

- B. Refer to Section 01 3216 for other scheduling requirements.

**END OF SECTION**

**SECTION 01 2100  
ALLOWANCES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes administrative and procedural requirements governing allowances.
  - 1. Cash allowances are hereby established for Owner's Contingency, Scope of Work items and materials in the amounts listed below and shall be included in the Contract Sum. These sums shall be reconciled in accordance with Article 3.8 of the General Conditions.
  - 2. Allowances for materials, such as brick, tile, etc., shall be for the net cost of materials only, without sales tax, delivered and unloaded at the jobsite. The party who makes the purchase (Contractor or subcontractor) shall include handling costs on site, labor, overhead, profit and other expenses contemplated for each allowance in the Contractor's Sum and not in the allowance. Include labor under allowance, only when labor is specified to be included.
  - 3. Allowances for Scope of Work , such as Owner's contingency, graphics, technology, etc., will be adjusted, as necessary, to reflect the difference between the allowance amount stated and Contractor's handling costs, cost of materials, without sales tax, plus labor, subcontract costs, with overhead and profit markup, and any other reasonable costs, except the Contractor's overhead and profit, which is not allowed.
  - 4. Contractor shall cause the work covered by these allowances to be performed for such amounts and by such persons as the Architect may direct or by persons selected by competitive sealed proposals, but he will not be required to employ persons against whom he makes reasonable objection. If any items cost less than the amount listed, the Owner shall be given a credit in the amount of the difference. If the Owner so desires, credits in one allowance category may be transferred to any other allowance category. If any items cost more than the amount listed, such adjustment will include additional handling costs on the site, labor, installation costs, overhead, profit and other expenses resulting to the Contractor or subcontractor from any increase over the original allowance, unless such increase is funded by a transfer of funds from other allowances in which case no overhead and profit will be allowed. If the final cost of all allowances, when determined, is more or less than the sum of the allowances, the Contract Sum will be adjusted accordingly by Change Order.
  - 5. Contractor shall proceed with the work in question only after receiving written directions executed by the Owner and the Architect. Such direction will be provided by an Allowance Expenditure Authorization prepared by the Architect and executed by Owner, Architect and Contractor. Owner will not be obligated to pay the cost of any work completed without prior authorization.
  - 6. Unexpended balance of allowance sums shall revert to the Owner in the final settlement of the Contract.
- 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.

**1.02 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.

### **1.03 SUBMITTALS**

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- C. 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.
- D. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

### **1.04 COORDINATION**

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

### **1.05 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 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.
- D. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

### **1.06 CONTINGENCY ALLOWANCES**

- A. Use the contingency allowance only as directed by Architect 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, insurance, equipment rental, and similar costs.
- C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.
- D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

### **1.07 TESTING AND INSPECTING ALLOWANCES**

- A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.
- B. 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.
- C. Costs of services not required by the Contract Documents are not included in the allowance.
- D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

### **1.08 ADJUSTMENT OF ALLOWANCES**

- A. 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.
- B. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

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

### **3.02 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.

### **3.03 SCHEDULE OF ALLOWANCES**

### **3.04 ALLOWANCES**

- A. Owner's Contingency Allowances: \$25,000.00
1. Contractor shall include the amount indicated above in his Base Bid as a contingency to cover the cost of hidden, concealed or otherwise unforeseen conditions which develop during completion of the work. Contractor shall be allowed to recover all costs associated with the completion of work under this contingency, however, no overhead or profit will be allowed.
- B. Contractor's Contingency Allowances: \$25,000.00
1. Contractor shall include the amount indicated above in his Base Bid as a contingency to cover the cost of hidden, concealed or otherwise unforeseen conditions which develop during completion of the work. Contractor shall be allowed to recover all costs associated with the completion of work under this contingency, however, no overhead or profit will be allowed.
- C. Testing Allowance: \$15,000.00
1. Contractor shall include the amount indicated above in his Base Bid for the cost of providing all required testing and inspections for the project in accordance with Sections 01 4523 & 01 4529.
- D. Landscaping Allowance: \$25,000.00
1. Contractor shall include the amount indicated above in his Base Bid for the cost of providing irrigation and planting to areas as indicated on drawings or by Owner, and for sodding and hydromulching of areas affected by construction.

**END OF SECTION**

**SECTION 01 2513  
PRODUCT SUBSTITUTION PROCEDURES**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Specified product compliance, and product quality assurance
- B. Specific administrative and procedural requirements for handling requests for substitutions made prior to award of Contract.
- C. Requirements for product delivery, storage and handling.

**1.02 RELATED REQUIREMENTS**

- A. Instructions to Proposers: Product options and procedures for submittal of requests for substitutions during the Proposal period.

**1.03 DESCRIPTION OF REQUIREMENTS**

- A. Definitions: Definitions used in this Section are not intended to negate the meaning of other terms used in the Contract Documents, including such terms as "specialties", "systems", "structure", "finishes", "accessories", "furnishings", "special construction", and similar terms. Such terms are self-explanatory and have recognized meanings in the construction industry.
  - 1. Products: Shall mean items purchased for incorporation in the Work, regardless of whether they were specifically purchased for the project or taken from the Contractor's previously purchased stock. The term "product" as used herein includes the terms "material", "equipment", "system", and other terms of similar intent.
    - a. Named Products: Are those identified by the use of the manufacturer's name for a product, including such items as a make or model designation, as recorded in published product literature, of the latest issue as of the date of the Contract Documents.
    - b. Specified Products: same as Named Products.
  - 2. Materials: Shall mean products that must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, or installed to form units of work.
  - 3. Equipment: Is defined as a product with operational parts, regardless of whether motorized or manually operated, and in particular, a product that requires service connections such as wiring or piping.

**1.04 PRODUCT QUALITY ASSURANCE**

- A. Source Limitations: To the fullest extent possible, provide products of the same generic kind, from a single source, for each unit of work.
  - 1. When it is discovered that specific products are available only from sources that do not or cannot produce an adequate quantity to complete project requirements in a timely manner, consult with the Architect/Engineer for a determination of what product quantities are most important before proceeding. The Architect/Engineer will designate those qualities, such as visual, structural, durability, or compatibility, that are most important. When the Architect/Engineer's determination has been made, select products from those sources that produce products that possess the most important qualities, to the fullest extent possible.
- B. Compatibility of Options: Compatibility of products is a basic requirement of product selection. When the Contractor is given the option of selecting between two (2) or more products for use on the project, the product selected must be compatible with other products previously selected, even if the products previously selected were also Contractor options. The complete compatibility between the various choices available to the Contractor is not assured by the various requirements of the Contract Documents, but must be provided by the Contractor.
- C. Or Equal:
  - 1. Where the phrase "or equal", "or equivalent", "or Architects approved equal", or similar phrasing, occurs in the Proposal Documents, do not assume that materials, equipment, or

- methods of construction will be approved by the Architect unless the item has been specifically approved for this Work by the Architect.
2. The decision of the Architect shall be final.
- D. Where a proposed substitution involves the work of more than one (1) contractor, each contractor involved shall cooperate and coordinate the work with each other contractor involved, so as to provide uniformity and consistency and to assure the compatibility of products.
- E. Foreign Product Limitations: "Foreign products" as distinguished from "domestic products" are defined as products that are either manufactured substantially (50 percent or more of value) outside of the United States and its possessions, or produced or supplied by entities known to be substantially owned (more than 50 percent) by persons who are not citizens of nor living within the United States and its possessions.
1. Except under one (1) of the following conditions, select and provide domestic, not foreign, products for inclusion in the Work.
    - a. There is no domestic product available that complies with the requirements of the Contract Documents.
    - b. Available domestic products that comply with the requirements of the Contract Documents are available only at prices or other procurement terms that are substantially higher (25 percent or more) than for available foreign products that comply with the requirements of the Contract Documents.
    - c. At the discretion of the Architect or Owner.
  2. Final determination and acceptance will be the responsibility of the Architect.
- F. Standards: Refer to Section 01 4100, Regulatory Requirements for the applicability of industry standards to the products specified for the Project, and for the acronyms used in the text of the Specification Sections.

#### **1.05 SUBSTITUTIONS OF PRODUCTS**

- A. The products described in the Proposal Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution. The materials and equipment named in, and the procedures covered by these specifications have been selected as a standard because of quality, particular suitability or record of satisfactory performance. It is not intended to preclude the use of equal or better materials or equipment provided that same meets the requirements of the particular project and is approved in an Addendum as a substitution prior to the submission of Proposals.
- B. No substitution will be considered prior to receipt of Proposals unless written request for approval has been received by the Architect at least seven (7) days prior to the date for receipt of Proposals. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including drawings, cuts, performance and test data and any other information necessary for an evaluation. The Architect's decision of approval or disapproval of a proposed substitution shall be final.
- C. If the Architect approves any proposed substitution prior to receipt of Proposals, such approval will be set forth in an Addendum. Offerors shall not rely upon approvals made in any other manner.
- D. The Architect and Owner reserve the right to disapprove the use of any manufacturer who in their judgment is unsuitable for use on the Project and that decision will be final.
- E. The following are not considered as substitutions:
1. Revisions to the Contract Documents, when requested by the Owner, Architect, or any of their consultants are considered as "changes" not substitutions.
  2. Specified Contractor options on products and construction methods included in Contract Documents are choices made available to the Contractor and are not subject to the requirements specified in this Section for substitutions.

3. Except as otherwise provided in the Contract Documents, the Contractor's determination of and compliance with governing authorities do not constitute "substitutions" and do not constitute a basis for change orders.
- F. The following may be considered as a reason for a request for substitution:
  1. The request is directly related to an "or approved equal" clause or similar language in the Contract Documents.
  2. The specified product or method of construction cannot be provided within the Contract Time in accordance with paragraph below concerning availability of specified items.
  3. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
  4. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other consideration of merit, after deducting offsetting responsibilities the Owner may be required to bear. These additional responsibilities may include such considerations as additional compensation to the Architect/Engineer for redesign and evaluation services, the increased cost of other work by the Owner or separate contractors, and similar considerations.
  5. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
  6. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.
  7. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provides the required warranty.
- G. Availability of specified items:
  1. Verify prior to submittal of Proposal that all specified items will be available in time for installation during orderly and timely progress of the work.
  2. In the event specified items will not be so available, notify the Architect prior to receipt of Proposal. Submit Request for Substitutions in accordance with this section.
  3. The request will not be considered if the product or method cannot be provided as a result of the Contractor's failure to pursue the work promptly or coordinate activities properly.
  4. Costs of delays because of non-availability of specified items, when such delays could have been avoided by the Contractor, will be back-charged as necessary and shall not be borne by the Owner.
- H. A request constitutes a representation that Proposer:
  1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
  2. Will provide same warranty for Substitution as for specified product, except when inability to provide specified Warranty is reason for request for substitution as described above.
  3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
  4. Waives claims for additional costs or time extension which may subsequently become apparent.
  5. Will reimburse the Owner and pay for all costs, including Architect/Engineer's redesign and evaluation costs resulting from the use of the proposed substitution, or for review or redesign services associated with re-approval by authorities having jurisdiction.
- I. No substitutions will be considered after the Award of Contract.

#### **1.06 SUBSTITUTION REQUEST SUBMITTAL**

- A. Requests for Substitutions: Submit three (3) copies of each request for substitution. In each request identify the product or fabrication or installation method to be replaced by the substitution; include related Specifications Section and Drawing numbers, and complete

documentation showing compliance with the requirements for substitutions. Include, as appropriate, with each request, the following information:

1. Product data, drawings and descriptions of products, fabrication and installation procedures.
  2. Samples, where applicable or requested.
  3. A detailed comparison of the significant qualities of the proposed substitution with those of the work originally specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect, where applicable.
  4. Coordination information, including a list of changes or modifications needed by other parts of the work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.
  5. A statement indicating the effect the substitution will have on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
  6. Cost information, including a proposal of the net change, if any in the Contract Sum.
  7. Certification by the Contractor to the effect that, in the Contractor's opinion, after thorough evaluation, the proposed substitution will result in work that in every significant respect is equal-to or better than the work required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
  8. A statement indicating the Contractor will reimburse the Owner and pay for all costs, including Architect/Engineer's re-design and evaluation costs resulting from the use of the proposed substitution.
- B. Work-Related Submittals: The Contractor's submittal of, and the Architect/Engineer's acceptance of, Shop Drawings, Product Data, or Samples which are related to work not complying with the Contract Documents, does not constitute an acceptance or valid request for a substitution, nor approval thereof.

## **1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. General: Deliver, store, and handle products in accordance with manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft. Control to prevent overcrowding of construction spaces or overloading of structure. In particular, coordinate delivery and installation to ensure minimum holding or storage times for items known or recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other sources of loss.
1. Deliver products to the site in the manufacturer's sealed containers or other packaging system, complete with labels intact, and instructions for handling, storage, unpacking, installing, cleaning and protecting.
  2. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of product.
  3. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
  4. Store products at the site or in a bonded and insured off-site storage facility or warehouse in a manner that will facilitate inspection and measurement of quantity or counting of units. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
  5. Store heavy materials away from the project structure or in a manner that will not endanger the supporting construction.

## **PART 2 - PRODUCTS**

### **2.01 GENERAL PRODUCT COMPLIANCE**

- A. General: Requirements for individual products are indicated in the Contract Documents; compliance with these requirements is in itself a contract requirement. These requirements may



be specified in any one (1) of several different specifying methods, or in any combination of these methods. These methods include the following:

1. Proprietary
  2. Descriptive
  3. Performance
  4. Compliance with Reference Standards
- B. Compliance with codes, compliance with graphic details, allowances, and similar provisions of the Contract Documents also have a bearing on the selection process.
- C. Procedures for Selecting Products: The Contractor's options in selecting products are limited by requirements of the Contract Documents and governing regulations. They are not controlled by industry traditions or procedures experienced by the Contractor on previous construction projects. Required procedures include, but are not limited to the following for the various indicated methods of specifying:
1. Proprietary and Semi-Proprietary Specification Requirements:
    - a. Single Product Name: Where only a single product or manufacturer is named, provide the product indicated, unless the specification indicates the possible consideration of other products. Advise the Architect/Engineer before proceeding, when it is discovered that the named product is not a reasonable or feasible solution.
    - b. Two (2) or More Product Names: Where two (2) or more products or manufacturers are named, provide one (1) of the products named, at the Contractor's option. Exclude products that do not comply with specification requirements. Do not provide or offer to provide an unnamed product, unless the specification indicates the possible consideration of other products. Advise the Architect/Engineer before proceeding where none of the named products comply with specification requirements, or are not feasible for use. Where products or manufacturers are specified by name, accompanied by the term "or approved equal" or similar language, comply with this Section regarding "substitutions" to obtain approval from the Architect/Engineer for the use of an unnamed product.
  2. Non-Proprietary Specification Requirements: Where the specifications name products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to the use of these products only, the Contractor may, at his option, use any available product that complies with the Contract requirements.
  3. Descriptive Specification Requirements: Where the specifications describe a product or assembly generically, in detail, listing the exact characteristics required, but without use of a brand name, provide products or assemblies that provide the characteristics indicated and otherwise comply with Contract requirements.
  4. Performance Specification Requirements: Where the specifications require compliance with indicated performance requirements, provide products that comply with the specific performance requirements indicated, and that are recommended by the manufacturer for the application indicated. The manufacturer's recommendations may be contained in published product literature, or by the manufacturer's individual certification of performance. General overall performance of a product is implied where the product is specified for specific performances.
  5. Compliance with Standards, Codes, and Regulations: Where the specifications require only compliance with an imposed standard, code or regulation, the Contractor has the option of selecting a product that complies with specification requirements, including standards, codes, and regulations.
  6. Visual Matching: Where matching an established sample is required, the final judgement of whether a product proposed by the Contractor matches the sample satisfactorily will be determined by the Architect. Where there is no product available within the specified product category that matches the sample satisfactorily and also complies with other specified requirements, comply with the provisions of this Section regarding "substitutions" and other Contract Documents for "change orders" for the selection of a matching product in another product category, or for non-compliance with specified requirements.

7. Visual Selection: Except as otherwise indicated, where specified product requirements include the phrase "...as selected from the manufacturer's standard colors, patterns, textures..." or similar phrases, the Contractor has the option of selecting the product and manufacturer, provided the selection complies with other specified requirements. The Architect is subsequently responsible for selecting the color, pattern and texture from the product line selected by the Contractor.
  8. Allowances: Refer to individual sections of the specifications and Section 01 21 00, Allowances for an indication of product selections that are controlled by established allowances, and for the procedures required for processing such selections.
- D. Producer's Statement of Applicability: Where individual specification sections indicate products that require a "Statement of Applicability" from the manufacturer or other producer, submit a written-certified statement from the producer stating that the producer has reviewed the proposed application of the product on the project. This statement shall state that the producer agrees with or does not object to the Architect/Engineer's specification and the Contractor's selection of the product on the project is suitable and proper.

