

***Egyptian Theatre
Phase 1 Improvements
City of Coos Bay, Oregon***

***Project Specifications
100% Construction Documents***

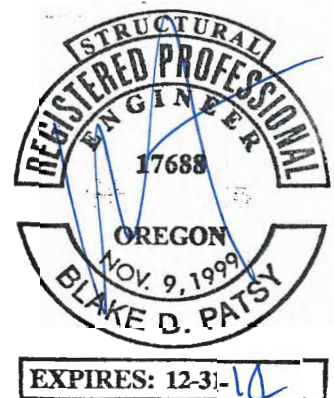
KPFF Project No. 212024
March 29, 2013

Submitted to:

City of Coos Bay
500 Central Avenue
Coos Bay, OR 97420

Submitted by:

KPFF Consulting Engineers
111 SW Fifth Avenue, Suite 2500
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PROJECT Egyptian Theatre Phase 1 Improvements
City of Coos Bay, Oregon

STRUCTURAL ENGINEER

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SECTIONS

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SHN Consulting Engineers & Geologists, Inc., Geotechnical Report, dated
December 3, 2012

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Work restrictions.
5. Specification and drawing conventions.
6. Miscellaneous provisions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.2 PROJECT INFORMATION

A. Project Identification: Egyptian Theatre Phase 1 Improvements.

1. Project Location: 229 South Broadway, Coos Bay, Oregon 97420.

B. Owner: City of Coos Bay; 500 Central Ave. Coos Bay, Oregon 97420.

1. Owner's Representative: Rob Van Dyke, S.E. KPFF Consulting Engineers 111 SW 5th Avenue, Suite 2500, Portland, Oregon 97204. 503-764-0545

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Strengthening of mezzanine lobby floor
2. Micropile, foundations, and steel framing installation at west exterior wall.
3. Strengthening of roof members.

B. Type of Contract.

1. Project will be constructed under a single prime contract.

1.4 ACCESS TO SITE

- A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Limits: Limit site disturbance, including sidewalk patching, to 6 feet (12.2 m) beyond building perimeter.
 - 2. Driveways, Walkways and Entrances: Keep entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.5 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 8:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
 - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to adjacent occupied properties with Owner.
 - 1. Notify Owner not less than two days in advance of proposed disruptive operations.
 - 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor-air intakes.

- F. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

1.6 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
 - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use **CSI Form 13.1A**.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

- h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from **ICC-ES**.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
- 3. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Engineer will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Engineer does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
 - 1. Conditions: Engineer will consider Contractor's request for substitution when the following conditions are satisfied:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.

- b. Requested substitution will not adversely affect Contractor's construction schedule.
 - c. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - d. Requested substitution is compatible with other portions of the Work.
 - e. Requested substitution has been coordinated with other portions of the Work.
 - f. Requested substitution provides specified warranty.
 - g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Engineer will consider requests for substitution if received within 30] days after the Notice to Proceed.
1. Conditions: Engineer will consider Contractor's request for substitution when the following conditions are satisfied:
- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Engineer for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Requested substitution will not adversely affect Contractor's construction schedule.
 - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution has been coordinated with other portions of the Work.
 - h. Requested substitution provides specified warranty.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.2 MINOR CHANGES IN THE WORK

- A. Engineer will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Engineer will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Engineer are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use forms acceptable to Engineer.
- B. Contractor-Initiated Work Change Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Engineer.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Work Change Proposal Request Form: Use form acceptable to Engineer.

1.4 CHANGE ORDER PROCEDURES

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

1.5 CONSTRUCTION CHANGE DIRECTIVE

- A. Work Change Directive: Engineer may issue a Work Change Directive on AIA Document G714 Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.
 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
 - 1. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

1.2 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Engineer at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Engineer.
 - c. Engineer's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Arrange schedule of values consistent with format of AIA Document G703 .
 - 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
 - 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
9. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Work Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Engineer and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit Application for Payment to Engineer by the 17th of the month. The period covered by each Application for Payment is one month, ending on the 30th.
- D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703as form for Applications for Payment.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Engineer will return incomplete applications without action.
 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 2. Include amounts of Change Orders and Work Change Directives issued before last day of construction period covered by application.
- F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Engineer by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Schedule of unit prices.
 5. Submittal schedule (preliminary if not final).
 6. List of Contractor's staff assignments.
 7. List of Contractor's principal consultants.
 8. Copies of building permits.
 9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 10. Initial progress report.
 11. Report of preconstruction conference.
 12. Certificates of insurance and insurance policies.
- I. Application for Payment at Substantial Completion: After Engineer issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."

6. AIA Document G707-1994, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Requests for Information (RFIs).
 - 2. Project meetings.
- B. Related Requirements:
 - 1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.2 DEFINITIONS

- A. RFI: Request from Owner, Engineer, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.

- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's construction schedule.
 - 2. Preparation of the schedule of values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Preinstallation conferences.
 - 7. Project closeout activities.

