.2. **Hot & Cold Water Meters, 2-in. through 6-in. nominal size** – Hot & cold water meters shall utilize the following components:

2.2.1. Badger RCDL Industrial Turbo Turbine Meter with bronze body, equipped with a Badger RTR Transmitter/Register. Register scale & transmitter units of measure shall be in cubic feet or fractions/multiples thereof. (one per service required)

2.2.2. Badger Bronze Plate Strainer sized to match the water meter. (one required for each water meter)

3. **Meter Monitoring System**

3.1. RTR transmitter outputs from each water meter shall be connected to a meter monitoring system panel. This panel shall be connected to a 120-volt power source and a dedicated phone line for remote access through Temple’s existing TimeFrame system.

3.2. See Section 7, Meter Monitoring System, for additional requirements.

4. **Mechanical Installation**

4.1. Installation of water meters requires prior written approval of installation drawings showing the piping arrangement, dimensions and orientation of all metering equipment, gauges, valves, and fittings.

4.2. All meter installations shall be performed according to the manufacturer’s instructions, recommended best practices, the International Plumbing Code, and the Plumbing Code section of the Philadelphia Building Construction and Occupancy Code.

5. **Electrical Installation**

5.1. All wire and cable shall be enclosed in electrical metallic tubing (EMT), electrical throughway or raceway, or watertight flexible electrical metallic tubing (sealtite) with a separate ground. Flexible electrical metallic tubing shall only be used in places where EMT cannot be installed. No wire or cable
shall be left exposed, including in plenums and shaft-ways, upon completion of the installation.

5.2. Signal cables shall not be installed in conduit or raceway that also carries power wiring. Separate conduits or raceways shall be installed for any signal cable(s) required by this project.

5.3. All signal cables installed between the water meter and the meter monitoring system equipment shall be Belden No. 87760 or approved equal.

5.4. When using Belden No. 87760 cable, the red conductor shall be used for +VDC and the black conductor shall be used for -VDC.

5.5. Signal cables connected between the water meter and the meter monitoring system panel shall have the cable shields grounded at the meter monitoring system panel. The cable shields shall also be connected to the silver shield wire of the RTR transmitter.

6. Approvals

6.1. The only valid approvals for metering are those given by a representative of the Temple University OFM Energy Office.

6.2. No metering equipment shall be purchased or installed without prior written approval.

6.3. No approvals will be given without complete shop drawings.

6.4. Water meters shall not be installed without prior written approval of an installation drawing.

6.5. No metering equipment may be energized without an inspection report signed by a representative of the Temple OFM Energy Office.

7. Shop Drawing Submittals

7.1. No approvals will be given without complete shop drawing submittals.

7.2. A complete shop drawing submittal shall include the following:
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Standard Energy Specifications
Domestic
Hot & Cold Water Metering

7.2.1. A schedule showing the quantity and the maximum consumption rate in cubic feet per minute and operating pressure of all water consuming equipment.

7.2.2. A schematic piping diagram of the building's domestic hot water and/or domestic cold water piping system(s) showing all pipe sizes, connected equipment, and rated equipment capacity.

7.2.3. Total minimum and maximum expected water consumption.

7.2.4. Meter sizing & selection criteria.

7.2.5. Complete model numbers of the selected equipment.

7.2.6. Meter equipment technical specifications and physical dimensions.

7.2.7. Dimensioned and detailed installation drawings for each metering system.

8. Contacts

Badger Water Metering:

J.R. Stover & Associates, Inc.
600 North Bethlehem Pike
Ambler, PA 19002
Phone: 215-646-3707
Fax: 215-538-9488

Temple University OFM Energy Office:

Daniel P. Donnelly  Kurt Bresser
Assistant Energy Manager  Energy Manager
Phone: 215-204-6778  Phone: 215-204-4515
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Standard Energy Specifications
Hot & Cold Water Metering

9. Standard Drawing(s)
Temple University OFM
Section 5

Standard Energy Specifications
Hot & Cold Water Metering
1. **Electric Meter Selection and Installation Design**

1.1. Electric meters shall be utilized to measure electric consumption (energy) and demand (power).

1.2. All electric meters for main service(s) metering and non-university tenant sub-metering shall incorporate local displays.