## **2.02 SUBSTITUTIONS**

- A. Condition: The Contractor's request for substitution will be received and considered when extensive revisions to Contract Documents are not required, when the proposed changes are in keeping with the general intent of the Contract Documents, when the request is timely, fully documented and properly submitted, and when one (1) or more of the above conditions are satisfied, all as judged and determined by the Architect/Engineer; otherwise the requests will be returned without action except to record non-compliance with these requirements.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION OF PRODUCTS**

- A. General: Except as otherwise indicated in individual sections of these specifications, comply with the manufacturer's instructions and recommendations for installation of the products in the applications indicated.
- B. Anchor each product securely in place, accurately located and aligned with other work.
- C. Clean exposed surfaces and protect surfaces as necessary to ensure freedom from damage and deterioration at time of acceptance.
- D. Products and assemblies shall be installed complete, in-place, watertight and structurally sound.

### **3.02 INSTALLATION OF APPROVED SUBSTITUTIONS**

- A. Coordinate all approved substitutions with adjacent work.
- B. Comply with the manufacturer's and/or supplier's instructions and recommendations for installation of the products in the applications indicated.
- C. Provide all items required by manufacturer and/or supplier regarding installation, i.e. supplemental supports, anchors, fasteners, painting, etc. whether or not indicated or specified.

**END OF SECTION**

**SECTION 01 2516  
SUBSTITUTION REQUEST FORM**

**PROJECT: TEXAS AGGIES CORPS OF CADETS ASSOCIATION**

**PROJECT NO.**

**FROM:** \_\_\_\_\_

**BIDDER HEREBY REQUESTS ACCEPTANCE OF THE FOLLOWING PRODUCT OR SYSTEM AS A  
SUBSTITUTION IN ACCORDANCE WITH PROVISIONS OF THE INSTRUCTIONS TO BIDDERS AND  
SECTION 01 6000 OF THE SPECIFICATIONS:**

**8.01 SPECIFIED PRODUCT OR SYSTEM**

- A. Substitution request for: \_\_\_\_\_  
B. Specification Section No.: \_\_\_\_\_ Article: \_\_\_\_\_

**8.02 SUPPORTING DATA**

- A. Product data for proposed substitution is attached (description of product, reference standards, performance and test data).

**8.03 QUALITY COMPARISON**

**A. SPECIFIED PRODUCT SUBSTITUTION**

1. Name Brand: \_\_\_\_\_
2. Catalog No. \_\_\_\_\_
3. Manufacturer: \_\_\_\_\_
4. Vendor: \_\_\_\_\_
5. Variations: \_\_\_\_\_
6. (Add additional sheets if necessary)
7. Maintenance Service Available: Yes No
8. Spare Parts Source: \_\_\_\_\_
9. Warranty: Yes No \_\_\_\_\_ Years.

**8.04 PREVIOUS INSTALLATIONS**

- A. Identification of similar projects on which proposed substitution was used:  
B. Project: \_\_\_\_\_ Project: \_\_\_\_\_  
C. Address: \_\_\_\_\_ Address: \_\_\_\_\_  
D. Architect \_\_\_\_\_ Architect \_\_\_\_\_  
E. Owner \_\_\_\_\_ Owner \_\_\_\_\_  
F. Date Installed \_\_\_\_\_ Date Installed \_\_\_\_\_

**8.05 REASON FOR NOT GIVING PRIORITY TO SPECIFIED ITEM**

- A. \_\_\_\_\_  
B. \_\_\_\_\_

**8.06 EFFECT OF SUBSTITUTION**

- A. Proposed substitution affects other work or trades: NO Yes (If yes, explain)  
1. \_\_\_\_\_  
2. \_\_\_\_\_  
3. \_\_\_\_\_

4. Substitutions requires dimensional revisions or redesign of structural, M/E/P, or other work: No Yes (if yes, attach data explaining revisions).

**8.07 BIDDER'S STATEMENT OF CONFORMANCE OF PROPOSED SUBSTITUTION TO CONTRACT REQUIREMENTS**

- A. I / we have investigated the proposed substitution.
- B. I / we believe that it is equal or superior in all respects to specified product, except as stated above.
- C. Will provide same warranty as specified for specified product:
- D. Have included complete cost data and implications of the substitution;
- E. Will pay redesign and special inspection costs caused by the use of this product:
- F. Will coordinate the incorporation of the proposed substitution into the Work:
- G. Waive future claims for added cost to Contract caused by the substitution.
- H.

**8.08 BIDDER:** \_\_\_\_\_

**8.09 (NAME OF PRIME BIDDING CONTRACTOR)**

**8.10**

- A. All questions must be answered and all blanks filled in. Enter "NA" of not applicable. Unresponsive or incomplete requests will be rejected and returned without review.

**8.11 ARCHITECT'S REVIEW AND ACTION**

- A. Resubmit substitution request: Yes No
- B. Provide more information in the following areas: \_\_\_\_\_
- C. \_\_\_\_\_
- D. \_\_\_\_\_
- E. Prime Bidder must sign Bidder's Statement of Conformance Yes
- F. Substitution is accepted. Yes No
- G. Substitution is accepted, with the following comments:
- H. \_\_\_\_\_
- I. \_\_\_\_\_
- J. Substitution request received too late. Yes No
- K. Architect:
- L.

1. By: \_\_\_\_\_ Date: \_\_\_\_\_

**THE ARCHITECT HAS RELIED UPON THE INFORMATION PROVIDED BY THE BIDDER, AND MAKES NO CLAIM AS TO THE ACCURACY, COMPLETENESS, OR VALIDITY OF SUCH INFORMATION. IF AN ACCEPTED SUBSTITUTION IS LATER FOUND TO BE NOT IN COMPLIANCE WITH THE CONTRACT DOCUMENTS, BIDDER SHALL PROVIDE THE SPECIFIED PRODUCT AT NO COST TO THE OWNER.**

**END OF SECTION**

**SECTION 01 2900  
PAYMENT PROCEDURES**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedures for submitting Applications for Payment.

**1.02 GENERAL**

- A. Coordinate requirements of this Section with the requirements of the General and Supplementary Conditions of the Contract concerning payment procedures.

**1.03 SCHEDULE OF VALUES**

- A. Submit printed schedule on AIA Form G703 - Continuation Sheet for G702 in accordance with Section 01 2973, Schedule of Values. Contractor's standard form or electronic media printout will be considered but must be approved by the Owner.

**1.04 APPLICATIONS FOR PAYMENT**

- A. Submit four (4) notarized originals of each application on AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702 or other similar form approved by the Owner.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C. Submit updated construction schedule with each Application for Payment.
- D. Payment Period: Submit at intervals stipulated in the Agreement in accordance with Document CB, Supplementary Conditions of the Contract.
- E. Only materials stored on the project site shall be paid for unless the materials are stored in a bonded warehouse.
- F. Substantiating Data: When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Items which may be requested by the Architect or Owner to substantiate costs include, but are not limited to the following:
  - 1. Current Record Documents as specified in Section 01 7700, Closeout Procedures, for review by Owner which will be returned to Contractor.
  - 2. Labor time sheets, purchase orders, or similar documentation.
  - 3. Affidavits attesting to off-site stored products.

**PART 2 – PRODUCTS (NOT USED)**

**PART 3 – EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01 2973  
SCHEDULE OF VALUES**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Work Included: Provide a detailed breakdown of the agreed Contract Sum showing values allocated to each of the various parts of the work, as specified herein and in other provisions of the Contract Documents.
- B. Coordinate requirements of this Section with the requirements of the General and Supplementary Conditions of the Contract concerning Schedule of Values.

**1.02 QUALITY ASSURANCE**

- A. Use required means to assure arithmetical accuracy of the sums described.
- B. When so required by the Owner, provide copies of the subcontracts or other data acceptable to the Owner, substantiating the sums described.

**1.03 SUBMITTALS**

- A. Prior to the first Application for Payment, submit a proposed schedule of values to the Owner, as outlined below:
  - 1. Meet with the Owner and determine additional data, if any, required to be submitted.
  - 2. Secure the Owner's approval of the schedule of values prior to submitting first Application for Payment.

**1.04 SCHEDULE OF VALUES**

- A. The Schedule of Values shall be broken down into item costs for each specification section as a minimum. After review by the Owner, the Schedule of Values shall be broken down into further items as required. (See following list and refer to the enclosed sample.). In addition, total each Specification Division separately.
- B. Schedule of Values - Items in addition to Specification Sections.
  - 1. Mobilization
  - 2. Clean Up
  - 3. Building Permit
  - 4. Bonds, Insurance
  - 5. Mechanical Accessories
  - 6. Demolition
  - 7. Rough-In Labor - (Electrical)
  - 8. Rough-In Material - (Electrical)
  - 9. Finish Labor - (Electrical)
  - 10. Finish Material - (Electrical)
  - 11. Allowances (listed separately)
  - 12. Record drawings and close-out documents
  - 13. Submittals listed separately per mechanical, electrical and plumbing
  - 14. Roof warranty as a line item
  - 15. Donated items individually itemized at \$0.00 (zero dollars).

**PART 2 – PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01 3113  
PROJECT COORDINATION**

**PART 1 - GENERAL**

**1.01 REQUIREMENTS**

- A. General: notify the Architect whenever there is need of clarification or interpretation of the Contract Documents prior to commencement of work.
- B. Commencement of work without Architect's prior notification means Contractor's acceptance of responsibility.
- C. Commencement of work without Architect's prior notification implies Contractor's understanding of conditions, assemblies, methods, or procedures.
- D. The project superintendent shall notify the Owner on an ongoing basis of ongoing work.

**1.02 PRE-INSTALLATION CONFERENCE**

- A. General: Notify the Architect 48 hours in advance of certain stages of construction, and, as required by the Architect, organize a pre-installation meeting with each trade individually prior to commencement of their portion of the Work. At a minimum, representatives of the Architect, the General Contractor's project superintendent, and the Sub-contractor's Foreman and Project Manager shall be present at each meeting. The Engineer shall be notified as applicable.
- B. As indicated in each specific section of this Project Manual, or as required by the Architect, these stages generally include, but are not necessarily limited to the following:
  - 1. Division 2 – (Selective) Demolition.
  - 2. Division 3 - Installation of light weight concrete.
  - 3. 03 3000 - Excavation of grade beams.
  - 4. 03 3000 - Installation of concrete underlayment, vapor barriers, underslab water proofing
  - 5. 03 3000 - Placing of reinforcing, formwork, and concrete.
  - 6. Division 4 - Block, brick, and stone placement, glass unit masonry, masonry cleaning.
  - 7. 04 2000 - Placing of masonry, grout, and reinforcement.
  - 8. 05 5000 - Miscellaneous metals, ladders, brackets, pipe rails, etc.
  - 9. Division 6 - Finish Carpentry and Millwork
  - 10. Division 7 - installation of waterproofing, air barriers, vapor barriers, flashing and sheet metal.
  - 11. Division 7 - Installation of roofing system(s) and associated work.
  - 12. 07 2100 - Concealment of insulation.
  - 13. 07 9200 - Installation of building and glazing sealants.
  - 14. Division 8 - Installation of doors, frames, windows, and storefronts.
  - 15. Division 8 - Installation of rolling and coiling doors and grilles.
  - 16. 08 7100 - Installation of finish hardware
  - 17. 08 8000 - Installation of glazing and glazed systems
  - 18. Division 9 - Installation of plaster and gypsum board products.
  - 19. Division 9 - Installation of tile, flooring, and pavers.
  - 20. 09 5100 - Installation of acoustical ceiling (grid and panels).
  - 21. 09 6519 - Installation of resilient flooring and base.
  - 22. 09 9100 - Painting and staining (each coat).
  - 23. 09 7216 - Installation of wall coverings.
  - 24. Division 10 - Installation of specialty items, markerboards, display cases, projection screens, signage and graphics, canopies.
  - 25. 10 2813 - Installation of toilet accessories.
  - 26. Division 11 - Installation of appliances, stage curtain systems, library shelving, and shop equipment
  - 27. Divisions 22, 23 and 26 - Completion of roughing-in of plumbing, heating, air conditioning and electrical work (prior to concealment).

28. Division 22 - Installation of plumbing fixtures.
  29. Division 23 - Installation of heating, ventilating and air conditioning.
  30. Division 26 - Installation of all electrical fixtures.
  31. Divisions 22, 23 and 26 - Any and all testing specified for equipment, mechanical, electrical and plumbing systems.
  32. 31 0000 - Clearing and stripping of top soil within limits of grading.
  33. 31 0000 - (Excavation and) Placing (of each lift of) select fill material, and site grading.
  34. 31 0000, 31 2323, and Divisions 22, 23 and 26 - Compaction, inspection, testing, and covering of underground utilities.
  35. Division 32 - Installation of site amenities, fencing, surfaces, landscaping, etc.
- C. In addition to notifying the Architect, notify the Structural Engineer (48 hours) prior to the following stages:
1. Drilling, reinforcing, and placing of first piers and footings.
  2. Placing first reinforcing and grade beams.
  3. Erecting structural steel elements.

## **PART 2 – PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.01 PRE-CONSTRUCTION CONFERENCE**

- A. The Contractor shall contact Architect at least ten (10) days prior to commencing construction in order for Architect to schedule a pre-construction meeting with Contractor, Architect, and Owner. This meeting must occur prior to commencement of any construction.

### **3.02 CONFERENCES AND MEETINGS**

- A. Refer to Section 01 3119, Project Meetings for requirements pertaining to Pre- construction Conference, Progress Meetings, and Pre-installation Conferences.

**END OF SECTION**



**SECTION 01 3119  
PROJECT MEETINGS**

**PART 1 - GENERAL**

**1.01 REQUIREMENTS INCLUDE**

- A. The Architect's:
  - 1. Scheduling of each meeting (pre-construction meeting, periodic project meetings, and specialty called meetings throughout the progress of the Work).
- B. The Contractor's:
  - 1. Preparation of agenda for meetings.
  - 2. Making physical arrangement for meetings.
  - 3. Participation in all meetings and conferences.
  - 4. Scheduling attendance of Job Superintendent, Project Coordinator, and other parties affecting or affected by decisions made at meetings and conferences as their interests require.
  - 5. Scheduling Pre-installation conferences.
  - 6. Scheduling Pre-Closeout Meeting
  - 7. Providing updated schedules.
  - 8. Providing status reports/logs of CPRs, MCs, and shop drawings/submittals.
  - 9. Presiding at minutes, including all significant proceedings and decisions.
  - 10. Recording, reproducing, and distributing copies of meeting minutes within two (2) working days, excluding weekends and holidays, after each meeting to:
    - 11. All participants in the meeting.
    - 12. All parties affected by decisions made at the meeting.
    - 13. Providing status report of allowance funds.

**PART 2 – PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

**3.01 PRE-CONSTRUCTION CONFERENCE**

- A. Contractor shall contact Architect at least ten (10) days prior to commencing construction in order for Architect to schedule a pre-construction meeting with Contractor, Architect, and Owner. This meeting must occur prior to commencement of any construction.
- B. Architect will:
  - 1. Administer pre-construction conference for the establishment of communication methods, procedures and Owner requirements.
  - 2. Administer site mobilization conference for clarification of Owner and Contractor.
- C. Location: At Project site as designated by the Architect.
- D. Attendance:
  - 1. Contractor or Contractor's Representative
  - 2. Job Superintendent
  - 3. Project Coordinator (Manager)
  - 4. Owner or Owner's Representative
  - 5. Major subcontractors
  - 6. Major suppliers
  - 7. Architect's Representative
  - 8. Architect's Field Representative
  - 9. Consultants as needed
  - 10. Others as appropriate
- E. Meeting Agenda, may include, but is not limited to:
  - 1. Discussion on major subcontracts and suppliers and projected construction schedules.
  - 2. Critical work sequencing.

3. Major equipment deliveries and priorities. Discussion of long lead time items.
4. Project coordination and designation of responsible personnel.
5. Procedures and processing of field decisions, proposal requests, submittals, minor changes, change orders and applications for payment.
6. Method of distribution of Contract Documents.
7. Procedures for maintaining Record Documents.
8. Use of premises, office work and storage areas, on-site parking, and Owner's requirements.
9. Construction facilities and temporary utilities.
10. Housekeeping procedures.