1.5 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 - 1. Engineer will return RFIs submitted to Engineer by other entities controlled by Contractor with no response.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 - 1. Project name.
 - 2. Project number.
 - 3. Date.
 - 4. Name of Contractor.
 - 5. Name of Engineer.
 - 6. RFI number, numbered sequentially.
 - 7. RFI subject.
 - 8. Specification Section number and title and related paragraphs, as appropriate.
 - 9. Drawing number and detail references, as appropriate.
 - 10. Field dimensions and conditions, as appropriate.
 - 11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 - 12. Contractor's signature.
 - 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Engineer.
- D. Engineer's Action: Engineer will review each RFI, determine action required, and respond. Allow seven working days for Engineer's response for each RFI. RFIs received by Engineer after 1:00 p.m. will be considered as received the following working day.
 - 1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Engineer's actions on submittals.
 - f. Incomplete RFIs or inaccurately prepared RFIs.
 - 2. Engineer's action may include a request for additional information, in which case Engineer's time for response will date from time of receipt of additional information.
 - 3. Engineer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:
 - 1. Project name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Engineer.
 - 4. RFI number including RFIs that were dropped and not submitted.
 - 5. RFI description.
 - 6. Date the RFI was submitted.
 - 7. Date Engineer's response was received.
- F. On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Engineer within seven days if Contractor disagrees with response.
 - 1. Identification of related Minor Change in the Work, Work Change Directive, and Proposal Request, as appropriate.
 - 2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Engineer of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Engineer, within three days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Engineer, but no later than **15** days after execution of the Agreement.
 - 1. Attendees: Authorized representatives of Owner and Engineer; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Critical work sequencing and long-lead items.
 - c. Designation of key personnel and their duties.
 - d. Procedures for processing field decisions and Change Orders.
 - e. Procedures for RFIs.
 - f. Procedures for testing and inspecting.
 - g. Procedures for processing Applications for Payment.
 - h. Distribution of the Contract Documents.
 - i. Submittal procedures.
 - j. Use of the premises and existing building.
 - k. Work restrictions.
 - l. Working hours.
 - m. Responsibility for temporary facilities and controls.
 - n. Procedures for moisture and mold control.
 - o. Procedures for disruptions and shutdowns.
 - p. Construction waste management and recycling.
 - q. Parking availability.
 - r. Office, work, and storage areas.
 - s. First aid.
 - t. Security.
 - u. Progress cleaning.
 - 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action.
- B. Informational Submittals: Written and graphic information and physical samples that do not require Engineer's responsive action. Submittals may be rejected for not complying with requirements.

1.3 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Engineer and additional time for handling and reviewing submittals required by those corrections.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 7 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 7days for review of each resubmittal.
- C. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.
 3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Engineer.
 - d. Name of Contractor.
 - e. Name of subcontractor.
 - f. Name of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
- i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
 - a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Engineer.
5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will return without review submittals received from sources other than Contractor.
 - a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
 - 1) Project name.
 - 2) Date.
 - 3) Destination (To:).

- 4) Source (From:).
- 5) Name and address of Engineer.
- 6) Name of Construction Manager.
- 7) Name of Contractor.
- 8) Name of firm or entity that prepared submittal.
- 9) Names of subcontractor, manufacturer, and supplier.
- 10) Category and type of submittal.
- 11) Submittal purpose and description.
- 12) Specification Section number and title.
- 13) Specification paragraph number or drawing designation and generic name for each of multiple items.
- 14) Drawing number and detail references, as appropriate.
- 15) Indication of full or partial submittal.
- 16) Transmittal number.
- 17) Submittal and transmittal distribution record.
- 18) Remarks.
- 19) Signature of transmitter.

D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Engineer.
4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Engineer.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of firm or entity that prepared submittal.
 - g. Names of subcontractor, manufacturer, and supplier.
 - h. Category and type of submittal.
 - i. Submittal purpose and description.
 - j. Specification Section number and title.
 - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - l. Drawing number and detail references, as appropriate.
 - m. Location(s) where product is to be installed, as appropriate.
 - n. Related physical samples submitted directly.

- o. Indication of full or partial submittal.
 - p. Transmittal number.
 - q. Submittal and transmittal distribution record.
 - r. Other necessary identification.
 - s. Remarks.
- E. Options: Identify options requiring selection by Engineer.
- F. Deviations: Identify deviations from the Contract Documents on submittals.
- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Engineer's action stamp.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Engineer's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements:
 - 1. Submit electronic submittals via email as PDF electronic files.
 - a. Engineer will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Engineer will return two copies.
 - 3. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Engineer will not return copies.
 - 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. Submit Product Data before or concurrent with Samples.
 5. Submit Product Data in the following format:
 - a. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 30 by 42 inches (750 by 1067 mm).
 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:

- a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.
- E. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures.
- F. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."
- G. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."
- H. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- I. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- J. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- K. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

- L. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- M. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- N. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- O. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- P. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.
- Q. Schedule of Tests and Inspections: Comply with requirements specified in Section 014000 "Quality Requirements."
- R. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- S. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- T. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- U. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

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

- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ENGINEER'S ACTION

- A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or revisions required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- C. Informational Submittals: Engineer will review each submittal and will not return it, or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to Engineer, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.3 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.
- C. Site Plan: Indicating staging and parking areas.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel

pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide galvanized-steel bases for supporting posts.

2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from

adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

- E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- F. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
 - 1. Connect temporary service to Owner's existing power source, as directed by Owner.
- G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, and inspections.
- H. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- I. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- J. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Temporary Signs: Provide construction sign at front entrance of the theatre to inform public and individuals seeking entrance to Project.
- K. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."
- L. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- M. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
 - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.
- N. Staging: Staging as allowed at east side of theater.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
- D. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- F. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- H. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.4 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - 2. Keep interior spaces reasonably clean and protected from water damage.
 - 3. Discard or replace water-damaged and wet material.
 - 4. Discard, replace, or clean stored or installed material that begins to grow mold.
 - 5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - 2. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Progress cleaning.
 - 6. Protection of installed construction.
 - 7. Correction of the Work.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for limits on use of Project site.
 - 2. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.2 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Engineer of locations and details of cutting and await directions from Engineer before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 - 3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Engineer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, timber piles and other construction affecting the Work.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Engineer according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

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

3.4 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 CUTTING AND PATCHING

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

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Proceed with patching after construction operations requiring cutting are complete.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 1. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 2. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 3. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 4. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.

1.2 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 2. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 - 2.
 3. Perform preventive maintenance on equipment used prior to Substantial Completion.
 4. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 5. Complete final cleaning requirements, including touchup painting.
 6. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Engineer, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

- A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 1. Organize list of spaces in sequential order, proceeding from lowest floor to highest floor.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Submit list of incomplete items in the following format:
 - a. PDF electronic file. Engineer will return annotated copy.