1.3. Electric sub-metering for university loads may be without a local display.

1.4. All electric meters shall be equipped with a relay, KY, or KYZ pulse initiator output for kWh.

1.5. Electric meters may be equipped with advanced power management or communication features. However, meter monitoring will be performed by Temple's existing meter monitoring system and requires that each meter be equipped with a relay, KY, or KYZ pulse initiator output for kWh.

1.6. Each electric meter shall be connected to current transformers through a shunt terminal block or shunt switch.

1.7. Each electric meter shall be connected to potential transformers or a voltage source that only serves electric meter(s). No other loads shall be connected to the electric meter(s) potential transformers or voltage source.

1.8. Each electric meter shall be connected to potential transformers or voltage source through an individual power disconnect switch. The switch shall only disconnect power from the individual electric meter.

1.9. Wherever possible, electric metering shall be incorporated into, and factory-installed in, the new building's substation(s) or main distribution panel(s).

2. **Approved Electric Metering Equipment (All information shall be verified with manufacturer prior to equipment procurement)** - The following are approved electric meters. Since electric meter models and specifications change frequently, other manufacturers and/or meter models may be submitted for consideration during the design phase.

2.1. **For Main Service(s) and Non-University Tenant Metering:**

2.1.1. Cutler Hammer
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2.1.1.1. IQ Analyzer IQA6400 Series with relay outputs.
2.1.1.2. IQ DP4100 Series with relay output.

2.1.2. General Electric

2.1.2.1. Power Leader EPM 5000P Series with KYZ pulse initiator.
2.1.2.2. Power Quality Monitor PQM with relay output.

2.1.3. Square D

2.1.3.1. Power Logic PM820 or PM850 with KYZ pulse initiator output.

2.2. For Sub-Metering of University Loads:

2.2.1. Any of the meters listed in Paragraph 2.1

2.2.2. Veris H8050 Series kWh transducer with pulse output.

3. Meter Monitoring System

3.1. All electric meters shall be connected to a meter monitoring system panel. This panel shall be connected to a 120-volt power source and a dedicated phone line for remote access through Temple’s existing TimeFrame system.

3.2. See Section 7, Meter Monitoring System, for additional requirements.

4. Electrical Installation

4.1. All wire and cable shall be enclosed in electrical metallic tubing (EMT), electrical throughway or raceway, or watertight flexible electrical metallic tubing (sealtite) with a separate ground. Flexible electrical metallic tubing shall only be used in places where EMT cannot be installed. No wire or cable shall be left exposed, including in plenums and shaft-ways, upon completion of the installation.

4.2. Signal cables shall not be installed in conduit or raceway that also carries power wiring. Separate conduits or raceways shall be installed for any signal cable(s) required by this project.
4.3. All signal cables installed between the electric meter and the meter monitoring system equipment shall be Belden No. 87760 or approved equal.

4.4. When using Belden No. 87760 cable, the red conductor shall be used for +VDC and the black conductor shall be used for -VDC.

4.5. Signal cables connected between the electric meter and the meter monitoring system panel shall have the cable shields grounded at the meter monitoring system panel. The cable shields shall be cut taped off at the electric meter end.

5. **Electric Meter Commissioning**

5.1. The services of the electric meter manufacturer's service technician shall be retained, (by the installing contractor), to program, initialize, test, or otherwise commission, each electric meter.

5.2. Pulse outputs from electric meters shall not be setup to exceed a pulse rate of 10 Hz with a 50% duty cycle and a 10 ms de-bounce at maximum load.

5.3. The work of the electric meter manufacturer's service technician shall be coordinated with the meter monitoring system equipment technician in Section 7 of the Standard Energy Specifications.

5.4. The electric meter manufacturer's service technician, upon completion of meter commissioning, shall submit hard-copy documentation of each meter's programmable settings, including, but not limited to, pulse output type (KYZ pulse initiator, SPST relay, etc.) and the value of each pulse in kWh, or fractions thereof.