### **3.02 PROGRESS MEETINGS**

- A. Architect will:
  1. Schedule project meetings throughout progress of the work at weekly intervals, and specially called meetings.
  2. Set agenda and administer said meetings.
  3. Preside at meetings.
  4. Record meeting minutes, including all significant proceedings and decisions.
  5. Reproduce and distribute copies of meeting minutes within two (2) working days, excluding weekends and holidays, after each meeting to:
    6. All participants in the meeting.
    7. All parties affected by decisions made at the meeting.
- B. Contractor shall:
  1. Make physical arrangements for meetings.
- C. Attendance:
  1. Contractor or Contractor's Representative
  2. Job Superintendent
  3. Project Coordinator (Manager)
  4. Owner or Owner's Representative
  5. Major subcontractors
  6. Major suppliers
  7. Architect's Field Representative
  8. Consultants as needed
  9. Others as appropriate
- D. Meeting Agenda, may include, but is not limited to:
  1. Review and approval of minutes of previous meeting.
  2. Review of Work progress since previous meeting.
  3. Field observations, problems, and conflicts.
  4. Review of off-site fabrication and delivery schedules.
  5. Corrective measures and procedures to regain projected schedule.
  6. Revisions to Construction Schedule.
  7. Plan progress and schedule during succeeding work period.
  8. Coordination of schedules.
  9. Review submittal schedules and expedite as required.
  10. Maintenance of quality standards.
  11. Allowance balances.
  12. Review of proposed changes and substitutions for:
    - a. Effect on Construction Schedule and on completion date.
    - b. Effect on other contracts of the Project.
  13. Status of Allowance Expenditure Authorizations (AEAs).
  14. Status of Change Proposal Requests (CPRs).
  15. Status of Minor Changes (MCs).

16. Status of submittals, review of submittal log.
17. Other items and critical issues affecting Work.

### **3.03 PRE-INSTALLATION CONFERENCES**

- A. In accordance with the requirements of Section 01 1100, Notification of Architect Requirements, the Contractor will convene pre-installation conferences when required by individual specification Sections or as required by the Architect, prior to the Contractor commencing Work of the Section.
- B. Attendance, optional:
  1. General Contractor or Contractor's Representative
  2. Project Coordinator (Manager)
  3. Owner or Owner's Representative
  4. Architect's Project Manager (Project Executive)
- C. Attendance, required:
  1. Project Superintendent
  2. Architect's Field Representative
  3. Sub-contractor's Project Manager
  4. Sub-contractor's Foreman
  5. Engineer's Representative, as needed.
  6. Manufacturer's Representative, as needed.
  7. Governing Agency Official, as required
  8. Inspection Agency Representative, as required.
  9. Others affecting or affected by Work.
- D. Meeting Agenda, may include, but is not limited to:
  1. Review of conditions of installation.
  2. Preparation and installation procedures.
  3. Coordination with related work
  4. Review of the contract document requirements.
  5. Review of code enforcement or testing requirements.
  6. Questions related to work required.

### **3.04 PRE-CLOSEOUT MEETING**

- A. In accordance with the requirements of Section 01 7700, Closeout Procedures, the Contractor will convene a pre-closeout meeting when he considers the Work or designated portion of the Work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the work for its intended use.
- B. Attendance, required:
  1. Owner or Owner's Representative
  2. Project Coordinator (Manager)
  3. General Contractor or Contractor's Representative
  4. Project Superintendent
  5. Architect's Project Manager (Project Executive)
  6. Architect's Field Representative
  7. Engineer's Representative, as needed.
- C. Meeting Agenda, may include, but is not limited to:
  1. Review of the contract document requirements for Substantial Completion and Project Closeout
  2. Review of Work which remains to be completed or corrected.
  3. Closeout Document review schedule and log
  4. Review of closeout procedures including, but not limited to Record Drawings, Warrantees, Operation and Maintenance Manuals, and Owner Demonstrations and Start-up.
  5. Review of code enforcement or testing requirements.

6. Questions related to work required.

**END OF SECTION**

**SECTION 01 3216  
CONSTRUCTION PROGRESS SCHEDULE**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes: Requirements for preparation of Construction Schedules for the Work of This Contract.
  - 1. Create a Construction Schedule using Critical Path Method (CPM) computer software capable of mathematical analysis of Precedence Diagramming Method (PDM) schedules. Provide printed activity listings and bar charts in formats described in this Section.
  - 2. Combine activity listings and bar charts with a narrative report to form the Contractor's Construction Schedule submittal to the Architect.
- B. Related Sections:
  - 1. 01 3113 – Project Coordination
  - 2. 01 3119 – Project Meetings
  - 3. 01 3300 – Submittal Procedures
  - 4. 01 7700 – Close-out Procedures

**1.02 DEFINITIONS**

- A. Activity: A task or discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling construction of the Project. Activities included in a construction schedule consume time and resources.
  - 1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
  - 2. Predecessor activities are activities that must be completed before another given activity can be started.
- B. CPM: Critical Path Method, a method of planning and scheduling a construction project in which activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of the Project.
- C. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Event: The starting or ending point of an activity.
- E. Float: The measure of leeway in stating and completing an activity.
  - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and the Contract completion dates.
  - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
  - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- F. Fragnet: A partial fragmentary network that breaks down activities into smaller activities for greater detail.
- G. Major Area: A story of construction, a separate building, or other significant construction element.
- H. Milestone: A key or critical point in time for reference or measurement.
- I. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

**1.03 SUBMITTALS**

- A. Arrange the following information in a tabular format.
  - 1. Specification section number and title
  - 2. Name of subcontractor

3. Description of the Work covered
  4. Scheduled date for first submittal from vendor coordinated with construction schedule
  5. Scheduled date for Architect's final release or approval
  6. Submittal category (action or informational)
  7. Fabrication time
  8. Date material to be delivered to site
- B. Preliminary Construction Schedule:
1. Phasing of construction:
    - a. Preconstruction services
    - b. Construction services
    - c. Major Areas
    - d. Close-out
  2. Owner coordinated activities as identified in the Contract Documents.
  3. Milestones:
    - a. Project mobilization and demobilization
    - b. Concrete slab completion
    - c. Paving completion
    - d. Envelope dry-in
    - e. Climate control initiation
    - f. Final cleaning
    - g. Close-out
      - 1) Final inspection and testing
      - 2) Owner training
      - 3) Punchlist re-walk
      - 4) Close-out document submission
  4. The scheduling software shall be capable of producing activity listings and bar charts with the following information for each activity in the schedule:
    - a. Activity ID
    - b. Activity Description
    - c. Estimated (Original) Duration
    - d. Percentage Complete
    - e. Early Start Date
    - f. Late Start Date
    - g. Early Finish Date
    - h. Late Finish Date
    - i. Free Float
    - j. Total Float
    - k. Activity Codes (for Major Areas, work types, specification sections, subcontractors, etc.)
  5. Predecessor/successor listing sorted by Activity ID which meets the criteria outlined in this section and which is produced by the Contractor's approved scheduling software.
  6. Include a logic network diagram with the first construction schedule submittal.

#### **1.04 QUALITY ASSURANCE**

- A. Pre-scheduling Conference: Conduct conference at Project site. Review method and procedures related to the Preliminary Construction Schedule and Project 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
  4. Review delivery dates for Owner-furnished products
  5. Review schedule for work of Owner's separate constraints
  6. Review time required for review of submittals and re-submittals

7. Review requirements for tests and inspections by independent testing and inspecting agencies
8. Review time required for completion and startup procedures
9. Review and finalize list of construction activities to be included in schedule
10. Review submittal requirements and procedures
11. Review procedures for updating schedule

#### **1.05 COORDINATION**

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Project Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
  1. Secure time commitments for performing critical elements of the Work from parties involved.
  2. Coordinate each construction activity in the network with other activities and schedule in proper sequence.

#### **1.06 RELIANCE UPON SCHEDULE**

- A. The Construction Schedule as reviewed by the Architect will be an integral part of the Contract and will establish conditions for various activities and phases of construction.

### **PART 2 - PRODUCTS**

#### **2.01 PROJECT CONSTRUCTION SCHEDULE, GENERAL**

- A. Prepare schedules using an industry-accepted software program developed specifically to manage construction project schedules.

#### **2.02 PRELIMINARY CONSTRUCTION SCHEDULE**

- A. Bar-Chart Schedule: Submit preliminary horizontal bar-chart-type construction schedule within ten (10) days of Notice of Award.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for the duration of construction.

#### **2.03 PROJECT CONSTRUCTION SCHEDULE**

- A. General: Prepare network diagrams using the Precedence Diagramming Method (PDM).
- B. CPM Schedule:
  1. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
  2. Use "calendar days" as the unit of time, not to exceed the number of calendar days identified in the Contract Documents.
  3. Activity durations shall be limited to 15 calendar days, excepting only submittal review and approval, fabrication and delivery or other exceptions as approved by the Owner.
- C. Initial Issue of Schedule: Prepare initial network diagram from a list of straight "early start- total float" sort. Identify critical activities. Prepare tabulated reports showing the following:
  1. Description of activity
  2. Principal events of activity
  3. Immediate preceding and succeeding activities
  4. Designated critical path
  5. Early and late start dates
  6. Early and late finish dates
  7. Activity duration in workdays
  8. Total float or slack time

- D. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
  - 1. Identification of activities that have changed
  - 2. Changes in early and late start dates
  - 3. Changes in early and late finish dates
  - 4. Changes in activity durations in workdays
  - 5. Changes in the critical path
  - 6. Changes in total float or slack time
  - 7. Changes in the Contract Time

### **PART 3 - EXECUTION**

#### **3.01 PROJECT CONSTRUCTION SCHEDULE**

- A. Meetings: Provide look-ahead schedule generated from construction schedule software for review at each Subcontractor Coordination and OAC Meeting.
- B. Project Construction Schedule Updating: At monthly intervals, on a regular monthly date specifically identified in the pre-construction conference, the Contractor shall update the schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting. Submit schedule with each application for payment.
  - 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, duration, actual starts and finishes, and activity duration.
  - 3. As the Work progresses, indicate Actual Completion percentage for each activity.
- C. Distribution: Distribute copies of approved schedule to Architect, 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 portion of the Work and are no longer involved in performance of construction activities.
- D. Recovery: If at any time during the course of the project, the critical path demonstrates the project is in excess of 15 calendar days behind schedule the Contractor shall provide within 5 days of notification, revisions to the schedule demonstrating the ability to return the project to the milestone and project delivery dates identified in the Contract Documents. In addition, the Contractor will revise all remaining work as necessary to reflect any changes in the planned execution.

#### **END OF SECTION**



**SECTION 01 3300  
SUBMITTAL PROCEDURES**

**PART 1 - GENERAL**

**1.01 SUBMITTAL PROCEDURES**

- A. Transmit to the Architect/Engineer each item indicated in individual specification sections with approved form identifying:
  - 1. Date of submission and dates of any previous submissions.
  - 2. Project title and number
  - 3. Contract identification
  - 4. Names of Contractor, Supplier, Manufacturer
  - 5. Pertinent drawing sheet and detail number, and specification section number, as appropriate
  - 6. Deviations from Contract Documents.
- B. Contractor shall be responsible for initial review prior to submittal to Architect/Engineer to verify adequacy and conformance to contract requirements. Lack of review by Contractor may be grounds for rejection.
- C. Apply Contractor's stamp, signed, to each item submitted, certifying that review and verification of products, field dimensions, adjacent construction work and coordination of information is in accordance with the requirements of the work and contract documents.
- D. Transmit each item in accordance with approved schedule, and in such sequence as to cause no delay in the work or in the work of any other Contractor. Allow minimum of ten
- E. (10) days for adequate Architect/Engineer review of each submittal. Time may vary according to scope and complexity of item under review. Allow adequate time in schedule for revisions and resubmittal as deemed necessary.
- F. Submit one (1) copy of the submittal to the Architect via electronic original. Transmit the electronic copy of consultant and engineering submittals directly to respective consultants with a transmittal and the electronic original to the Architect. The Architect and Consultant will make up the electronic copy and return to the Contractor upon completion of review. It will be the Contractors responsibility to maintain and distribute up-to-date reviewed submittals to all concerned parties.
- G. Submit each item according to individual specification sections and identified by Division, Section, and individual submittal number. Maintain log according to each Division.
- H. Revise and resubmit submittal as required; identify all changes made since previous submittal.
  - 1. Make any corrections or changes in the submittals required by the Architect/Engineer and resubmit until approved.
  - 2. Submit new submittal as required for initial submittal.

**1.02 PROPOSED PRODUCTS LIST**

- A. Within 30 days after date of Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

**1.03 PRODUCT DATA**

- A. Submit to Architect for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Submit the number of copies of product data and samples which the Contractor and his subcontractors need for their use PLUS two (2) additional sets for the Architect, one (1) additional set for the Owner and one (1) additional set for each of the Architect's consultants involved with the particular Section of Work.

- C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project

#### **1.04 MSDS SHEETS**

- A. The Texas Asbestos Health Protection Rules (Title 25. Health Services, Part I. Texas Department of Health Chapter 295 - Occupational Health, Subchapter C - Texas Asbestos Health Protection) were approved and became effective on October 20, 1992, and amended March 27, 2003. The Rules established the procedures and means to implement the provisions of Senate Bill 1341 and House Bill 79.
- B. Pursuant to the above referenced Rules, submit MSDS Sheets showing that materials used in the Project, contain 1.0 percent or less asbestos. This requirement pertains to every material in every Section of the Specifications, as applicable to the Project, whether written therein, or not. Submit MSDS Sheets for materials, including, but not limited to the following, as applicable to the Project.
1. Surfacing Materials:
    - a. acoustical plaster;
    - b. decorative plaster/stucco;
    - c. textured paint/coating;
    - d. spray applied insulation;
    - e. blown-in insulation
    - f. fire proofing insulation;
    - g. joint compound; and
    - h. spackling compounds
  2. Thermal System Insulation:
    - a. taping compounds (thermal)
    - b. HVAC duct insulation;
    - c. boiler insulation;
    - d. breaching insulation;
    - e. pipe insulation; and
    - f. thermal paper products
  3. Miscellaneous Material:
    - a. cement wallboard/siding;
    - b. asphalt/vinyl floor tile
    - c. vinyl sheet flooring/vinyl wall coverings;
    - d. floor backing;
    - e. construction mastic;
    - f. ceiling tiles/lay-in ceiling panels;
    - g. packing materials;
    - h. high temperature gaskets;
    - i. laboratory hoods/table tops
    - j. fire blankets/curtains;
    - k. elevator equipment panels;
    - l. elevator brake shoes;
    - m. ductwork flexible fabric connections;
    - n. cooling towers;
    - o. heating and electrical ducts;
    - p. electrical panel partitions;
    - q. electrical cloth/electrical wiring insulation;
    - r. chalkboards;
    - s. roofing shingles/tiles;
    - t. roofing felt;
    - u. base flashing;
    - v. fire doors;

- w. caulking/putties;
- x. adhesives/mastics; and
- y. wallboard

#### **1.05 SHOP DRAWINGS**

- A. Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. All dimensions indicated on the drawings are based on the specific models and manufacturers of products, equipment, fixtures and miscellaneous items specified. If the Contractor uses an approved product by another listed manufacturer which is different than the specific model and manufacturer listed in these specifications, then the Contractor shall be solely responsible for the coordination of any dimensional changes required, including structural, relocation of walls, equipment, fixtures, ceilings and miscellaneous items. When dimensional changes are required in these situations, the Contractor shall submit a proposed modification drawing to the Architect for approval prior to proceeding with the work. All causes and effects of the dimensional change shall be indicated on the Contractor's drawing submittal.

#### **1.06 SAMPLES**

- A. Submit for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Submit for aesthetic, color, or finish selection. Submit full range of manufacture's standard colors, textures, and patterns for Architect's selection.
- C. Submit samples to illustrate functional characteristics of the Product, with integral parts and attachment devices. Coordinate submittal of different categories for interfacing work.
- D. Submit the number specified in respective Specification Section; minimum of two (2), of which one (1) will be retained by Architect.
- E. Reviewed samples which may be used in the Work are indicated in individual specification sections.
- F. Samples will not be used for testing purposes unless specifically stated in specification section.

#### **1.07 DESIGN DATA**

- A. When required, submit for Architect/Engineer's knowledge as contract administrator or for Owner.
- B. Submit design data for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

#### **1.08 TEST REPORTS**

- A. In accordance with Section 01 4523, Inspection and Testing Laboratory Services, submit test reports for Architect/Engineer's knowledge as contract administrator or for Owner. Architect will determine whether corrective action is required.
- B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

#### **1.09 CERTIFICATES**

- A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Architect, in quantities specified.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect and Owner.

- D. Submit required certificates in duplicate.

#### **1.10 GUARANTEES**

- A. When specified in individual specification sections, submit warranties by manufacturer, installation/application subcontractor, fabricator, or Contractor to Architect, in quantities specified.
- B. Submit warranties in accordance with Section 01 7700, Closeout Procedures.

#### **1.11 MANUFACTURER'S INSTRUCTIONS**

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Architect for delivery to Owner in quantities specified.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- C. Submit required instructions in duplicate.