1.8 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Engineer for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 1. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 3. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site in areas disturbed by construction activities, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - d. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - e. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - f. Sweep concrete floors broom clean in unoccupied spaces.
 - g. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - h. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - i. Remove labels that are not permanent.
 - j. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - k. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - l. Leave Project clean and ready for occupancy.

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired.

Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 024119 – SELECTIVE BUILDING DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of structures.

B. Related Sections include the following:

1. Division 1 Section "Construction Facilities and Temporary Controls" for temporary construction and environmental-protection measures.

1.2 DEFINITIONS

A. Remove:

1. Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Reinstall:

1. Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

C. Existing to Remain:

1. Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 MATERIALS OWNERSHIP

A. Historic items, relics, and objects of interest or value to Owner that may be encountered during selective demolition remain Owner's property.

1. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner's Authorized Representative.

1.4 SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.

2. Interruption of utility services, including how long utility services will be interrupted.
3. Use of existing stairs.
4. Locations of proposed dust-and noise-control devices, and temporary means of egress.
5. Means of protection for items to remain and items in path of waste removal from structures.

B. Inventory:

1. Include for each item the location for its reinstallation.

C. Predemolition Visual Records:

1. If requested by Owner's Representative at Predemolition Conference, provide predemolition visual record as follows:
 - a. Show existing conditions of adjoining construction and site improvements, including finished surfaces that might be misconstrued as damage caused by selective demolition operations.
 - b. Submit before Work begins.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with:
 - a. Governing EPA notification regulations before beginning selective demolition.
 - b. Hauling and disposal regulations of authorities having jurisdiction.

B. Predemolition Conference:

1. Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
2. Review:
 - a. Requirements of work performed by other trades that rely on substrates exposed by selective demolition.
 - b. Areas where existing construction is to remain and requires protection.

1.6 PROJECT CONDITIONS

- A. Notify Engineer and Owner's Authorized Representative of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

B. Hazardous Materials:

1. It is unknown if hazardous materials will be encountered in the Work.
2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Owner's Representative.
3. Hazardous material will be removed by the owner under a separate contract.

C. Storage or sale of removed items or materials on-site is not permitted.

D. Utility Service:

1. Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
2. Maintain fire-protection facilities in service during selective demolition operations.

1.7 WARRANTY

A. Existing Warranties:

1. Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled, and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered:
 1. Investigate and measure the nature and extent of conflict.
 2. Promptly submit a written report to Owner's Authorized Representative.
- E. Survey of Existing Conditions:

1. Record existing conditions by use of preconstruction visual records indicated in Article 1.4 C above.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems:

1. Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
2. Comply with requirements for existing services/systems interruptions specified in Division 1 Sections:
 - a. "Summary."
 - b. "Temporary Facilities and Controls."

B. Service/System Requirements:

1. Locate, identify, disconnect, and protect indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
2. Arrange to shut off indicated utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition:
 - a. Provide temporary services/systems that bypass area of selective demolition.
 - b. Maintain continuity of services/systems to other parts of structure.
 - c. Identify items to be salvaged and reinstalled.

3.3 PREPARATION

A. Temporary Facilities:

1. Provide temporary protection to prevent injury to people and damage to adjacent facilities to remain.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 1 Section "Temporary Facilities and Controls."

B. Temporary Shoring:

1. Provide and maintain structural supports required to:
 - a. Preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain.
 - b. Prevent unexpected or uncontrolled movement or collapse of construction being demolished.
2. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General:

1. Demolish and remove existing construction only to the extent required by new construction and as indicated.
2. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - a. Complete selective demolition operations above each floor before disturbing supporting members on the next lower level.
 - b. Neatly cut openings and holes plumb, square, and true to dimensions required.
 - c. Use cutting methods least likely to damage construction to remain, or adjoining construction.
 - d. Temporarily cover openings to remain.
 - e. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - f. Do not use cutting torches.
 - g. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - h. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - i. Do not impose excessive loads on supporting walls, floors, or framing.
 - j. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning.
 - a. Identify contents of containers.
3. Provide secure storage for items removed for salvage and reinstallation.
4. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition.
2. Pack or crate items after cleaning and repairing.
 - a. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in their original locations as noted in visual records and written inventory specified in This Section.
 - a. Comply with installation requirements for new materials and equipment.
 - b. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain:

1. Protect construction indicated to remain against damage and soiling during selective demolition.
2. When permitted by Engineer, items may be removed to a suitable, protected storage location during selective demolition, and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete:

1. Demolish in small sections.
2. Cut concrete at junctures with construction to remain, using power-driven saw.
3. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition.
4. Neatly trim openings to dimensions indicated.

B. Masonry:

1. Demolish in small sections.
2. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

C. Roofing:

1. Remove no more existing roofing than can be covered in one day by new roofing.
2. Maintain building interiors watertight and weathertight.
3. See Division 7 sections specifying new roofing for substrate requirements.
4. Remove existing flashings, copings, and roof accessories.
5. Remove existing roofing system down to substrate.

D. Interior Finish Materials:

1. Should hazardous materials be encountered during demolition operations, cease work in the area where such materials are found and immediately notify the Owner in writing.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General:

1. Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
2. Do not allow demolished materials to accumulate on-site.
3. Remove and transport debris in a manner that will prevent spillage.
4. Remove debris from elevated portions of structure to convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

- #### A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations.

- B. Return adjacent areas to condition existing before selective demolition operations began.