6. **Approvals**

6.1. The only valid approvals for metering are those given by a representative of the Temple University OFM Energy Office.

6.2. No metering equipment shall be purchased or installed without prior written approval.

6.3. No approvals will be given without complete shop drawings.
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Electric Metering

6.4. Electric meters shall not be installed without prior written approval of a single-line diagram.

6.5. No metering equipment may be energized without an inspection report signed by a representative of the Temple OFM Energy Office.

7. Shop Drawing Submittals

7.1. No approvals will be given without complete shop drawing submittals.

7.2. A complete shop drawing submittal shall include the following:

7.2.1. An electrical panel/switchgear schedule showing all loads.

7.2.2. A single-line diagram of the building's electrical system showing all electrical gear, transformers, panels, meters, and loads served.

7.2.3. Meter selection criteria.

7.2.4. Complete model numbers of the selected equipment.

7.2.5. Meter equipment technical specifications and physical dimensions.

7.2.6. Dimensioned and detailed installation drawings & wiring diagrams for each metering system.

8. Contacts

Temple University OFM Energy Office:

Daniel P. Donnelly  Kurt Bresser
Assistant Energy Manager  Energy Manager
Phone: 215-204-6778  Phone: 215-204-4515
E-Mail: daniel.donnelly@temple.edu  E-Mail: kurt.bresser@temple.edu
1. Meter Monitoring and Communications

   1.1. Pulse output contacts from each steam flow computer, BTU flow computer, domestic hot & cold water meter, and electric meter shall be connected to a meter monitoring system panel. This panel shall be connected to a 120 volt power source and a dedicated phone line for remote access through Temple’s existing TimeFrame system.

   1.2. A minimum of one Measuring and Monitoring Services (MMSI) TimeFrame Model No. TF32A+ Analog Monitoring Panel shall be furnished and installed in each building.

   1.3. Each Analog Monitoring Panel can monitor up to 32 meters. If there are more than 32 meters, additional TimeFrame Model No. TF32A+ Analog Monitoring Panels shall be furnished and installed.

2. Electrical Installation

   2.1. TF32A+ Analog Monitoring Panel shall be connected in a neat and workmanlike manner precisely according to the manufacturer’s instructions.

   2.2. All wire and cable shall be enclosed in electrical metallic tubing (EMT), electrical throughway or raceway, or watertight flexible electrical metallic tubing (sealtite) with a separate ground. Flexible electrical metallic tubing shall only be used in places where EMT cannot be installed. No wire or cable shall be left exposed, including in plenums and shaft-ways, upon completion of the installation.

   2.3. Signal cables shall not be installed in conduit or raceway that also carries power wiring. Separate conduits or raceways shall be installed for any signal cable(s) required by this project.

   2.4. All signal cables installed between the meter(s) and TF32A+ Analog Monitoring Panel shall be Belden No. 87760 or approved equal.

   2.5. When using Belden No. 87760 cable, the red conductor shall be used for +VDC and the black conductor shall be used for -VDC.

   2.6. Signal cables connected between the meter(s) and the meter monitoring system panel shall have the cable shields grounded at the TF32A+ Analog Monitoring Panel. Except for domestic hot & cold water meters utilizing the
Standard Energy Specifications
Meter Monitoring System

Badger Meter RTR transmitter/register, all cable shields shall be cut and taped off at the meter end.

3. Meter Monitoring System Commissioning

3.1. The services of an MMSI technician to program, initialize and test the TF32A+ Analog Monitoring Panel shall be furnished by the installing contractor.

3.2. The work of the MMSI technician shall be coordinated with the work of other meter manufacturer's service technicians to ensure correct setup of parameters.

4. Contacts

TimeFrame TF32A+ Analog Monitoring Panel:

Measuring & Monitoring Services, Inc.
620 Shrewsbury Avenue
Tinton Falls, NJ 07701
Phone: 732-530-3280
Fax: 732-576-8067

Temple University OFM Energy Office:

Daniel P. Donnelly    Kurt Bresser
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5. Standard Drawing(s)
Standard Energy Specifications
Meter Monitoring System