#### **1.12 MANUFACTURER'S FIELD REPORTS**

- A. Submit reports for Architect/Engineer's benefit as contract administrator or for Owner.
- B. Submit report in quantity specified or required within ten (10) days of observation to Architect for information. Architect will determine whether corrective action is required.
- C. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

#### **1.13 ERECTION DRAWINGS**

- A. When required, submit drawings for Architect/Engineer's benefit or for Owner.
- B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.
- C. Data indicating inappropriate or unacceptable Work may be subject to action by Architect/Engineer or Owner. Architect will determine whether corrective action is required.

#### **1.14 CONSTRUCTION PHOTOGRAPHS**

- A. Provide photographs monthly of site and construction throughout progress of Work produced by an experienced photographer, acceptable to Architect/Engineer.
- B. Photographs: digital; sent to Architect via email, or provide on non-rewritable compact disk. Along with Application for Payment, include one (1) reproducible copy of contact sheet of all photographs taken during that period indicating Work completed and identified as stated below.
- C. Photograph project conditions five (5) days maximum prior to submitting indicating relative progress of the Work. Do not photograph conditions previously photographed if no work has proceeded. As able, take photographs from same position indicating same view in successive installments.
- D. Take photographs as evidence of existing project conditions as follows:
  - 1. Site: Take four (4) site photographs at project corners
  - 2. Interior views: Take two (2) minimum interior photographs of each space under construction from differing directions or as required.
  - 3. Exterior views: Take two (2) photographs of each elevation.
  - 4. Details: Take as required to document concealed conditions, including, but not limited to, underground construction, utility penetrations and installation, steel erection, concrete and masonry reinforcing, waterproofing and flashing, and roofing installation.
  - 5. Cavity wall: Provide photographic evidence that cavity wall was maintained clean and free of debris and excess mortar.
- E. Identify each photograph with name of Project, room or view, and date.

**PART 2 – PRODUCTS (NOT USED)**

**PART 3 – EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01 4500  
QUALITY CONTROL**

**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

- A. Quality Assurance: Requirements for material and product quality and control of installation.
- B. Tolerances
- C. References and Standards
- D. Mock-ups
- E. Testing Laboratory Services
- F. Inspection Services
- G. Manufacturers' field services

**1.02 RELATED SECTIONS**

- A. Section 01 4523 – Testing and Inspecting Services
- B. Section 01 3300 - Submittal Procedures
- C. Section 02 3200 - Geotechnical Report
- D. The Work of this Section shall be included as a part of all Sections of Work, whether referenced therein or not.

**1.03 DESCRIPTION OF REQUIREMENTS**

- A. Unless specifically noted otherwise, perform all Work shown, mentioned, or reasonably inferred and comply with all work restrictions.
- B. Many of the requirements specified elsewhere are included herein for reference and convenience. Where a conflict occurs between the Contract Documents, either within themselves or each other, the more stringent requirement or the most expensive combination of materials and workmanship shall prevail.
- C. Contractor shall:
  - 1. perform Work in accordance with the General Conditions, as specified herein, and with the quality control requirements of each Specification Section;
  - 2. perform Work in the highest quality workmanship, unless specified otherwise;
  - 3. join materials with a uniform and accurate fit so they meet with neat straight lines, free of smears, overlaps or irregularities, as applicable to the work;
  - 4. install all exposed materials appropriately level, plumb, and at accurate angles as shown and flush with adjoining materials;
  - 5. attach materials with sufficient strength, and with number and spacing of fasteners and attachments that will not fail until materials joined are broken or permanently deformed;
  - 6. use concealed fasteners, unless shown or directed otherwise.

**1.04 QUALITY ASSURANCE AND CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturer's instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.

- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

#### **1.05 TOLERANCES**

- A. Monitor fabrication and installation tolerance control of Products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- C. Adjust Products to appropriate dimensions; position before securing Products in place.

#### **1.06 REFERENCES AND STANDARDS**

- A. For Products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Owner-Contractor Agreement except where specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. When specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- E. Neither contractual relationships, duties, responsibilities of parties in Contract nor those of Architect/Engineer shall be altered from Contract Documents by mention or inference otherwise in reference documents.
- F. Refer to Section 01 41 00, Codes, Regulations and Standards, for additional information concerning applicable reference and standards requirements.

#### **1.07 MOCK-UP REQUIREMENTS**

- A. Tests will be performed under provisions identified in this section and identified in respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be the comparison standard for remaining Work.
- D. Where mock-up has been accepted by Architect/Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so by Architect.
- E. Mock-up may be approved in phases as portions are completed.
- F. Project Mock-up Requirements: Provide an actual sample panel with the following properties:
  - 1. Size: Minimum 6 feet wide by 8 feet tall. Size may vary according to specific project requirements. Brace and support as required to withstand structural windloads.
  - 2. Materials: actual exterior finishes including, but not limited to face brick, cast stone, and plaster, actual building materials and assemblies indicating brick patterns on masonry and stud back-up as occurs with dampproofing and flashing as detailed, actual portion of aluminum storefront indicating jam, sill and head attachment and flashing details, and where appropriate, provide mock-up of special finish details, insets and reliefs, reveals, expansion and control joints, brick ledges, brick head and sills, pipe penetrations and waterproofing materials. Provide roof edge flashing and gutter section (as applicable) in pre-finished color as selected by Architect to cap the mock-up panel. Include a sealant joint at least 16 inches long. Brick and Mortar color shall be selected by Architect prior to mock-up assembly.

3. Drawing: Refer to mock-up diagram on Drawings for minimum project requirements. Mock-up drawing is for reference only. Actual mock-up drawing will be submitted by the Architect after submittals have been approved.

#### **1.08 TESTING SERVICES**

- A. Owner will appoint, employ, and pay for specified services of an independent firm to perform testing.
- B. The independent firm will perform tests and other services specified in individual specification sections and as required by the Architect/Engineer, Owner, or authority having jurisdiction.
- C. Testing and source quality control may occur on or off the project site. Perform off-site testing as required by the Architect/Engineer or the Owner.
- D. Reports will be submitted by the independent firm to the Owner, Architect/Engineer, and Contractor, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
- E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
  1. Notify Architect/Engineer and independent firm 48 hours prior to expected time for operations requiring services, or as specified in individual specification sections.
  2. Make arrangements with independent firm and pay for additional samples and tests required.
- F. Testing does not relieve Contractor to perform Work to contract requirements.
- G. Re-testing required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Architect/Engineer. Payment for re-testing will be charged to the Contractor by deducting testing charges from the Contract Sum/Price.
- H. Refer to Section 01 45 23, Inspection and Testing Laboratory Services, for additional information concerning testing, and submittal procedures and requirements for Testing Reports.

#### **1.09 INSPECTION SERVICES**

- A. Owner will appoint, employ, and pay for specified services of an independent firm to perform inspection.
- B. The independent firm will perform inspections and other services specified in individual specification sections and as required by the Architect/Engineer, Owner, or authority having jurisdiction.
- C. Inspecting may occur on or off the project site. Perform off-site inspecting as required by the Architect/Engineer or the Owner.
- D. Reports will be submitted by the independent firm to the Owner, Architect/Engineer, and Contractor, indicating inspection observations and indicating compliance or non-compliance with Contract Documents.
- E. Cooperate with independent firm; furnish safe access and assistance by incidental labor as requested.
- F. Notify Architect/Engineer and independent firm 48 hours prior to expected time for operations requiring services, or as specified in individual specification sections.
- G. Inspecting does not relieve Contractor to perform Work to contract requirements.
- H. Refer to Section 01 4523, Inspection and Testing Laboratory Services, for additional information concerning inspections, and submittal procedures and requirements for Inspection Reports.

#### **1.10 MANUFACTURERS' FIELD SERVICES**

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of



surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as required, and to initiate instructions when necessary.

- B. Submit qualifications of observer to Architect/Engineer within ten (10) days after receipt of Notice to Proceed, in advance of required observations. Observer subject to approval of Architect/Engineer and Owner.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Refer to Section 01 33 00, Submittal Procedures, for additional information concerning
- E. submittal procedures and requirements for Manufacturers Field Reports.

## **PART 2 – PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify utility services are available, of correct characteristics, and in correct locations.

### **3.02 PREPARATION**

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

**END OF SECTION**

**SECTION 01 4523  
TESTING AND INSPECTING SERVICES**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. A qualified independent testing laboratory and/or geotechnical engineering service selected and paid by Owner and approved by Architect, will perform professional testing and laboratory services specified herein.
- B. Inspecting agency shall make and perform all inspections and tests in accordance with the rules and regulations of the building code, local authorities, Specifications of ASTM, and these Contract Documents.
- C. Materials and workmanship not meeting required standards or performance obligations are to be removed and replaced. Replacement and subsequent testing shall be at Contractor's expense.
- D. Where terms "Inspector" and "Laboratory" are used, they mean and refer to an officially designated and accredited inspector of the testing laboratory or geotechnical service engaged by Owner.
- E. All testing laboratory services will be provided and paid for by the Owner and the Contractor shall be notified as soon as possible.
- F. The Owner will pay for the initial laboratory services of materials that comply with the requirements of the Contract Documents. The Contractor shall pay for testing and re- testing of materials that do not comply with the requirements of the Contract Documents.
- G. Laboratory inspection shall not relieve the Contractor or Fabricator of his responsibility to furnish materials and workmanship in accordance with the Contract Documents.
- H. Contractor or Fabricator shall cooperate with the testing laboratory in all matters pertaining to the work.

**1.02 RELATED REQUIREMENTS**

- A. Conditions of the Contract: Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals or public authorities.
- B. Respective Sections of Specifications. Certification of products.
- C. Each Specification Section Listed: Inspection and laboratory test required and standards for inspection and testing.
- D. Testing laboratory inspection, sampling and testing is required for:
  - 1. Section 31 0000 - Earthwork
  - 2. Section 31 2300 - Construction of Underground Utilities
  - 3. Section 31 3213.19 - Soil Stabilization: As specified or required by geotechnical report and/or project conditions.
  - 4. Section 31 6213.16 - Drilled and Reamed Foundation
  - 5. Section 32 1313 - Concrete Paving
  - 6. Section 32 1216 – Hot Mix-Hot Laid Asphaltic Concrete Paving
  - 7. Section 03 3000 - Cast-In-Place Concrete
  - 8. Section 04 2000 - Unit Masonry
  - 9. Division 05 - Metals: As specified or required for structural steel, open web steel joists, steel deck, miscellaneous metals, etc.
  - 10. Division 07 - Thermal and Moisture Protection: As specified or required for waterproofing and roofing.
  - 11. Division 07 - Fireproofing and Intumescent Paint
  - 12. As requested by the Construction Manager/Contractor, Owner, Architect, or Engineer(s).

### **1.03 QUALIFICATIONS**

- A. Testing agencies shall meet requirements of ASTM E329, "Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction" and ASTM E543, "Standard Practices for Agencies Performing Non-Destructive Testing".
- B. Testing agencies shall be insured against errors and omissions by a professional liability insurance policy having a minimum limit of liability of \$500,000.00.
- C. Inspection and testing services of testing agency shall be under the direction of a Registered Engineer licensed in the State of Texas, charged with engineering managerial responsibility, and having a minimum of five (5) years engineering experience in inspection and testing of construction materials.
- D. Inspecting personnel monitoring concrete work shall be ACI certified inspectors.
- E. Primary inspectors performing structural steel inspection shall be currently certified AWS Certified Welding Inspectors (CWI), in accordance with the provisions of AWS QCI, "Standard and Guide for Qualification and Certification of Welding Inspectors". Inspector may be supported by assistant inspectors who may perform specific inspection functions under supervision of the inspector. Assistant inspectors shall be currently certified AWS Certified Associate Welding Inspectors (CAWI). Work of assistant inspectors shall be regularly monitored by the inspector, generally on a daily basis.
- F. Testing machines shall be calibrated at intervals not exceeding 12 months by devices of accuracy traceable to the National Bureau of Standards.

### **1.04 RESPONSIBILITIES OF CONTRACTOR**

- A. See respective technical sections for specific requirements.
- B. Deliver to the laboratory, without cost to Owner, adequate quantities of representative samples of materials proposed for use which are required to be tested.
- C. Advise laboratory and Architect sufficiently in advance of construction operations to allow laboratory to complete any required checks or tests and to assign personnel for field inspection and testing as specified.
- D. Provide adequate facilities for safe storage and proper curing of concrete test samples on project site for the first 24 hours and also for subsequent field curing as required by ASTM C31.
- E. Furnish such nominal labor and equipment as is required to assist laboratory personnel in obtaining and handling samples at the site and in accessing work for inspection.
- F. Furnish concrete mix designs, in accordance with ACI 301, Section 3.9, made by an independent testing laboratory or qualified concrete supplier. Where mix designs by an independent testing laboratory are required, the laboratory shall be selected and paid by the Contractor.
- G. Obtain required inspections or approvals of the building official. All inspection requests and notifications required by building code are responsibility of the Contractor.
- H. Provide current welder certificates for each welder to be employed.
- I. Furnish fabrication/erection inspection and testing of all welds in accordance with AWS D1.1, Chapter 6.
- J. Prequalification of all welding procedures to be used in executing the work.

### **1.05 AUTHORITY AND DUTIES OF LABORATORY PERSONNEL**

- A. A representative of the testing laboratory, who has reviewed and is familiar with the project and specifications, shall participate in all pre-construction conferences. He shall coordinate material testing and inspection requirements with the Contractor and his subcontractors consistent with the planned construction schedule. The laboratory representative shall attend, throughout the course of the project, such conferences as may be required or requested to address quality control issues.

- B. Laboratory personnel shall inspect and/or test materials, assemblies, specimens, and work performed, including design mixes, methods and techniques and report to the Architect the progress thereof.
- C. If material furnished and/or work performed fails to meet requirements of Contract Documents, laboratory inspector shall promptly notify the Construction Manager, Architect, Engineers, supplier and/or subcontractor providing or preparing the materials or work being tested of such failure.
- D. Laboratory technicians do not act as foremen, or perform other duties for Contractor. Work will be checked as it progresses, but failure to detect any defective work or materials shall not, in any way, prevent later rejection when such defect is discovered.
- E. Laboratory inspector is not authorized to revoke, alter, relax, enlarge, or release any requirement of the Contract Documents or to approve or accept any portion of work, except where such approval is specifically called for in the Specifications.
- F. Comply with all building code requirements for "Special Inspection" whether or not such inspections are specified herein.

#### **1.06 SUBMITTALS**

- A. Submit copies of reports of each and every inspection and test as follows:
- B. Owner, Program or Project Manager, Architect, and each Engineer or outside consultants regarding their particular phase of the project: One (1) each
- C. Construction Manager, if applicable, and Contractor: Two (2) each
- D. State in report all details of each inspection and test. Indicate compliance or noncompliance with requirements of Contract Documents. Also state in report any and all unsatisfactory conditions.
- E. In addition to furnishing a written report, notify Construction Manager, if applicable, and Contractor verbally of any uncorrected conditions or failures to comply with requirements of the Contract Documents, and immediately Fax corresponding report to the Architect and Engineer.
- F. At completion of each trade or branch of work requiring inspecting and testing, submit a final certificate attesting to satisfactory completion of work and full compliance with requirements of Contract Documents.
- G. Submit copies of test results, sealed by a Registered Engineer, to municipal authorities having jurisdiction, as required.

#### **1.07 REFERENCED STANDARDS**

- A. Latest adopted edition of all standards referenced in this Section shall apply, unless noted otherwise. In case of conflict between these Contract Documents and a referenced standard, the Contract Documents shall govern. In case of conflict between Contract Documents and the Building Code, the more stringent shall govern.

#### **1.08 TESTING LABORATORY GUIDELINES AND PROCEDURES**

- A. Technicians scheduled to perform specific testing services must be qualified to review and perform other services that overlap, i.e. earthwork, foundation inspections, rebar inspection, and concrete when scheduled concurrently at the Project site.
- B. Technician time for services performed will be reimbursed at a regular time rate. Compensation at the overtime rate will be considered for any hours over eight (8) hours spent at the job site on a single day, field testing services performed on a Saturday or Sunday, and any field services performed on a recognized holiday.
- C. There will be a three (3) hour minimum for each scheduled testing service. Vehicle charges will be included on a \$25.00 per trip basis.
- D. Cylinder pick-up will be handled by the technician performing test on a scheduled pick-up day. If there are no testing services scheduled, the cylinder pick-up fee will be \$40.00 on week days and \$50.00 on weekends and holidays with no technician or vehicle charge.

- E. The Contractor shall bear the responsibility of scheduling all of the test services. The Contractor and the testing laboratory shall assume full responsibility to coordinate the testing services. Cancellations and/or failed test will be reimbursable to the Owner by the responsible party for the cancellations or failure of a test or service.

## **PART 2 – PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

- A. Testing services shall include, but not be limited to those specified below or which are necessary or required during course of construction to ascertain specification compliance and which may be deemed necessary by Architect, Engineer, or Owner to ensure the quality of the Work.
- B. The Owner reserves the right to add to or delete any or all inspection and testing specified herein, excluding testing as required by the applicable building codes.
- C. If conflicts arise between Drawings and Specifications, notify Architect immediately. In any case the most stringent requirements shall dictate procedure.