3.8 SELECTIVE DEMOLITION SCHEDULE

- A. Schedule of the following by Owner's Representative:

1. Existing Items to Be Removed.
 - a. Roofing and flashing, where indicated.
 - b. Wall and ceiling coverings within Area of Work not abated in place
 - c. Other items as directed by Engineer or Owner's Authorized Representative
2. Existing Items to Be Removed, Reconditioned, and Reinstalled.
 - a. Standing and running trim, including door frames, within Area of Work.
 - b. Wood base within Area of Work
 - c. Other items as directed by Engineer or Owner's Authorized Representative
3. Existing Items to Be Removed and Reinstalled.
 - a. Lights.
 - b. Wall-mounted equipment in usable condition.

END OF SECTION 024119

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes for the following:
 - 1. Footings.
 - 2. Foundation walls.
 - 3. Slabs-on-grade.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
 - 2. Include substantiating substantial test data to show compliance with ACI 318 Chapter 5.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement. The steel reinforcement detailer shall generate all shop drawing bending and installation details from the structural and architectural drawings and specifications. The use of reproductions or photocopies of the contract drawings shall not be permitted.
 - 1. Provide details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include special reinforcement required for openings through concrete structures.

2. Shop drawing re-submittals shall clearly identify all revisions to previous submittals.
 - a. Heavy ink clouded outlines (revision clouds) shall be drawn around revised areas of individual sheets.
 - b. Engineer will not review information outside of revision clouds on resubmitted drawings.
- D. Qualification Data: For testing agency.
 1. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.
- E. Material Certificates: For each of the following, signed by manufacturers:
 1. Cementitious materials
 2. Admixtures.
 3. Form materials and form-release agents.
 4. Steel reinforcement and accessories.
 5. Curing compounds.
 6. Floor and slab treatments.
 7. Bonding agents.
 8. Adhesives.
 9. Repair materials.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
 1. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician – Grade 1. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician – Grade II.
- B. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- C. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 1. ACI 301, "Specification for Structural "Concrete", Sections 1 through 5.
 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.7 SYSTEM DESCRIPTION

- A. Redesign or Departures from Requirements of the Contract Documents Initiated by Contractor:
 - 1. Obtain written acceptance from the Engineer.
 - 2. Bear costs for Contractor-initiated or construction error due to changes in type, form, system, or details of construction from those indicated by the contract documents.
 - 3. Costs of review of such changes by Engineer will be deducted from the Contract Sum by Change Order.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 - 2. Products: Subject to compliance with requirements, provide one of the products specified.
 - 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to manufacturers specified.
 - 4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. Structural 1, B-B, or better, mill oiled and edge sealed.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

- C. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: Refer to General Structural Notes.
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 60 percent.

2.4 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice" of greater compressive strength than concrete, and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.5 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I or II.
 - a. Fly Ash: ASTM C 618, Class C or F.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Silica Fume: ASTM C 1240, amorphous silica.
- C. Normal-Weight Aggregate: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm), 1 inch (25 mm), 1-1/2 inches (38 mm).
- D. Water: ASTM C 94/C94-M [and potable].

2.6 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.

- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- C. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
1. Products:
 - a. BASF Construction Chemicals - Building Systems; Rheocrete 222+.
 - b. Cortec Corporation; MCI [2000] [2005NS].
 - c. Grace Construction Products, W.R. Grace & Co.; DCI-S.
 - d. Sika Corporation; FerroGard-901.

2.7 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
1. Products:
 - a. Axim Concrete Technologies; Cimfilm.
 - b. BASF Construction Chemicals - Building Systems; Confilm.
 - c. Burke by Edoco; BurkeFilm
 - d. ChemMasters; Spray-Film
 - e. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Aquafilm.
 - f. Dayton Superior Corporation; Sure Film.
 - g. Euclid Chemical Company (the); Eucobar.
 - h. Kaufman Products, Inc.; Vapor Aid.
 - i. Lambert Corporation; Lambco Skin.
 - j. L&M Construction Chemicals, Inc.; E-Con.
 - k. MBT Protection and Repair, Div. of ChemRex; Confilm.
 - l. Meadows, W.R., Inc.; Sealtight Evapre.
 - m. Metalcrete Industries; Waterhold.
 - n. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
 - o. Sika Corporation, Inc.; SikaFilm.
 - p. Symons Corporation, a Dayton Superior Company; Finishing Aid.
 - q. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.
 - r. Unitex; Pro-Film.
 - s. Vexcon Chemicals, Inc.; Certi-Vex EnvioAssist.

- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 309, Type 1, Class B, dissipating.
 - 1. Products:
 - a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
 - b. BASF Construction Chemicals - Building Systems; Kure 200.
 - c. ChemMasters; Safe-Cure Clear.
 - d. Conspec by Dayton Superior; W.B. Resin Cure.
 - e. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
 - f. Edoco by Dayton Superior; Res X Cure WB.
 - g. Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.
 - h. Kaufman Products, Inc.; Thinfilm 420.
 - i. Lambert Corporation; AQUA KURE - CLEAR.
 - j. L&M Construction Chemicals, Inc.; L&M Cure R.
 - k. Meadows, W. R., Inc.; 1100-CLEAR.
 - l. Nox-Crete Products Group; Resin Cure E.
 - m. Right Pointe; Clear Water Resin.
 - n. SpecChem, LLC; Spec Rez Clear.
 - o. Symons by Dayton Superior; Resi-Chem Clear.
 - p. TK Products, Division of Sierra Corporation; TK-2519 DC WB.
 - q. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.

2.8 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class, suitable for application temperature and grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.9 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 and in accordance with the following:
1. Compressive Strength: Refer to General Structural Notes.
 2. Maximum Water-Cementitious Materials Ratio: Refer to General Structural Notes.
 3. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having the air content specified in the General Structural Notes.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
1. Fly Ash: 20 percent.
 2. Combined Fly Ash and Pozzolan: 20 percent.
 3. Ground Granulated Blast-Furnace Slag: 50 percent.
 4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 20 percent.
 5. Silica Fume: 10 percent.
 6. Combined Fly Ash, Pozzolans, and Silica Fume: 30 percent with fly ash or pozzolans not exceeding 20 percent and silica fume not exceeding 10 percent.
 7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent portland cement minimum, with fly ash or pozzolans not exceeding 20 percent and silica fume not exceeding 10 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing, high-range water-reducing or plasticizing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use corrosion-inhibiting admixture in concrete mixes for exterior exposed concrete.