### **3.02 TESTING OF EARTHWORK**

- A. Testing Services (As specified or required):
  - 1. References (As applicable for tests required):
    - a. American Society for Testing and Materials (ASTM)
      - 1) D698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>))
      - 2) D2922, Standard Test Method for Density of Soil and Soil- Aggregate In Place By Nuclear Methods (Shallow Depth)
      - 3) D4318, Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
    - b. American Association of State Highway and Transportation Officials (AASHTO)
      - 1) T89, Determining the Liquid Limit of Soils
      - 2) T90, Determining the Plastic Limit and Plasticity Index of Soils
      - 3) T99, Moisture-Density Relations of Soils Using a 2.5 kg (5.5 lb) Rammer and a 305-mm (12-in) Drop
      - 4) T238, Density of Soil and Soil Aggregates In Place By Nuclear Methods (Shallow Depth)
  - 2. Perform sieve analysis to develop grain size distribution curves for materials to be used for subgrade, fill under slab-on-grade, and backfills.
  - 3. Establish the moisture density relation of soils to be used as fill using the method best suited to the type of fill material.
  - 4. Determine moisture content of all fill materials before placement and advise Contractor when it is or is not suitable to achieve required compaction.
  - 5. Determine Liquid Limit in accordance with ASTM D4318 or AASHTO T89, Plastic Limit in accordance with ASTM D4318, and Plasticity Index in accordance with ASTM D4318 of all fill material,
  - 6. Perform one (1) in place density test for each 2,500 square feet (280 square yards) of existing subgrade material.
  - 7. Perform Moisture-Density curve in accordance with ASTM D698 or AASHTO T99 for one (1) type of fill material. If the original choice of material does not meet the specifications, the Contractor shall pay for additional testing.
  - 8. Perform in place density tests of each lift of compacted fill at locations adequate to evaluate the degree of compaction of all fill areas. Conduct one (1) test for each 2,500 square feet (280 square yards) of each lift of compacted fill.
  - 9. Perform testing at a frequency of one in-place density and moisture test for each 75 lineal feet or less of utility trench, with a minimum of three tests per lift

- B. Reports: Submit reports with the following information:
  - 1. Type and condition of soil at footing bottoms.
  - 2. Level of water table in the excavated areas.
  - 3. Grain size distribution of fill materials (average of three (3) tests).
  - 4. Moisture density test results.
  - 5. In place density test results with moisture content and relative density of each layer of compacted fill. Include with in place density test results, a plan showing location of each test.
  - 6. Notify Architect by telephone within one (1) hour of the discovery of the following conditions and follow up telephone notification with written report.
    - a. Materials used, or degree of soil compaction not meeting specified requirements.
    - b. Frost and freeze protection requirements for excavation bottoms not being complied with.
    - c. Water in excavations which is not being removed prior to work being performed in excavation.

### **3.03 INSPECTION OF PIPED SITE UTILITIES**

- A. Laboratory representative shall observe and report on the following:
  - 1. Proper alignment and grade of trenches.
  - 2. Pipe bedding and supports.
  - 3. Pipe, joints, jointing material, and thrust blocks prior to installation of pipe.
  - 4. Installation of pipe and joints.
  - 5. Testing of piped utilities performed by Contractor.

### **3.04 PAVING**

- A. Testing Services:
  - 1. Perform field tests for moisture density properties:
    - a. Provide field testing of the sub-grade as described in Paragraph 3.2, A, above.
    - b. Paving sub-base, provide one (1) field test for every 5,000 square feet of area of crushed limestone or caliche sub-base, if any.
    - c. Lime treated sub-grade, provide one (1) field test for every 5,000 square feet of area of lime treated sub-grade, if any, for content of lime and sub- grade compaction.
    - d. Cement soil stabilization, if any, provide one (1) field test for every 5,000 square feet of area of cement stabilized sub-grade for content of cement and sub-grade compaction.

### **3.05 PIER DRILLING OPERATION**

- A. A representative of a qualified geotechnical laboratory shall provide services herein specified.
- B. Laboratory representative shall make continuous inspections to determine that proper bearing stratum is obtained and utilized for bearing and that shafts are properly clean and dry before placing concrete.
- C. Laboratory shall furnish complete pier log showing the diameter, top and bottom elevations of each pier, casing required or not required, actual penetration into bearing stratum, elevation of top of bearing stratum, volume of concrete used, and deviations from specified tolerances.
- D. Laboratory representative shall make continuous inspections of drilled pier construction to check the following:
  - 1. Verify soundness of bearing stratum and desired penetration.
  - 2. Verify pier dimensions and reinforcing used.
  - 3. Monitor condition of hole and removal of water and loose material from bottom.
  - 4. Monitor placement of concrete and use of tremie or pumps.
  - 5. Monitor the extraction of casing, if used.
- E. Request probe holes when deemed necessary to confirm safe bearing capacity.

### **3.06 CONCRETE REINFORCING STEEL AND EMBEDDED METAL ASSEMBLIES**

- A. Inspect all concrete reinforcing steel prior to placing concrete for compliance with Contract Documents and approved shop drawings. All instances of noncompliance with Contract Documents and approved shop drawings shall be immediately brought to the attention of the Contractor for correction and then, if uncorrected, reported to the Architect.
- B. Laboratory representative shall observe and report on the following:
  - 1. Number and size of bars.
  - 2. Bending and lengths of bars.
  - 3. Splicing.
  - 4. Clearance to forms, including chair heights.
  - 5. Clearance to sides and bottom of trench if soil formed.
  - 6. Clearance between bars or spacing.
  - 7. Rust, form oil, and other contamination.
  - 8. Grade of steel.
  - 9. Securing, tying, and chairing of bars.
  - 10. Excessive congestion of reinforcing steel.
  - 11. Installation of anchor bolts and placement of concrete around such bolts.
  - 12. Fabrication and installation of embedded metal assemblies, including visual inspection of all welds.
  - 13. Visually inspect studs and deformed bar anchors on embedded assemblies for compliance with Contract Documents. Check number, spacing and weld quality. If, after welding, visual inspection reveals that a sound weld or a full 360 degree fillet has not been obtained for a particular stud or bar, such stud or bar shall be struck with a hammer and bent 15 degrees off perpendicular and then bent back into position. Anchors failing this test shall be replaced.
- C. Provide a qualified, experienced inspector to inspect reinforcing steel. Inspector shall have a minimum of three (3) years experience inspecting reinforcing steel in projects of similar size.

### **3.07 CONCRETE INSPECTION AND TESTING**

- A. Receive and evaluate all proposed concrete mix designs submitted by Contractor. If mix designs comply with Drawings and Specifications, the laboratory shall submit a letter to the Architect certifying compliance. Mix designs not complying with Drawings and Specifications shall be returned by the laboratory as being unacceptable. Check the proposed mixes for proportions, water cement ratio and slump in accordance with ACI 613 and 318.
- B. Comply with ACI 311, "Guide For Concrete Inspection" and ACI "Manual of Concrete Inspection" (SP-2).
- C. Sample and test concrete placed at the job site in accordance with ASTM C172. Each sample shall be obtained from a different batch of concrete on a random basis.
- D. All concrete shall be tested as follows:
  - 1. Mold and cure four (5) specimens from each sample.
    - a. for each 50 cubic yards or fraction thereof of structural building concrete; and
    - b. for each 100 cubic yards or fraction thereof of non-structural concrete and site work paving and sidewalks.
    - c. Laboratory cure two (2) cylinders in accordance with ASTM C192.
    - d. Field cure remaining cylinders in accordance with ASTM C31.
  - 2. TWO (2) specimens shall be tested at seven (7) days for information, two (2) shall be tested at 28 days for acceptance, and
  - 3. Store one (1) cylinder for testing at 56 days in the event the 28 days strength tests do not meet strength requirements.
- E. All deviations from the requirements of ASTM Specifications shall be recorded in the test report. Test concrete specimens in accordance with ASTM C39.
- F. Specimens for pumped concrete shall be taken at the discharge end of pumping equipment.

- G. Supervise curing and protection provided for test specimens in field, and transportation from the field to laboratory. Test cylinders shall be stored in the field 24 hours and then carefully transported to laboratory and cured in accordance with ASTM C31.
- H. Make one (1) strength test (four (4) cylinders) of each mix design of concrete placed in any one (1) day.
- I. Make one (1) slump test for each set of cylinders following procedural requirements of ASTM C143 and ASTM C172. Make additional slump tests whenever consistency of concrete appears to vary. Slump tests corresponding to samples from which strength tests are made shall be reported with strength test results. Other slump tests need not be reported.
- J. Determine total air content of air entrained normal-weight concrete sample for each strength test in accordance with ASTM C231.
- K. Determine air content and unit weight of lightweight concrete sample for each strength test in accordance with ASTM C173 and ASTM C567.
- L. Determine temperature of concrete sample for each strength test.
- M. Inspect each batch of concrete, monitor addition of mixing water to assure uniform consistency from truck to truck. Check mixing form mixers before mix begins to set and within time limits set forth in ASTM C94.
  - 1. Monitor addition of water and high-range water reducer to concrete at job site and length of time concrete is allowed to remain in truck during placement.
- N. Testing agency shall furnish and maintain a competent inspector at the mixing plant at the start of each day's mixing. Inspector shall examine concrete materials for compliance with Specifications and approved mix design, weighing and measuring devices, proportioning and mixing of materials, water and cement content of each batch, general operation of the plant, and transportation of concrete to jobsite. Inspector shall verify that amount of free surface moisture contained in fine and course aggregate has been properly accounted for in the concrete mixing to achieve required consistency and water cement ratio.
- O. Testing laboratory shall monitor addition of water to concrete at the jobsite and the length of time concrete is allowed to remain in the truck before placement. Inspector shall compare mixture with criteria on the approved mix design and report any significant deviation to the Architect, Contractor and concrete supplier. Do not permit addition of water which will exceed maximum water/cement ratio for the mix as given on the approved mix design.
- P. Observe placing of all concrete, except non-structural slabs-on-grade and site work. Observe and report on placing method, consolidation, cold joints, length of drop, and displacement of reinforcement. Report deficiencies to Contractor immediately for corrective action. Inspections may be reduced to a periodic basis when all procedures have been deemed satisfactory by the laboratory.
- Q. Test reports shall include but not be limited to the following information: date of concrete placement, concrete mix identification number or proportion of ingredients, truck ticket number, time test was made, time of batching, location of each placement, slump, unit weight, water content (microwave test) and air content of concrete sampled and date and results of strength test.
- R. Report promptly to Architect all details of reasons for rejection of any and all quantities of concrete. Give all information concerning locations of the concrete pours, quantities, date of pours, and other pertinent facts concerning concrete represented by the specimens.
- S. Testing laboratory shall certify each delivery ticket indicating class of concrete delivered (or placed), amount of water added and time at which cement and aggregate were dispensed into the truck, and time at which concrete was discharged from the truck.
- T. Evaluation and Acceptance:
  - 1. If measured slump, or air content of air entrained concrete, falls outside specified limits, a check test shall be made immediately on another portion of the same sample. In the event



- of a second failure, concrete shall be considered to have failed to meet the requirements of the specifications, and shall not be used in the structure.
2. Strength level of concrete will be considered satisfactory if the averages of all sets of three (3) consecutive strength tests results are equal to, or exceed, specified strength and no individual test result (average of two (2) cylinders) is below specified strength by more than 500 psi.
  3. Completed concrete work will be accepted when requirements of "Specifications for Structural Concrete for Buildings", ACI 301, Chapter 18, have been met.
- U. Concrete Test Reports:
1. Reports shall be made and distributed immediately after respective tests or inspections are made.
  2. Where reports indicate deviations from Contract Documents, they shall also include a determination of the probable cause of deviation and where applicable, a recommendation for corrective action.
- V. Furnish a statistical analysis for each class of concrete placed on the project in accordance with ACI 214 and ACI 318. Information shall be updated and distributed once a month as directed by the Architect. Information shall include, but not be limited to, the following:
1. Strength tests at seven (7) days.
  2. Strength tests at 28 days of two (2) cylinder averages.
  3. 28-day moving average strength tests of last three (3) test groups.
  4. Standard deviation and coefficient of variation based on 28 day strength tests.
  5. Average strength and number of 28 days tests for most recent month.
  6. Strength test one (1) cylinder at 56 days in the event the 28 days strength tests do not meet strength requirements.
- W. Test Footings (Shafts) (Piers) (Caissons): Same diameter and type as specified for other footings, placed in same manner. Accepted test footings may be used in the Work.
- X. Non-Compliant Test Reports: All test reports indicating non-compliance should be faxed immediately to all parties on the test report distribution list. Copies shall be on different colored paper.
- Y. Inspect application of curing compound and monitor all curing conditions to assure compliance with specification requirements. Report curing deficiencies to the Contractor immediately and submit a written report to the Architect.

### **3.08 TESTING OF NON-SHRINK GROUT**

- A. Make one (1) strength test for all plates grouted and for all grout used in joints between members.
- B. Each test shall consist of four (4) cubes, two (2) to be tested at seven (7) days and two (2) at 28 days, made and tested in accordance with ASTM C109, with the exception that grout shall be restrained from expansion by a top plate.

### **3.09 STRUCTURAL STEEL**

- A. Inspect structural steel during and after erection for conformance with Contract Documents and shop drawings. Review and report on fabricator's quality control procedures and capabilities.
- B. Field Inspection:
  1. Proper erection of all pieces.
  2. Proper touch up painting of all shop primed structural steel exposed to view or in a crawl space.
  3. Proper installation of all bolts.
  4. Plumbness of structure and proper bracing.
  5. Proper field painting.
  6. Initial inspection of welding process and periodically thereafter, as necessary.
  7. Visual examination of all completed welds.
  8. Ultrasonic testing of all penetration field welds.

9. Installation of field welded shear studs.
  10. Inspect all shop fabricated members, upon their arrival at the jobsite, for defects incurred during transit and handling.
  11. Measure and record camber of all beams upon arrival and before erection for compliance with specified camber. Measure lying flat with web horizontal. Members outside specified camber tolerance shall be returned to shop for correction.
- C. Qualifications of Welders: Fabricator and erector shall provide the testing laboratory with names of welders to be employed on work, along with certification that each welder has passed qualification tests within the last 12 months, using procedures covered in AWS D1.1, "Structural Welding Code - Steel", latest edition. Verify all welder qualifications.
- D. Inspection of field welding shall include the following:
1. Visually inspect fillet welds for size, soundness, and proper return around ends. Check for seams, folds, and delaminations.
  2. Visually inspect all welds for proper repair of painting.
  3. Ultrasonically test all penetration welds in accordance with ASTM E164.
  4. Inspect surfaces to be welded. Surface preparations, fit-up and cleanliness of surface shall be noted. Electrodes shall be checked for size, type and condition.
  5. Welding inspector shall be present during alignment and fit-up of members being welded, and shall check for correct surface preparation of root openings, sound weld metal, and proper penetration in the root pass. Where weld has not penetrated completely, inspector shall order the joint to be chipped down to sound metal, or gouged out, and re-welded. Root passes shall be thoroughly inspected for cracks. All cracks shall be gouged out and re-welded to two (2) inches beyond each end of crack.
  6. Inspector shall check that all welds have been marked with welder's symbol and shall mark welds requiring repairs and shall make a re-inspection. Inspector shall maintain a written record of all welds. Work completed and inspected shall receive an identification mark by the inspector. Unacceptable material and work shall be identified by word "reject" or "repair" marked directly on the material.
  7. Testing agency shall advise the Owner and Architect of any shop and/or field conditions which, in his opinion, may require further tests and examination by means other than those specified. Such further tests and examinations shall be performed as authorized by the Owner and Architect.
  8. Owner reserves the right to use ultrasonic or radiographic inspection to verify adequacy of all welds. Testing procedures and acceptance criteria shall be as specified in AWS D1.1.
  9. Weld quality to comply with the American Institute of Steel Construction Manual of Steel Construction.
  10. Percentage of weld tested will be determined by the number of welds that fail the initial testing.
  11. All welds that fail shall be re-welded and re-tested until they pass. Test two (2) additional welds for every weld failure at the Contractor's expense.
- E. Inspection of bolted construction shall be in accordance with AISC "Specification for Structural Steel Buildings" as follows:
1. All bolts shall be visually inspected to ensure that plies have been brought into snug contact.
  2. High strength bolting shall be inspected in accordance with Section 9 of the "Specifications for Structural Joints Using ASTM A325 or A490 Bolts".
- F. Inspection of stud welding shall be in accordance with Section 7.8, of the AWS D1.1, Structural Welding Code, and as follows:
1. Minimum of two (2) shear studs shall be welded at the start of each production period in order to determine proper generator, control unit and stud welder setting. These studs shall be capable of being bent 45 degrees from vertical without weld failure.
  2. When temperature is below 32 degrees F, one (1) stud in each 100 shall be tested after cooling. Studs shall not be welded below 0 degrees F or when surface is wet with rain or

snow. If stud fails in the weld, two (2) new studs shall pass the test before resumption of welding.

3. Visually inspect studs for compliance with Contract Documents. Check, number, spacing, and weld quality. If, after welding, visual inspection reveals that a sound weld or a full 360 degree fillet has not been obtained for a particular stud, such stud shall be struck with a hammer and bent 15 degrees off perpendicular in the direction away from the missing weld. Studs failing under this test shall be replaced.

### **3.10 REINFORCING STEEL MECHANICAL SPLICES**

- A. Inspection and Observation Services:
  1. Visually inspect and report on the completed condition of each mechanical splice of reinforcing steel.
  2. Reports and the manufacturer's published criteria for acceptable completed splices.
  3. Special emphasis shall be placed on inspection of the end preparation of each bar to be spliced, as required by the I.C.B.O. Report.
- B. Reports: Submit reports to Architect with the following information:
  1. Submit copies of manufacturer's published criteria for acceptable completed splices prior to observing mechanical splices.
  2. Reports on each mechanical splice shall indicate location of the splice, size of bars spliced, and acceptability or rejection of splice. Reasons for rejection shall be shown on each report.

### **3.11 OPEN WEB JOISTS AND JOIST GIRDERS**

- A. Inspect all joists at jobsite for conformance with specified fabrication requirements. Check welded connections between web and chord, splices, and straightness of members.
- B. Inspect installation of joists at jobsite. Check connections to supporting members, chord extensions, number of rows of bridging, and bridging connections for conformance with Contract Documents and referenced standards.
- C. Check welder qualification certificates for both shop and field welding operators.

### **3.12 METAL FLOOR DECK**

- A. Field inspection shall consist of the following:
  1. Checking types, gauges and finishes for conformance with Contract Documents and shop drawings.
  2. Examination of composite floor deck exposed to crawl space, for damage to galvanizing due to welding or other construction activities. Galvanized composite floor deck shall be repaired in accordance with these specifications.
  3. Examination for proper erection of all metal deck, fastenings, reinforcing of holes, deck reinforcing, miscellaneous deck supports, hanger tabs, shear studs, deck closures, painting or other coating.
  4. Certification of welders.
  5. Field welded shear studs used to fasten metal floor decking to supporting steel shall be inspected and tested as described in the paragraph addressing structural steel.

### **3.13 METAL ROOF DECK**

- A. Field inspection shall consist of the following:
  1. Checking types, gauges and finishes for conformance with Contract Documents and shop drawings.
  2. Examination for proper erection of all metal deck, including fastenings at supports and side laps, reinforcing of holes, and miscellaneous deck supports.
  3. Certification of welders.
  4. Visual inspection of at least 25 (twenty-five) percent of all welds.

### **3.14 SPRAYED FIREPROOFING (WHEN APPLICABLE)**

- A. Verify that applied thickness, density, and bond strength of sprayed fireproofing meets fire rating requirements of approved design.
- B. Verify that installation meets fire rating requirements of approved design.
- C. Inspect and test for thickness as follows:
  - 1. Test twenty-five (25) percent of structural frame columns and beams in each building level.
  - 2. Test ten (10) percent of beams other than structural frame in each building level.
  - 3. Test one (1) slab per 5,000 square feet of building area.
- D. Inspection and test procedures in accordance with ASTM E605 and E736.

### **3.15 EXPANSION BOLT INSTALLATION**

- A. Inspect drilling of each hole and installation of each expansion bolt for conformance with Contract Documents and shop drawings.
- B. Verify installation torque for each expansion bolt for compliance with manufacturer's installation instructions.

### **3.16 LIGHTWEIGHT INSULATING CONCRETE FILL**

- A. Inspection and Observation Services (As required):
  - 1. Inspection of roof deck prior to start of work.
  - 2. Inspection during installation of insulation and lightweight insulating concrete fill work to ascertain compliance with Contract Documents.
  - 3. Observation of base ply fastener pull tests performed by Contractor to ascertain minimum withdrawal resistance of 40 pounds per fastener.
- B. Testing Services (As required):
  - 1. References (As applicable for tests required):
    - a. American Society for Testing and Materials (ASTM)
      - 1) C177, Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties By Means of the Guarded-Hot-Plate Apparatus
        - (a) C495, Test Method for Compressive Strength of Lightweight Insulating Concrete
        - (b) C578, Specification for Rigid, Cellular Polystyrene Thermal Insulation
  - 2. Test EPS insulation board for thermal insulation value in accordance with ASTM C177.
  - 3. Test lightweight insulating concrete fill in accordance with ASTM C495 for:
    - a. Mix design compressive strength.
    - b. Mix design wet and dry density range.
    - c. Number of Tests:
      - 1) One (1) per 5,000 square feet
      - 2) Not less than one (1) for each day's work
  - 4. Test EPS insulation board for density in accordance with ASTM C578.

### **3.17 TESTING OF ROOFING**

- A. Inspection and Observation Services (As required):
  - 1. Inspection of roof deck prior to start of work.
  - 2. Inspect on-site condition of stored roofing materials.
  - 3. Inspection during roofing, roof insulation, and sheet metal work to ascertain compliance with Contract Documents.
  - 4. Observation of roof test cuts performed by Contractor to ascertain that they are properly made.
  - 5. Observation of patching of roof test cuts to ascertain that they are properly made.
- B. Testing Services (As required):

1. Perform dissection and analysis on cuts provided by Contractor to confirm number of plies, bonding of plies, weight of bitumen and softening temperature to ascertain compliance with specifications.

### **3.18 MASONRY**

- A. Inspection and Observation Services:
  1. Inspection of placement of reinforcement including condition, grade, size, location, spacing, and lap splices.
  2. Review mortar design mixes.
  3. Inspection of laying, mortaring, and grouting of concrete masonry units and elements.
- B. Testing Services:
  1. References (As applicable for tests required):
    - a. ASTM International (ASTM)
      - 1) C140, Standard Test Methods of Sampling and Testing Concrete Masonry Units
      - 2) C780, Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
      - 3) C1019, Standard Test Method for Sampling and Testing Grout
      - 4) E447-97, Standard Test Methods for Compressive Strength of Laboratory Constructed Masonry Prisms
  2. Testing of Concrete Masonry Units (CMU):
    - a. Preconstruction: Perform the following tests in accordance with ASTM C140.
      - 1) Compressive Strength
      - 2) Absorption
      - 3) Weight
      - 4) Moisture Content
      - 5) Dimensions
  3. Mortar Tests:
    - a. Preconstruction: Perform the following tests in accordance with ASTM C780 on each type of mortar mix used on the Project.
      - 1) 28 Day Compressive Strength
      - 2) Water Retention
    - b. Construction: Perform 28 day compressive strength test in accordance with ASTM C780 on each type of mortar mix used on the Project at the rate of one (1) test per 2,000 square feet of masonry.
  4. Refer to and include work for reinforcing steel specified in Paragraphs 3.5 and 3.6 above.
  5. Grout Tests:
    - a. Preconstruction: Perform the following tests in accordance with ASTM C1019 on each type of grout mix used on the Project.
      - 1) Slump Test
      - 2) 28 Day Compressive Strength
    - 3) Construction: Perform 28 day compressive strength test in accordance with ASTM C1019 on each type of grout mix used on the Project at the rate of one (1) test per 2,000 square feet of masonry.
    - 4) Prism Test: Perform preconstruction 28 day compressive strength test on concrete masonry walls in accordance with ASTM E447- 97, Method B.

**END OF SECTION**

**SECTION 01 4529  
STRUCTURAL TESTING AND INSPECTIONS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section includes requirements for quality assurance and quality control to be completed by the Testing Laboratory, the Special Inspector, Contractor, and/or the Geotechnical Engineer for the following structural items:
  - 1. Concrete Forming and Accessories.
  - 2. Concrete Reinforcing.
  - 3. Precast Structural Concrete
  - 4. Cast-in-Place Concrete.
  - 5. Post-Tensioned Concrete.
  - 6. Masonry.
  - 7. Structural Steel.
  - 8. Steel Decking.
  - 9. Earthwork.
- B. Related Requirements:
  - 1. Specification 014000 "Quality Requirements" for other independent testing agency procedures and administrative requirements.

**1.03 PRICE AND PAYMENT PROCEDURES**

- A. Unit Prices:
  - 1. Cost Proposal: The Testing Laboratory's proposal to the Owner shall contain unit price stipulations for specified tests and inspections and on an hourly basis for personnel. A total estimated price shall also be submitted.
- B. Measurement and Payment
  - 1. Payment of the Testing Laboratory: The Owner will pay for the initial Laboratory services for inspection and testing of materials for compliance with the requirements of the Contract Documents.
  - 2. Payment for Substitution Testing: The Contractor shall arrange for and pay for any additional samples and tests above those required by the Contract Documents as requested by the Contractor for his convenience in performing the work.
  - 3. Payment for Retesting: When initial tests indicate work does not comply with the requirements of the Contract Documents, the Contractor shall be liable to the Owner for the cost for any additional inspections, sampling, testing, and retesting done by the Testing Laboratory.
  - 4. Payment by Contractor: The Contractor shall furnish and pay for the following items if required:
    - a. Soil survey of the location of borrow soil materials, samples of existing soil materials, and delivery to the Contractor's Testing Laboratory.
    - b. Samples of concrete aggregates and delivery to the Contractor's Testing Laboratory.
    - c. Concrete mix designs as prepared by his concrete supplier.
    - d. Site-situated storage boxes for concrete cylinders
    - e. Concrete coring, tests of below strength concrete, and load tests, if ordered by the Owner, Architect, or Engineer.
    - f. Certification of reinforcing steel and prestressing steel mill order.
    - g. Certification of structural steel mill order.
    - h. Certification of portland cement, lime, fly ash.
    - i. Certification of welders and preparation of Welding Procedure Specifications.

- j. Tests, samples, and mock-ups of substitute material where the substitution is requested by the Contractor and the tests are necessary in the opinion of the Owner, Architect or Engineer to establish equality with specified items.
  - k. The making and testing of concrete cylinders for the purpose of evaluating strength at time of form stripping or for post-tensioning or the time spent evaluating the in situ strength of concrete using the Maturity Method.
  - l. Any other tests when such costs are required by the Contract Documents to be paid by the Contractor.
5. Payment for Tests of Suspected Deficient Work: If, in the opinion of the Building Official, Owner, Architect, or Engineer, any of the work of the Contractor is not satisfactory, the Contractor shall furnish and pay for all tests that the Owner, Architect, or Engineer deem advisable to determine its proper construction.

#### **1.04 OWNER RESPONSIBILITIES**

- A. The Owner shall engage a Geotechnical Engineer to provide inspection services for the foundations as outlined below in Article 3.7.
- B. The Owner shall provide a copy of the project plans and specifications to the Testing Laboratory prior to the start of construction and prior to any preinstallation meetings.

#### **1.05 CONTRACTOR RESPONSIBILITIES**

- A. The Contractor shall not engage the same Testing Laboratory for construction services as the Owner has for Structural Testing Laboratory Services as defined herein unless agreed to by the Owner.
- B. Furnishing Samples and Certificates: The Contractor shall provide to the laboratory certificates and representative samples of materials proposed for use in the work in quantities sufficient for accurate testing as specified.
- C. Furnishing Casual Labor, Equipment and Facilities: The Contractor shall furnish casual labor, equipment, and facilities as required for sampling and testing by the laboratory and otherwise facilitate the required inspections and tests.

#### **1.06 TESTING LABORATORY RESPONSIBILITIES**

- A. The Testing Laboratory shall sample and test materials as they are being installed for compliance with specified acceptance criteria. The Testing Laboratory will report and interpret the test results. The Laboratory shall monitor and report on the installation of construction work and shall perform tests on the completed construction as required to indicate Contractor's compliance with the various material specifications governing this work.
- B. The Testing Laboratory shall serve as a Special Inspector to provide Special Inspection services for the items listed below. The scope of such services for each item shall be as defined in the Building Code or as defined in the local building code of the jurisdiction wherein the project is located. These inspections are mandatory for conformance to the legal requirements of the building code and shall be in addition to the inspections and tests otherwise defined in this specification.
  - 1. Special Inspector Responsibilities:
    - a. The special inspector shall observe the work assigned to ascertain that, to the best of his/her knowledge, it is in conformance with the approved design drawings and specifications.
    - b. The special inspector shall furnish inspection reports to the Building Official, the Architect/Engineer, and the Owner. All discrepancies shall be brought to the immediate attention of the Architect/Engineer, Contractor, and Owner. A report that the corrected work has been inspected shall be sent to the Building Official, the Architect/Engineer, and the Owner.
    - c. The special inspector shall create and maintain a log of all discrepancies throughout the duration of the Project. This log shall include, but is not limited to, discrepancy date, description of discrepancy, drawing and/or detail reference, description of as-built condition, description of any remedial work performed, and status of

discrepancy. This log shall be submitted to the Architect/Engineer on a periodic basis for review and comment. Upon completion of the Project, this log shall be submitted in its entirety as an attachment to the final signed report described below.

- d. The special inspector shall submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance to the approved plans and specifications and the applicable workmanship provisions of the building code.
- C. The Testing Laboratory shall provide inspections on the following items:
  - 1. Reinforcing steel placement.
  - 2. Concrete work.
  - 3. Welding of reinforcing steel.
  - 4. Bolts to be installed in concrete.
  - 5. Bolts, anchors, and reinforcing bars installed in hardened concrete (post-installed anchors).
  - 6. Prestressing tendons placement.
  - 7. Prestressing operation.
  - 8. Grouting of bonded prestressing tendons.
  - 9. Inspection of structural steel, bolting, and welding material.
  - 10. Welding of structural steel.
  - 11. High-strength bolting.
  - 12. Compacted earth fill.
  - 13. Masonry work.
- D. Inspections Required by Government Agencies: The Testing Laboratory shall perform inspections and submit reports and certifications as required by government agencies having jurisdiction over the aspects of the project covered by this specification.
- E. Notification of Deficiencies in the Work: The Testing Laboratory shall notify the Architect, Engineer, and Contractor within 24 hours of discovery of observed irregularities and deficiencies of the Work and other conditions not in compliance with the requirements of the Contract Documents. Notification shall be by telephone or e-mail and then in writing.
- F. The Testing Laboratory shall be responsible for separating and billing costs attributed to the Owner and costs attributed to the Contractor.
- G. Monitoring Product and Material Certifications: The Testing Laboratory shall be responsible for monitoring the submittals of product and material certifications from manufacturers and suppliers as specified in the Specifications and shall report to the Owner, Architect, and Engineer when those submittals are not made in a timely manner.
- H. Limitations of Authority: The Testing Laboratory is not authorized to revoke, alter, relax, enlarge upon, or release any requirements of the Specifications or to approve or accept any portion of the work or to perform any duties of the General Contractor and his Subcontractors.

#### **1.07 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. The Testing Laboratory shall cooperate with the Architect, Engineer, and Contractor and provide qualified personnel promptly on notice.
  - 2. The Contractor shall cooperate with Testing Laboratory personnel and provide access to the work and to manufacturers' operations.
  - 3. Notification of Source Change: The Contractor shall be responsible for notifying the Owner, Architect, Engineer, and Testing Laboratory when the source of any material is changed after the original tests or inspections have been made.
- B. Preinstallation Meetings: The Testing Laboratory shall attend preinstallation meetings with the Architect, Engineer, Contractor, and material suppliers as required to coordinate materials inspection and testing requirements with the planned construction schedule and shall participate in such meetings throughout the course of the project.



C. Scheduling:

1. Advance Notice: The Contractor shall be responsible for notifying the Testing Laboratory sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests. Failure to sufficiently notify may result in additional costs incurred by the Testing Laboratory that may be back-charged to the Contractor by the Owner.

**1.08 SUBMITTALS**

A. Quality Control Reports:

1. Information on Reports: The Testing Laboratory shall submit copies of reports of inspections and tests promptly. The reports shall contain at least the following information:
  - a. Project name.
  - b. Date report issued.
  - c. Testing Laboratory name and address.
  - d. Name and signature of inspector/technician.
  - e. Date of inspection and/or sampling.
  - f. Date of test.
  - g. Identification of product and Specification section.
  - h. Location in the project.
  - i. Identification of inspection or test.
  - j. Record of weather conditions and temperature (if applicable).
  - k. Results of test regarding compliance with Contract Documents.
2. Copies: The Laboratory shall send signed electronic (PDF) copies of test and inspection reports to the following parties:
  - a. Owner or his/her representative.
  - b. General Contractor.
  - c. Architect.
  - d. Engineer of Record.

B. Discrepancy Log: The Testing Laboratory shall create and maintain a log of all discrepancies throughout the duration of the project.