2.10 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116, and furnish batch ticket information

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 1. Class C, 1/2 inch (13 mm) for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 1. Install keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete if concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by the Engineer.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated.
2. Use a bonding agent or roughen interface to 1/4" (6mm) amplitude at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement, unless approved by Engineer.
 1. Do not add water to concrete after adding high-range water-reducing admixtures to mix.
- C. Adjust mix as required to maintain specified air content at the point of discharge.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete.

3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.9 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

3.10 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.
- B. Formed Surfaces: Cure formed concrete surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- D. Cure concrete according to ACI 308.1 by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.11 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Engineer.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 5. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch (19 mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 6. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Engineer's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Engineer's approval.

3.12 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections: As indicated in the General Structural Notes.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 - 2. Testing Frequency: Obtain at least one composite sample for each 150 cu. yd. (114 cu. m) or fraction thereof of each concrete mix placed each day and at least one composite sample for each 5000 square feet of surface area of slabs or walls.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
 - 6. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - 7. Compressive-Strength Tests: ASTM C 39/C 39M; test one laboratory-cured specimen at 7 days, two at 28 days, and hold one for later testing.
 - a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 - 8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
 - 9. Test results shall be reported in writing to Structural Engineer, concrete manufacturer, Building Official, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, type of break for both 7- and 28-day tests, and air content.
 - 10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Engineer.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 033000

SECTION 051200 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Structural steel.
 - 2. Grout.
- B. Related Sections include the following:
 - 1. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Structural steel shop drawings shall contain sufficient detail and information to allow complete fabrication and erection of the structure without reference to the contract drawings either on the fabrication shop floor or at the project site. The steel detailer shall generate all shop drawing fabrication and installation details from the structural and architectural drawings and specifications. The use of reproductions or photocopies of the contract drawings shall not be permitted.
 - a. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - b. Include embedment drawings.
 - c. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
 - d. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
 - 2. Shop drawing re-submittals shall clearly identify all revisions to previous submittals.

- a. Heavy ink, clouded outlines (revision clouds) shall be drawn around revised areas of individual sheets.
 - b. Engineer will not review information outside of revision clouds on resubmitted drawings.
- C. Welding Certificates.
- D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Articles to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- F. Mill test reports for structural steel, including chemical and physical properties.
- G. Product Test Reports: Signed by manufacturers certifying that the following products comply with requirements:
 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 2. Tension-control, high-strength bolt-nut-washer assemblies.
 3. Shop primers.
 4. Nonshrink grout.
- H. Source quality-control test reports.
- I. Certified Manufacturer's Test Reports.
- J. Written Welding Procedure Specifications (WPSs): In accordance with AWS D1.1 requirements for each welded joint proposed for use whether prequalified or by testing. Include all welding that will be performed during fabrication (shop) and installation/erection (field) Include the following items as applicable for the welding process:
 1. Indicate as-detailed configuration, and the maximum and minimum fit-up configurations.
 2. Identify specific electrode and manufacturer.
 3. List actual values of welding parameters to be used so clear instruction is provided to welders.
 4. Steel specification(s) and grade(s) to be welded.
 5. Thickness range of materials to be joined.
 6. Type of joint.
 7. Type of weld.
 8. Size of weld.
 9. Position of welding.
 10. Flux and shielding gas.
 11. Electrode diameter.
 12. Voltage (except SMAW).
 13. Current (amperage) or wire feed speed.
 14. Travel speed.
 15. Minimum Preheat and Interpass Temperatures: Provide minimum preheat and interpass temperature for all welds, including tack welds, in accordance with AWS D1.1, Table

- 3.2. The Contractor may specify higher minimum temperatures as a part of the WPS. Preheat and interpass temperatures lower than those required by AWS D1.1, Table 3.2, are permitted provided the WPS has been qualified by testing. Minimum preheat and interpass temperatures shall be verified at a distance of 3 inches from the joint or for materials over 3 inches in thickness at a distance equal to the thickness of the part.
16. Maximum Preheat and Interpass Temperatures: The maximum preheat and interpass temperature permitted is 550 degrees F, measured at a distance of 1 inch from the joint. This maximum temperature may not be increased with or without qualification testing.
 17. Number and placement of passes.
 18. Technique (stringer or weave bead).
 19. Shielding gas flow rate.
 20. Other pertinent information specific to the weld.
- K. Procedure Qualification Record (PQR): In accordance with AWS D1.1 for all procedures qualified by testing.
- L. Manufacturer's Certifications: For all welding electrodes, fluxes, and shielding gasses to be used. Certifications shall satisfy the applicable AWS A5 requirements.
- M. Test Reports: Copies of reports of tests conducted on shop and field bolted and welded connections. Include data on type(s) of tests conducted and test results.
- N. Design Calculations: Submit design calculations, bearing the seal and signature of a Professional Engineer, employed by the Contractor and registered in the state of the project, for the following:
1. Connections that differ from that indicated in the contract documents.
 2. Requests for substitution of member sizes or material grades.
 3. Modification of the strength or configuration of structural framing for the convenience to accommodate the erection sequence, construction equipment, and/or material availability.
- O. Maintain one copy of each document on-site.
- 1.5 QUALITY ASSURANCE
- A. Installer Qualifications: The installer shall have at least five years experience in this size and type of structure.
- B. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD (standard for building structures).
1. Fabricator shall be registered with and approved by authorities having jurisdiction.
- C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