1. Information on Log: This log shall include, but is not limited to:
  - a. Discrepancy date.
  - b. Description of discrepancy.
  - c. Drawing and/or detail reference.
  - d. Description of as-built condition.
  - e. Description of any remedial work performed.
  - f. Status of discrepancy.
2. Submission Schedule: This log shall be submitted to the Architect/Engineer on a periodic basis for review and comment. Upon completion of the Project, this log shall be submitted in its entirety as an attachment to the final signed report described below under Certifications.

C. Certification: Upon completion of the job, the Laboratory shall furnish to the Owner, Architect, and Engineer of Record, a statement signed by a licensed professional engineer that, to the best of their knowledge, required tests and inspections were made in accordance with the requirements of the Contract Documents.

**1.09 QUALITY ASSURANCE**

A. Qualifications of Special Inspector: The special inspector shall be a qualified person who shall demonstrate competence, to the satisfaction of the Building Official, for inspection of the particular type of construction or operation being inspected. The Special Inspector shall meet the legal qualifications of the building code having jurisdiction.

B. Qualifications of Testing Laboratory:

1. The Testing Laboratory shall meet the basic requirements of ASTM E 329 and shall submit to the Owner, Architect, and Engineer evidence of current accreditation from the American

2. Association for Laboratory Accreditation, the AASHTO Accreditation Program or the "NIST" National Voluntary Laboratory Accreditation Program.
  3. The Testing Laboratory shall be an Approved Agency by the Building Official to perform Special Inspections and other tests and inspections as outlined in the applicable building code.
  4. Tests and inspections shall be conducted in accordance with specified requirements, and if not specified, in accordance with the applicable standards of the American Society for Testing and Materials or other recognized and accepted authorities in the field.
  5. Qualifications of Welding Inspectors
    - a. Inspectors performing visual weld inspection shall meet the requirements of AWS D1.1 Section 6.1.4. Inspectors shall have current certification as an AWS Certified Welding Inspector (CWI). Assistant inspectors, if any, shall be supervised by an Inspector and shall be qualified by training and experience to perform the specific functions to which they are assigned.
    - b. Inspectors performing nondestructive examinations of welds other than visual inspection (MT, PT, UT, and RT) shall meet the requirements of AWS D1.1, Section 6.14.6.
- C. The Contractor shall not engage the same testing laboratory for construction services as the Owner has for quality assurance testing, unless agreed to by the Owner.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.01 SCOPE OF WORK**

- A. The work to be performed by the Testing Laboratory shall be as specified in this Section of the Specification and as determined in meetings with the Owner, Architect, and Engineer.

### **3.02 CONCRETE FORMING AND ACCESSORIES**

- A. Field Inspection:
1. Shallow Foundation Elements:
    - a. Verify element width, length, depth, and elevation.
    - b. Verify that forms are plumb and straight, braced against movement, and lubricated for removal.
  2. Slabs-on-Grade:
    - a. Verify formwork at turndowns and slab edges is plumb and straight, braced against movement and lubricated for removal.
  3. Columns and Walls:
    - a. Verify that forms are plumb and straight, braced against movement, lubricated for removal, and conform to approved shop drawings.
    - b. Verify proper dimensions and orientation.
    - c. Verify top of column elevation is set in form and that it is 1/2 inch below the future slab soffit.
  4. Suspended Floors (General):
    - a. Verify that formwork conforms to signed and sealed shop drawings.
    - b. Verify that shoring layout conforms to signed and sealed shop drawings.
    - c. Verify that reshores at all levels conform to signed and sealed shop drawings.
    - d. Verify that forms are plumb and straight, braced against movement, and lubricated for removal.
    - e. Verify that the forms used for exposed finish surfaces are of the type specified and provide a joint system as shown on the Architect's drawings.
    - f. Verify the proper dimensions of girders, beams, and joists.
    - g. Verify that the slab thickness and top of slab elevation is correct.
    - h. Verify the top of columns are 1/2 inch below the deck soffit.
  5. Pan Form Slabs:

- a. Verify that pans used are of the type specified and are free of dents, surface irregularities, sags, rust, or stains.
- b. Verify that the discontinuities that will be created in the slab soffit at the splice points of the pans do not exceed the value specified.
6. Flat Slabs:
  - a. Verify that the top of columns are 1/2 inch below the deck soffit.
7. In-Situ Concrete Strength Verification Prior to Form Stripping: The Testing Laboratory shall verify that the concrete has reached the required minimum strength before form removal by evaluating the specified tests. Refer to Paragraph 3.4C.2.a for additional information regarding the tests.

### **3.03 CONCRETE REINFORCING**

- A. Quality Assurance:
  1. Review the Welding Procedure Specification (WPS) submitted by the contractor for any reinforcing steel other than ASTM A 706 that is proposed to be welded for consistency with acceptable welding practices and AWS.
  2. Review welder qualifications by certification or verify by retesting. Obtain welder certificates.
- B. Field Testing: The following tests shall be completed by the Testing Laboratory:
  1. Mechanical Tension Splices: The Laboratory shall conduct monotonic tension tests in accordance with ASTM A 1034 of mechanical tension splices of the type as specified on the structural drawings. It is not necessary that the specimens to be tested are production splices, however, the specimens to be tested shall have been made by the Contractor's personnel under field conditions. The rate of testing shall be as follows:
    - a. Two specimens for the first 50 splices (or fraction thereof) at the beginning of the job. Splices not meeting tension requirements shall be retested at Contractor's expense until all splices meet the tension requirements.
    - b. One specimen for every 100 (or fraction thereof) additional splices occurring on the job. Any splices not meeting tension requirements shall be retested at Contractors expense until all splices have passed the test.
    - c. A minimum of one test specimen shall also be selected from transition splices (splices of one bar size to another bar size), if any.
- C. Field Inspection: The scope of the work to be performed by the inspector on the jobsite shall be as follows:
  1. Reinforcing Steel: The Testing Laboratory or designated Special Inspector shall inspect 100% of reinforcement before each concrete pour to verify the information noted below. Inspection reports shall be prepared and distributed in accordance with the local building code and as specified in this specification.
    - a. Primary and secondary longitudinal reinforcement has correct size and number in proper layers.
    - b. Longitudinal reinforcement has correct length and lap.
    - c. Ties and stirrups are of correct size, spacing, and number and have the proper termination hook geometry.
    - d. Unscheduled face reinforcement in beams are provided and are of correct size, number and spacing and have the proper end terminations.
    - e. Proper hooks are provided at bar ends as detailed.
    - f. Reinforcement is properly supported and braced to formwork to prevent movement during concrete placement.
    - g. Reinforcement has proper cover.
    - h. Sufficient spacing between reinforcement for concrete placement.
    - i. Dowel reinforcement is of proper size, at proper spacing, and has proper lap length and embedment length.
    - j. Welded wire reinforcement is composed of flat sheets, has proper wire gage and spacing, is properly supported, and is properly lapped.

- k. Proper construction/control/expansion joint spacing and reinforcement.
- l. Reinforcement around embedded items is placed according to details.
- m. Welded reinforcement has been done according to AWS requirements.
- n. Proper installation of flat slab shear head reinforcement.
- o. Reinforcing Steel Compression Butt Splices: The Testing Laboratory shall provide 100% visual inspection of compression butt splices on the project. Inspection shall verify splice conformance with the requirements for end bearing splices as set forth in ACI 318 as well as the manufacturer's instructions.
- p. Mechanical Tension Splices: The Testing Laboratory shall provide 100% visual inspection of mechanical tension splices on the project and consult with the manufacturer regarding recommendations for installation. Inspection shall verify compliance with specifications and conformance with the manufacturer's recommendations for installation after consulting with the manufacturer, who is to be present for the first installation of the splice on the project.
- q. Welded Reinforcing: Continuous inspection of the welding of reinforcing bars to ensure compliance with the requirements of AWS shall be done for the following items:
  - 1) Reinforcing steel resisting flexural and axial forces.
  - 2) Boundary elements of reinforced concrete walls.
  - 3) Shear reinforcement.

### **3.04 CAST-IN-PLACE CONCRETE**

- A. Quality Assurance:
  - 1. Concrete Mix Designs: The Testing Laboratory shall review the submitted mix designs for conformance to the specifications and for suitability for use in the project.
  - 2. Preinstallation Meetings: The Testing Laboratory shall attend the preinstallation meetings as noted in Specification 033000 "Cast-in-Place Concrete."
- B. Source Inspection:
- C. Field Testing: The following tests shall be completed by the Testing Laboratory:
  - 1. During Concrete Placement:
    - a. Record the amount of water added and note if it exceeds the amount allowed to be added shown in the approved mix design.
    - b. Mold concrete test cylinders as specified below in Paragraph 3.a.
    - c. Perform tests to determine slump, concrete temperature, unit weight, and air entrainment as specified below.
    - d. Record information for concrete test reports as specified below.
    - e. Pick up and transport to Laboratory cylinders cast the previous day.
  - 2. After Concrete Placement:
    - a. In-situ Concrete Strength Verification for Form Stripping: The Testing Laboratory shall perform the tests necessary to determine the concrete strength prior to form stripping:
      - 1) If concrete strength for form stripping is to be determined using field-cured cylinders, the cylinder shall be broken at the time of form removal as directed by the Contractor.
      - 2) If concrete strength for form stripping is to be determined using the Maturity Method, the Testing Laboratory shall verify that the requirements of ASTM C 1074 are being followed and that the proper criteria for determining concrete strength by this method has been established and is being followed.
    - b. Investigation of Low Strength Concrete Test Results:
      - 1) Cost of Investigations for Low Strength Concrete: The Contractor shall reimburse the Owner for the costs of investigations of low strength concrete, as defined in Part I above.
      - 2) Scope of Investigations: See Specification Section 03 30 00 "Cast-In-Place Concrete" for the investigations that may be required by the Engineer. The Testing Laboratory will conduct these investigations if required.

- c. Post-Installed Anchors in Concrete:
    - 1) Verify maximum anchor tightening torque for all applicable post-installed anchors.
    - 2) Provide pull tests on individual anchors as specified in the ICC Evaluation Services Report, on the drawings, or as directed by the Engineer-of-Record.
  - d. Floor Flatness and Levelness Measuring: Perform tests as defined below.
  - e. Testing of Concrete Floor Slabs for Acceptability to Receive an Adhesive-Applied, Low-Permeable Floor Covering: Perform tests as defined below.
  - f. Testing of Non-Shrink Grout for Base Plates, Bearing Plates, and Precast Wall Panels:
    - 1) Compressive Strength Tests: Compressive strength of grout shall be determined by testing grout cubes according to the requirements of ASTM C 109 - Modified. Test one set of three cubes at one day, and one set of three cubes at 28 days.
    - 2) Frequency of Testing: One set of cubes (6 cubes) shall be made for every ten base plates and bearing plates or fraction thereof but not less than one set for each day's operation. One set of cubes shall be made for each day's operation of grouting wall panels.
3. Standards for Concrete Tests:
- a. Concrete Test Cylinders: Mold and test concrete cylinders as described below:
    - 1) Cylinder Molding and Testing: Cylinders for strength tests shall be molded and Laboratory cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39. Cylinders may be either 6" in diameter by 12" or 4" in diameter by 8", however, the diameter of the cylinder shall be at least three times the nominal maximum size of the coarse aggregate in the mix tested. All of the cylinders for each class of concrete shall be of the same dimension for all sets of that class.
    - 2) Field Samples: Field samples for strength tests shall be taken in accordance with ASTM C 172 at the point of placement.
    - 3) Quantity of Cylinders: Each set of test cylinders shall consist of a minimum of four standard test cylinders. If concrete strength for form stripping is to be determined using field-cured cylinders, one additional cylinder per set will be required for formed slab and pan-formed beam floors for the purpose of evaluating the concrete strength at the time of form stripping. This cylinder shall be stored on the floor where form removal is to occur under the same exposure conditions as the floor concrete. The cylinder shall be cured under field conditions in accordance with ASTM C 31. Field-cured test cylinders shall be molded at the same time and from the same samples as laboratory- cured test specimens. The Contractor shall reimburse the Owner for the cost of making and testing these cylinders.
    - 4) Frequency of Testing: A set of test cylinders shall be made according to the following minimum frequency guidelines:
      - (a) One set for each class of concrete taken not less than once a day.
      - (b) Piers, Piles, Underreamed Footings: One set for each 50 cubic yards or fraction thereof.
      - (c) Drilled/Underreamed Piers: One set for each 50 cubic yards or fraction thereof.
      - (d) Floors: One set for each 150 cubic yards or fraction thereof but not less than one set for each 5,000 square foot of floor area.
      - (e) Columns: One set for each 50 cubic yards or fraction thereof with a minimum of two sets per floor.
      - (f) All Other Concrete: A minimum of one set for each 150 cubic yards or fraction thereof but not less than one set for each 5,000 square foot of area for walls.
      - (g) No more than one set of cylinders at a time shall be made from any single truck.

- (h) If the total volume of concrete is such that the frequency of testing as specified above would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.
  - (i) The above frequencies assume that one batch plant will be used for each pour. If more than one batch plant is used, the frequencies cited above shall apply for each plant used.
- 5) The cylinders shall be numbered, dated, and the point of concrete placement in the building recorded.
- 6) For concrete specified on the drawings to reach the required strength at 28 days, break one cylinder of the set at seven days, two 6" by 12" cylinders or three 4" by 8" cylinders at 28 days, and keep one in reserve for testing at the Engineer's direction.
- 7) Cylinder Storage Box: The Contractor shall be responsible for providing a protected concrete cylinder wooden storage box at a point on the job site mutually agreeable with the Testing Laboratory for the purpose of storing concrete cylinders until they are transported to the Laboratory. The box shall be constructed and equipped to maintain the environment specified for initial curing in ASTM C 31.
- 8) Transporting Cylinders: The Testing Laboratory shall be responsible for transporting the cylinders to the Laboratory in a protected environment such that no damage or ill effect will occur to the concrete cylinders including loss of moisture, freezing temperatures or jarring.
- 9) Information on Concrete Test Reports: The Testing Laboratory shall make and distribute concrete test reports after each job cylinder is broken. Such reports shall contain the following information:
  - (a) Truck number and ticket number.
  - (b) Concrete Batch Plant.
  - (c) Mix design number.
  - (d) Accurate location of pour in the structure.
  - (e) Strength requirement.
  - (f) Date cylinders made and broken.
  - (g) Technician making cylinders.
  - (h) Concrete temperature at placing.
  - (i) Air temperature at point of placement in the structure.
  - (j) Amount of water added to the truck at the batch plant and at the site and whether or not it exceeds the amount allowed by the mix design.
  - (k) Slump.
  - (l) Unit weight.
  - (m) Air content.
  - (n) Cylinder compressive strengths with type of failure if concrete does not meet Specification requirements. Seven day breaks are to be flagged if they are less than 60% of the required 28 day strength. 28 day breaks are to be brought to the attention of the Architect and Engineer in writing if either cylinder fails to meet specification requirements.
- b. Slump Tests: Slump Tests (ASTM C 143) shall be completed at the beginning of concrete placement for each batch plant and for each set of test cylinders made. The slump test shall be made from concrete taken from the end of the concrete truck chute. The concrete shall be considered acceptable if the slump is within the slump tolerance noted on the mix design submittal form for that class of concrete.
- c. Air Entrainment: Air entrainment tests (ASTM C 231 or C 173, C 173 only for lightweight concrete) shall be made at the same time slump tests are made as cited above. Samples for air entrainment tests shall be taken at the point of placement.

- d. Concrete Temperature: Concrete temperature at placement shall be measured (ASTM C 1064) at the same time slump tests are made as cited above.
- e. Floor Flatness and Levelness Measuring:
  - 1) The Testing Laboratory shall measure the floor for flatness and levelness according to ASTM E 1155.
  - 2) Measurement of the finished concrete surface profile for any test section shall be made when requested by the Representative at his option. Notwithstanding, measurements shall be made within 24 hours after completion of finishing operations. For structural elevated floors measurement shall also be made prior to removal of forms and shores. The Contractor shall be notified immediately after the measurements of any section are complete and a written report of the floor measurement results shall be submitted within 72 hours after finishing operations are complete.
  - 3) The concrete surface profile shall be measured using equipment manufactured for the purpose such as a Dipstick Floor Profiler as manufactured by the Edward W. Face Company in Norfolk, Virginia, F-Meters manufactured by Allen Face & Company in Norfolk, Virginia, optical, or laser means or other method specified in ASTM E 1155.
  - 4) Each floor test section and the overall floor area shall conform to the two- tiered measurement standard as specified herein.
    - (a) Minimum Local Value (MLV). The minimum local FF/FL values represent the absolute minimum surface profile that will be acceptable in any one floor test section.
    - (b) Specified Overall Value (SOV). The specified overall FF/FL values represent the minimum values acceptable for all combined floor test sections representing the overall floor.
  - 5) For purposes of this specification a floor test section is defined as the smaller of the following areas:
    - (a) The area bounded by column and/or wall lines.
    - (b) The area bounded by construction and/or control joint lines.
    - (c) Any combination of column lines and/or control joint lines.
    - (d) Test sample measurement lines within each test section shall be multidirectional along two orthogonal lines as defined by ASTM E 1155.
    - (e) The precise layout of each test section shall be determined by the Testing Laboratory and shall be submitted for Architect/Engineer review and approval.
- f. Testing of Concrete Floor Slabs for Acceptability to Receive an Adhesive-Applied, Low-Permeable Floor Covering:
  - 1) The following tests shall be performed by the Testing Laboratory as a part of quality assurance testing to insure that the proper moisture condition and alkalinity of the substrate has been achieved prior to installing adhesive- applied, low-permeability floor coverings such as vinyl composition tile (VCT), linoleum, sheet vinyl, vinyl-backed carpet, rubber, athletic flooring, synthetic turf, wood, acrylic terrazzo, thin-set tile, epoxy overlays and adhesives, waterproofing, et.al.
    - (a) Moisture Vapor Emission Rate: Perform testing according to ASTM F 1869 to determine if the moisture emission rate from the floor is below the flooring manufacturer's maximum recommended value but not greater than five pounds per 1,000 square feet per 24 hours.
    - (b) Relative Humidity Determination Test: As an alternate to the Moisture Vapor Emission Rate Test, and if agreed to by the Contractor, Architect and Owner, perform testing according to ASTM F 2170 to determine if the relative humidity of the concrete slab is below the flooring manufacturer's maximum recommended value but not greater than 75%.
    - (c) Alkalinity Testing: Perform testing in accordance with ASTM F 710, Paragraph 5.3, to determine if the pH level of the concrete slab surface is

below the flooring manufacturer's maximum recommended value but not greater than 10. Perform one test per 1,000 square feet with a minimum of three tests within the total area being tested.

4. Evaluation and Acceptance of Concrete:
  - a. Strength Test: A strength test shall be defined as the average strength of two six inch cylinder breaks or three four inch cylinder breaks from each set of cylinders tested at the time indicated above.
  - b. Quality Control Charts and Logs: The Testing Laboratory shall keep the following quality control logs and charts for each class of concrete containing more than 2,000 cubic yards. The records shall be kept for each batch plant and submitted on a weekly basis with cylinder test reports:
    - 1) Number of strength tests made to date.
    - 2) Strength test results containing the average of all strength tests to date, the high test result, the low test result, the standard deviation, and the coefficient of variation.
    - 3) Number of tests under specified strength.
    - 4) A histogram plotting the number of strength test cylinders versus compressive strength.
    - 5) Quality control chart plotting compressive strength test results for each test.
    - 6) Quality control chart plotting moving average for strength where each point plotted is the average strength of three previous test results.
    - 7) Quality control chart plotting moving average for range where each point plotted is the average of 10 previous ranges.
  - c. Acceptance Criteria: The strength level of an individual class of concrete shall be considered satisfactory if both of the following requirements are met:
    - 1) The average of all sets of three consecutive strength tests equal or exceed the required  $f'_c$ .
    - 2) No individual strength test falls below the required  $f'_c$  by more than the greater of 10% of  $f'_c$  or 500 PSI.
  - d. If either of the above Acceptance Criteria requirements is not met, the Testing Laboratory shall immediately notify the Engineer by telephone. Steps shall immediately be taken to increase the average of subsequent strength tests.
- D. Field Inspection: The scope of the work to be performed by the inspector on the jobsite shall be as follows:
  1. Before Concrete Placement:
    - a. Inspect concrete formwork per Article 3.2.
    - b. Inspect concrete reinforcing per Article 3.3.
    - c. Inspect bolts and rods to be embedded in concrete for proper grade, size, length, and embedment.
    - d. For slabs-on-grade, verify that the moisture retarder is provided, is lapped properly, and is not torn or punctured.
    - e. Verify that there is no standing water in pour area and that all debris has been removed from the area and from the formwork.
    - f. Verify that openings and sleeves in slabs or walls are correct size and location. Verify that the openings are shown on the structural drawings and notify the Engineer immediately of any openings in the field that are not shown on the drawings.
    - g. Verify that horizontal and vertical sleeves through girders, beams, or joists have been approved by the Engineer and that approved reinforcement is provided.
    - h. Verify the tops of previously poured columns and/or walls are 1/2 inch below the deck soffit.
  2. During Concrete Placement: Provide continuous monitoring to:
    - a. Upon arrival of concrete, inspect the concrete to verify that the proper concrete mix number, type of concrete, concrete strength is being placed at the proper location. Verify that the mix meets the project specifications and is not over 90 minutes old at



- the time of placement. Report concrete not meeting the specified requirements and immediately notify the Contractor, Batch Plant Inspector, Architect, Engineer, and Owner.
- b. Inspect plastic concrete upon arrival at the jobsite to verify proper batching. Observe mix consistency and adding of water as required to achieve target slumps in mix designs. The responsibility for adding water to trucks at the job site shall rest only with the Contractor's designated representative. The Contractor is responsible that all concrete placed in the field is in conformance to the Contract Documents.
  - c. Verify that the Contractor is following appropriate Hot Weather or Cold Weather concreting practices consistent with any extreme environmental conditions at the point of placement in the structure.
  - d. Verify that concrete deposited is uniform and that vertical drop does not exceed six feet and is not permitted to drop freely over reinforcement causing segregation.
  - e. Verify that the formwork has remained stable during the concreting operation.
  - f. Verify that there are no cold joints.
  - g. Verify that the concrete is properly vibrated.
  - h. Inspect bolts embedded in concrete during concrete placement for verification that they have been properly installed to the specified embedment.
  - i. Verify that the finishing of the concrete surface is done according to specifications.
  - j. The Testing Laboratory shall report any irregularities that occur in the concrete at the job site or test results to the Contractor, Architect, Owner, and Engineer.
3. After Concrete Placement:
- a. Verify that the curing process is according to Specifications and that any curing compound used is applied in accordance with the manufacturer's recommendations.
  - b. Verify that sawcut control joints in slab-on-grades are cut within 12 hours of placement.
  - c. Post-Installed Anchors in Concrete: Provide inspection of post-installed anchor installations at the frequency noted in the specifications and in accordance with the published, currently valid, Evaluation Service Report (ESR) for each anchor product. Post-installed anchors include anchors and reinforcing steel. Inspection of post-installed anchors shall include but not be limited to the following:
    - 1) Periodic Inspection: Verify initial installation of post-installed anchors in concrete for each individual installer with each individual anchor product in accordance with the requirements stated below for each type of anchor. Periodically inspect anchor installation after the initial verification.
    - 2) Continuous Inspection: Verify each installation of post-installed anchors in concrete in accordance with the requirements stated below for each type of anchor.
    - 3) All Post-Installed Anchors: Verify that the anchor is installed in accordance with manufacturer's printed installation instructions as well as the following design requirements.
      - (a) Concrete type, concrete strength and concrete thickness are in accordance with design drawings.
      - (b) Anchor manufacturer and product, including material, is in accordance with design drawings or approved substitution.
      - (c) Anchor diameter, length and installed embedment depth.
      - (d) Drill bit type and diameter.
      - (e) Anchor edge distance and spacing.
      - (f) Hole diameter and depth.
      - (g) Hole cleaning procedure and cleanliness.
      - (h) Anchor maximum tightening torque.
4. Adhesive Anchors: In addition to the requirements for All Post-Installed Anchors, verify adhesive identification and expiration date.

- a. The installation of all adhesive anchors shall be continuously inspected when anchors are subject to sustained tension loads, such as anchors for shelf angles, or when anchors are installed in an upwardly inclined condition.
- E. Causes for Rejection of Concrete: The Contractor shall reject concrete delivered to the site for any of the following reasons:
  - 1. Wrong class of concrete (incorrect mix design number).
  - 2. Environmental Conditions: Environmental condition limits shall be as follows unless appropriate provisions in concreting practices have been made for cold or hot weather:
    - a. Cold Weather: Air temperature must be 40°F and rising or the average daily temperature cannot have been lower than 40°F for 3 consecutive days unless the temperature rose above 50°F for at least one-half of any of those 24 hour periods.
    - b. Hot Weather: Environmental conditions must be such that cause an evaporation rate from the concrete surface of 0.2 lb./sq. ft./hr. or less as determined by Figure 2.1.5 in ACI 305R-91.
  - 3. Concrete may be placed at other environmental condition ranges only with approval of the job inspector for the Testing Laboratory or other duly appointed representative.
  - 4. Concrete with temperatures exceeding 95°F shall not be placed in the structure.
  - 5. Air contents outside the limits specified in the mix designs.
  - 6. Slumps outside the limits specified.
  - 7. Excessive Age: Concrete shall be discharged within 90 minutes of plant departure or before it begins to set if sooner than 90 minutes unless approved by the Laboratory job inspector or other duly appointed representative.
- F. Concrete Batch Trip Tickets: Concrete batch trip tickets shall be collected and retained by the Contractor. Compressive strength, slump, air, and temperature tests shall be identified by reference to a particular trip ticket. Tickets shall contain the information specified in ASTM C 94. Each ticket shall also show the amount of water that may be added in the field for the entire batch that will not exceed the specified water cement ratio for the design mix. The Contractor and Testing Laboratory shall immediately notify the Architect/Engineer and each other of tickets not meeting the criteria specified.
- G. Field Inspection:
  - 1. Provide continuous inspection of shotcrete placement operations for proper application techniques and adherence to specification requirements.
- H. Reporting:
  - 1. Provide a daily written report of the day's activities including the disposition of any discrepancies in procedure or materials brought to the attention of the Contractor. Contact the Engineer and Architect by telephone and in writing in the event any reported discrepancy is not satisfactorily resolved.

### **3.05 STRUCTURAL STEEL**

- A. Scope of Work:
  - 1. Contract Obligations:
    - a. Owner Responsibility: The Owner shall pay for initial shop and field inspections and tests as required during the fabrication and erection of the structural steel.
    - b. Testing Laboratory Responsibility: The inspection by the Testing Laboratory of the Fabricator's work shall be in sequence, timely, and performed in such a manner so that corrections can be made without delaying the progress of the work. Inspections shall be performed by qualified technicians with a minimum of two years of experience in structural steel testing and inspection. Refer to Paragraph 1.9B.4 for special requirements for welding inspectors. The Testing Laboratory shall provide test reports of inspections. All test reports shall indicate types and locations of defects found during inspection, the measures required and performed to correct such defects, statements of final approval of welding and bolting of shop and field connections, and other fabrication and erection data pertinent to the safe and proper welding and bolting of shop and field connections. Weld inspection reports shall be

- signed by an inspector with current certification as an AWS Certified Welding Inspector (CWI). In addition to the parties listed in this Specification the Fabricator and Erector shall receive copies of the test reports.
- c. Rejection of Material or Workmanship: The Owner, Architect, Engineer, and Testing Laboratory reserve the right to reject any material or workmanship not in conformance with the Contract Documents at any time during the progress of the work. However, this provision does not allow waiving the obligation for timely, in sequence inspections.
- B. Quality Assurance:
1. Verify that the fabricator's fabrication and quality control procedures provide a sound basis for inspection control of workmanship and of the ability to conform to construction documents and industry standards. Review the procedures for completeness and adequacy relative to code requirements for the fabricator's finished product.
  2. Review field welder qualifications by certification or verify by retesting. Obtain welder certificates.
- C. Field Testing: The Testing Laboratory shall provide the following tests in the field:
1. Test welds completed in the field according to Paragraph E "Weld Testing:" below.
  2. Test bolted connections completed in the field according to Paragraph I "High-Strength Bolt Testing."
  3. Perform bend tests on completed shear connectors attached to beams as required according to procedures outlined in AWS D1.1. In addition, perform field bend tests on an additional 2% of completed shear connectors on each beam but not less than one connector per beam.
  4. Testing of Non-Shrink Grout for Base Plates, Bearing Plates, and Precast Wall Panels:
    - a. Compressive Strength Tests: Compressive strength of grout shall be determined by testing grout cubes according to the requirements of ASTM C 109 - Modified. Test one set of three cubes at one day, and one set of three cubes at 28 days.
    - b. Frequency of Testing: One set of cubes (6 cubes) shall be made for every ten base plates and bearing plates or fraction thereof but not less than one set for each day's operation. One set of cubes shall be made for each day's operation of grouting wall panels.
- D. Field Inspection: The Testing Laboratory shall provide the following inspections in the field:
1. Inspect galvanized HSS and other cold-worked structural steel members for cracking or other damage resulting from galvanizing process. Endeavor to complete inspections prior to erection of these members. Immediately notify Contractor and Architect/Engineer of any irregularities discovered.
  2. Provide continuous or periodic monitoring of field welding as described below in Paragraph O "Weld Inspection and Process Monitoring."
  3. Provide continuous or periodic monitoring of field bolting as described below in Paragraph F "High-Strength Bolt Inspection and Process Monitoring" of high-strength bolt installation in pre-tensioned or slip-critical joints using turn-of-the-nut without matchmarking or calibrated wrench method of bolt installation.
  4. Inspect welded or bolted connections that were completed, but not inspected, in the shop. Perform inspections according to Paragraph O "Weld Inspection and Process Monitoring" and/or Paragraph F "High-Strength Bolt Inspection and Process Monitoring" as appropriate.
  5. Obtain the planned erection procedure, and review with the Erector's supervisory personnel.
  6. Check the installation of base plates for proper leveling, grout type, and grout application.
  7. Check structural steel as received in the field for possible shipping damage, workmanship, and identification marking to conform to AISC 360 for structural steel and specified ASTM standards for other steel.
  8. Verify that surveys are occurring as specified to check plumbness and frame alignment as erection progresses. Review the submitted survey report.

9. Periodically inspect the steel frame for such items as bracing and stiffening details, member locations, and joint details at each connection for compliance with approved construction documents.
  10. Inspect 100% of the column compression and base joints for verification that gaps in contact bearing do not exceed 1/16 inch. Gaps greater than 1/16 inch but less than ¼ inch shall be reported to the Owner and Engineer for assessment. All gaps greater than 1/4 inch shall be shimmed according to Specification 05 12 00 "Structural Steel Framing."
  11. Endeavor to guard the Owner against the Contractor cutting, grinding, reaming, or making any other field modification to structural steel without the prior approval of the Engineer. Report any noted unauthorized modifications to the Owner and Engineer.
  12. Approve Welding Procedure Specifications submitted by the Contractor. Approve any changes submitted by the Contractor to any WPS that has already been approved. Obtain the Welding Procedure Qualification Record (WPQR) for each successful WPS qualification.
  13. Periodically verify welding electrodes to be used and other welding consumables as the job progresses.
  14. Periodically observe joint preparation, assembly practice, welding techniques including preheating and sequence, and the performance of welders with sufficient frequency to assure compliance with code and contract document requirements. Check preheating to assure conformance with AWS D1.1, Section 5.6. Verify procedure for control of distortion and shrinkage stresses.
  15. Continuously observe joint preparation and fit up, backing strips, and runout plates for welded moment connections and column splices.
  16. Periodically provide visual inspection of the root pass of partial and complete joint penetration welds.
  17. Visually inspect 100 % of welds for proper size, length, location, and weld quality in accordance with AWS D1.1 requirements. Unless specifically noted otherwise, all welding shall be considered statically loaded nontubular connections.
  18. Visually inspect 100% of completed shear connectors on each beam.
  19. Visually inspect 100% of the welds of anchors to embedded plates that are to be cast into concrete elements.
  20. In addition to the inspections above, perform the following:
    - a. Continuously monitor and observe joint preparation, assembly practice, welding techniques including preheating and sequence, and the performance of welders for 100% of complete and partial joint penetration welds, plug and slot welds, multiple-pass fillet welds, and single-pass fillet welds greater than 5/16 inch. Check preheating to assure conformance with AWS D1.1, Section 5.6. Verify procedure for control of distortion and shrinkage stresses.
    - b. Periodically monitor welding of single-pass fillet welds that are less than or equal to 5/16 inch.
    - c. Periodically monitor the welding of headed studs to floor beams.
    - d. Periodically monitor the welding of anchors to embedded plates that are to be cast into concrete elements.
- E. Weld Testing:
1. Perform nondestructive examination services using a qualified technician with the necessary equipment to perform the following:
    - a. Nondestructive examination conducted in accordance with the specific requirements for the item being examined including radiographic (RT), ultrasonic (UT), magnetic particle (MT), or dye-penetrant inspection (PT). Nondestructive inspection procedures shall conform to AWS D1.1.
    - b. Interpret, record, and report results of the nondestructive tests.
    - c. Mark for repair, any area not meeting Specification requirements. Correction of rejected welds shall be made in accordance with AWS D1.1.