- D. Welding Standards: Comply with applicable provisions and qualify procedures and personnel according to AWS D1.1, "Structural Welding Code-Steel", and ASW D1.8, "Structural Welding Code – Seismic Supplement" for members part of the SLRS.
1. Present evidence that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
 2. Qualifications for Welding Work: Qualify welding personnel in accordance with AWS D1.1, "Qualification," (or approved equal).
 - a. Qualify welders in accordance with AWS D1.1 for each process, position, and joint configuration.
 - b. Welders who have not used the welding process for a period of 6 or more months shall be recertified.
 - c. If recertification of welders is required, retesting will be the Contractor's responsibility.
 - d. WPSs for each joint type shall indicate proper AWS qualification and be available where welding is performed.
 - e. Welders whose work fails to pass inspection shall be requalified before performing further welding.
- E. Comply with applicable provisions of the following specifications and documents:
1. AISC 303 "Code of Standard Practice for Steel Buildings and Bridges" (with exceptions noted in Part 1 of this Section).
 2. AISC 360 "Specification for Structural Steel Buildings, 13th edition.
 3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 4. ASTM A 6 (ASTM A 6M) "Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use."
- F. Professional Engineer Qualifications: A structural engineer who is licensed in the State of Oregon and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with structural steel framing that are similar to that indicated for this Project in material, design, and extent
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.
1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.

2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.7 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.8 EXCEPTIONS TO AISC CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES

- A. Add the following paragraph to Section 1.8.1 of the AISC Code of Standard Practice for Steel Buildings and Bridges:

“The Contractor shall have sole responsibility for site safety. The Fabricator and Erector shall review the Contract Documents and if the structure, as shown on those documents, is in conflict with the requirements of any safety regulations, the Fabricator shall notify the Structural Engineer of Record prior to commencing shop drawing production. If the Fabricator and/or Erector fail to notify the Structural Engineer of Record, as stated above, they shall become responsible for all costs for correcting such conflicts with the requirements of any and all safety regulations.”

- B. Add the following paragraph to Sections 7.5.1 **AND** Section 7.5.3 of the AISC Code of Standard Practice for Steel Buildings and Bridges:

“The Owner’s Designated Representative for Construction shall prepare the Embedment Drawing. The Embedment Drawing shall be submitted to the Structural Engineer of Record for information only. The Structural Engineer of Record shall not be responsible for the review and approval of the Embedment Drawing.”

- C. Add the following paragraph to Section 7.10.3 of the AISC Code of Standard Practice for Steel Buildings and Bridges:

“The Erector shall have the sole responsibility for determining the means and methods used to properly and adequately brace the framing during erection.”

- D. Revise the second paragraph of Section 7.10.3 of the AISC Code of Standard Practice for Steel Buildings and Bridges as follows:

“The Erector need not consider loads during erection that result from the performance of work by, or the acts of, others, except as specifically identified by the Owner’s Designated Representatives for Design and Construction, nor those that are unpredictable, such as loads due to hurricane, tornado, ~~earthquake~~, explosion or collision. **The Erector shall determine, furnish**

and install temporary supports to resist earthquake loads specified by the 2006 International Building Code for new buildings.”

- E. Revise Section 7.14 of the AISC Code of Standard Practice for Steel Buildings and Bridges as follows:

“The correction of minor misfits by moderate amounts of reaming or grinding, ~~welding or cutting~~, and the drawing of elements into line with drift pins, shall be considered to be normal erection operations. Errors that cannot be corrected using the foregoing means, or that require ~~major welding, cutting or~~ changes in member or Connection configuration, shall be promptly reported to the Owner’s Designated Representatives for Design and Construction and the Fabricator by the Erector, to enable the responsible entity to either correct the error or approve the most efficient and economical method of correction to be used by others.”

Particular note shall be paid to the commentary for this section of the AISC Code of Standard Practice for Steel Buildings and Bridges, which reads as follows:

“As used in this Section, the term “moderate” refers to the amount of reaming, grinding, welding or cutting that must be done on the project as a whole, not the amount that is required at an individual location. It is not intended to address limitations on the amount of material that is removed by reaming at an individual bolt hole, for example, which is limited by the bolt-hole size and tolerance requirements in the AISC and RCSC Specifications.”

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
- B. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than the following:
1. Channels, Angles, M, S-Shapes: 60 percent.
 2. Plate and Bar: 25 percent.
 3. Cold-Formed Hollow Structural Sections: 25 percent.
 4. All Other Steel Materials: 25 percent.
- C. Structural Steel Shapes and Bars: Refer to the General Structural Notes.
- D. Channels, Angles: Refer to the General Structural Notes.
- E. Plate and Bar: Refer to the General Structural Notes.
- F. Cold-Formed Hollow Structural Sections: Refer to the General Structural Notes.
- G. Welding Electrodes: Comply with AWS requirements.

1. Welding electrodes shall have a minimum tensile strength of 70 ksi using AWS A5 classification test.
2. Welding filler metals, as supplied by the manufacturer, shall meet the requirements for H16 (16 mL diffusible hydrogen per 100 grams deposited weld metal) as tested using the mercury or gas chromatograph method as specified in AWS A4.3, "Standard Methods for Determination of Diffusible Hydrogen Content of Martensitic, Bainitic, and Ferritic Steel Weld Metal Produced by Arc Welding." The manufacturer's Certificate of Conformance shall be considered adequate proof that the supplied electrodes meet this requirement, and no additional testing of filler metal samples or of production welds is required.
3. All low hydrogen electrodes shall be stored, handled, protected from atmospheric exposure and redried, if required, per AWS D1.1, 5.3.
4. FCAW electrodes shall be received in moisture-resistant packages that are undamaged. They shall be protected against contamination and injury during shipment and storage. Electrode packages shall remain effectively sealed against moisture until the electrode is required for use. When removed from the protective packaging and installed on machines, care shall be taken to protect the electrodes and coatings, if present, from deterioration or damage. Modification or lubrication of an electrode after manufacture for any reason is not permitted, except drying shall be permitted when recommended by the manufacturer.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.
 1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
- B. Headed Anchor Rods: ASTM F 1554, Grade 36 straight.
 1. Nuts: ASTM A 563 (ASTM A 563M) heavy hex carbon steel.
 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 3. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
 4. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
- C. Threaded Rods: ASTM A 36/A 36M.
 1. Nuts: ASTM A 563 (ASTM A 563M) heavy hex carbon steel.
 2. Washers: ASTM A 36/A 36M carbon steel.
 3. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

2.3 PRIMER

- A. Primer: SSPC-Paint 25, Type I or II, zinc oxide, linseed oil, and alkyd.
- B. Galvanizing Repair Paint: ASTM A 780.

2.4 GROUT

- A. Nonmetallic, Non-Shrink Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" (with exceptions noted in Part 1 of this Specification Section).
 - 1. Identify high-strength structural steel according to ASTM A 6/ A 6M and maintain markings until structural steel has been erected.
 - 2. Mark and match-mark materials for field assembly.
 - 3. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Re-Entrant Corners: Provide ½-inch radius at all re-entrant corners, unless noted otherwise.
- C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
- D. Bolt Holes: Cut, drill, or punch bolt holes perpendicular to metal surfaces.
- E. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- F. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning and SSPC-SP 3, "Power Tool Cleaning."
- G. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.
- H. Exposed Structural Steel: For structural steel exposed at interior and exterior locations.
 - 1. Fit and shop assemble items in largest practical sections for delivery to site.
 - 2. Fabricate items with joints tightly fitted and secured.
 - 3. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting rust, scale, seam marks, roller marks, rolled trade names, and roughness.
 - 4. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating and shop priming.
 - 5. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.6 SHOP CONNECTIONS

- A. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
- B. Erection Connections, etc: Place holes, plates, or other attachments required by the Erector so as not to interfere with or cause any other detrimental effect to structural members or their connections. Holes and attachments are not permitted in the "protected zone" as described in Section 1.3 and defined in the drawings.
- C. Exposed Steel Shop Connections:
 - 1. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small, uniform radius.
 - 2. Continuously seal joined members by intermittent (stitch) welds and plastic filler.
 - 3. Verify that weld sizes, fabrication sequence, and equipment used will limit distortions to allowable tolerances. Prevent weld show-through.
 - 4. Exposed mechanical fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where noted otherwise.

2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces to be field welded.
 - 2. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
 - 3. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
- C. Exposed Steel Surface Preparation: Clean surfaces of exposed structural steel to the following specifications and standards:
 - 1. SSPC-SP6, "Commercial Blast Cleaning".
- D. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

- E. Painting: Prepare steel and apply a 1-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

2.8 DIMENSIONAL TOLERANCES

- A. Fabrication Tolerances: Unless otherwise noted, fabricate structural members to referenced AISC Specifications for allowable tolerances.

2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/ A 123M.
 - 1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth
 - 2. Materials for galvanizing shall be geometrically suitable for galvanizing as specified in ASTM A384 and A385. For built-up members, assemblies shall be fabricated as required to limit warping and distortion.
- B. Steel that will be finished by hot dip galvanizing shall have controlled silicon and phosphorus contents. The silicon content shall be in either of the ranges 0 – 0.04% or 0.15% – 0.25%, the phosphorus content shall be below 0.04%. Before galvanizing, submit mill test certificates verifying silicon and phosphorus contents to the Architect and galvanizer.
- C. Bolts, nuts and washers, and iron and steel hardware components shall be galvanized by the hot-dip process in accordance with ASTM A 153.
- D. Surface Preparation: Steel shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter: Clean steel in accordance with Steel Structures Painting Council (SSPC) SSPC-SP-6, "Commercial Blast Cleaning."
- E. Coating Requirements
 - 1. Weight: The weight of the galvanized coating shall conform to Table 2 of ASTM A 123 or Table 1 of ASTM A 153, as appropriate.
 - 2. Surface Finish: The galvanized coating shall be continuous, adherent, as smooth and evenly distributed as possible, and free from any defect that is detrimental to the stated end use of the coated article.
 - a. Determine the integrity of the coating by visual inspection and coating thickness measurements.
 - b. Where slip factors are required for slip-critical connections, these shall be obtained after galvanizing by suitable treatment of the faying surfaces in accordance with the latest edition of the Specification for Structural Joints Using ASTM A 325 or A 490 bolts as approved by the Research Council on Structural Connections of the Engineering Foundation.
 - 3. Adhesion: The galvanized coating shall be sufficiently adherent to withstand normal handling during transport and erection.

F. Touch-Up and Repair

1. Mechanical Damage: Repair areas damaged by welding; flame cutting; or during handling, transport, or erection in accordance with ASTM A 780 by one of the following methods:
 - a. Zinc-Based Solder: In accordance with ASTM A 780, Annex A1.
 - 1) Apply the zinc-based solder in a minimum thickness of 4 mils (3 mils for material less than 1/4-inch thick).
 - 2) Verify coating thickness by measurements with a magnetic or electromagnetic gauge.
2. Wet Storage Stain
 - a. Remove any wet storage stain if formed and discovered prior to leaving the galvanizer's plant unless late pick up or acceptance of delivery has necessitated the material being stored in unfavorable conditions. Remove wet storage stain before installation so that premature failure of the coating will not occur. Remove wet storage stain as follows:
 - 1) Arrange the object so that their surfaces dry rapidly.
 - 2) Remove light deposits by means of a stiff bristle (not wire) brush. Heavier deposits are to be removed by brushing with a 5 percent solution of sodium or potassium dichromate with the addition of 0.1 percent by volume of concentrated sulfuric acid. Apply with a stiff bristle brush, and leave for approximately 30 seconds before thoroughly rinsing and drying.
 - 3) Alternatively, a proprietary product, such as Oakite Highlite or equal, which is intended for this purpose, may be used according to manufacturer's recommendations.
 - 4) Check coating thickness in the affected areas to ensure that the zinc coating remaining after the removal of wet storage stain is sufficient to meet or exceed the requirements of the specification.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.
 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 "Code of Standard Practice for Steel Buildings and Bridges" with exception noted in Part 1 of this Specification Section, and AISC 360 "Specification for Structural Steel Buildings"..
- B. Base Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base plates. Clean bottom surface of base plates.
 - 1. Set base plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of base plate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and base plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
- D. Splice members only where indicated.
- E. Do not use thermal cutting during erection.
- F. Do not enlarge unfair holes in members by burning or using drift pins.
- G. Reaming: Light drifting will be permitted to draw the parts together, but drifting to match unfair holes will not be permitted. Any enlargement of holes necessary to make connections in the field shall be done by reaming with twist drills, care being taken not to weaken the adjoining metal. If, in the judgement of the Engineer/Architect, the extent of the reaming is such that holes cannot be properly filled or accurately adjusted after reaming, the faulty member shall be discarded and replaced with a new one, and all costs and expenses resulting therefrom shall be paid by the Contractor.
- H. Cutting and Fitting: No cutting of sections, either flanges, webs, stems or angles shall be done by the Contractor without the consent of the Engineer/Architect, unless this cutting is particularly specified or shown on the drawings
- I. Corrective Measures
 - 1. Any errors in locations or inaccuracies in the setting of anchor bolts, base plates, or other items of attachment or support for steel work shall be reported to the Engineer, and shall be corrected in a manner subject to the approval of the Engineer.
 - 2. Any misfits due to errors in fabrication shall be reported immediately to the Engineer, along with proposed method of correction of same and Engineer approval obtained before proceeding with corrective measures.

3. No members shall be cut or burned without specific approval in writing.
4. Bolted or welded connections, joints, or fastenings, which are classified as defective in the opinion of the Engineer, shall be corrected by the Contractor in a manner subject to the Engineer's approval.

3.4 FIELD CONNECTIONS

- A. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
 1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" (with exceptions noted in Part 1 of this Specification Section) for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
 2. FCAW electrodes shall be protected from atmospheric exposure as follows:
 - a. Electrodes not consumed within 24 hours of accumulated exposure outside closed or heated storage shall not be used for seismic critical welds.
 - b. Electrode spools shall be identified and monitored for total atmospheric exposure time. Electrodes that have been exposed for periods exceeding an accumulated 24 hours may be dried when manufacturer's recommendations show that drying is effective at removing moisture and restoring electrodes to their designated diffusible hydrogen level. Dry as specified by the manufacturer. If the electrode or the electrode spool is damaged by baking, the electrode shall not be used.
 3. Each Welder working on the project shall be assigned an identification symbol or mark. Each Welder shall mark or stamp this identification symbol at each weldment completed and inspected by the welder. Stamps, if used, shall be low-stress type. All welds shall be marked or stamped.
- B. Erection Connections, etc: Place holes, plates, or other attachments required by the Erector so as not to interfere with or cause any other detrimental effect to structural members or their connections. Holes and attachments are not permitted in the "protected zone" as described in Section 1.3 and defined in the drawings.
- C. Exposed Steel Field Connections:
 1. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small, uniform radius.
 2. Continuously seal joined members by intermittent (stitch) welds and plastic filler.
 3. Verify that weld sizes, fabrication sequence, and equipment used will limit distortions to allowable tolerances. Prevent weld show-through.
 4. Exposed mechanical fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where noted otherwise.
 5. Remove erection bolts; fill holes with plug welds and grind smooth.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections and tests and to prepare test reports in accordance with "Testing and Inspection" Article 3.6 below.

3.6 TESTING AND INSPECTION

- A. All structural steel work is subject to special inspection. Testing Agency and Inspector Requirements:.
1. Special Inspector: Testing Agency shall provide qualified "Special Inspector" who will perform the inspection services.
 2. Testing agency will conduct and interpret tests, and state in each report whether test specimens comply with or deviate from requirements.
 3. Testing agency will notify the Owner and Engineer immediately of discrepancies in the work which are time-critical or affect the construction progress.
 4. Inspector will:
 - a. Verify material identification.
 - b. Verify bolt tightening.
 - c. Inspect welding.
- B. Fabrication Inspection: When approved by the Building Official, the Owner, and Engineer, full-time special inspection in the fabrication shop by the Owner's Testing Agency may be waived, subject to the following:
1. The Fabricator participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant.
 2. All shop inspection is provided by the Contractor, per the requirements herein, and is documented. Reports and test results are to be available for the Owner's Inspector to review.
 3. Periodic inspection by the Owner's Inspection Agency is allowed by the Fabricator.
 4. Certified Plants: Continuous plant inspection is not required at plants producing prefabricated steel products which are certified by the Building Official.
- C. Contractor Responsibilities Related to Shop and Field Inspections:
1. Maintain complete records of all quality control and testing performed by the Contractor.
 2. Furnish all electrical power, turning or moving of members, hoisting, staging, and other facilities required for inspection.
 3. Provide testing agency with access to places where structural steel work is being fabricated or erected so required inspection and testing can be accomplished.
 4. Correct deficiencies in, or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.
 5. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.
 6. Grant Inspectors full authority to inspect all material and work that fails to conform in every respect to these specifications.
 7. When required by Engineer or Owner's Independent Testing Agency or Contractor's engaged inspection organization, make adequate platforms available to the Inspector for the purpose of checking high-strength bolts and welds. Scaffolding shall be provided to ensure safe performance of this operation.
- D. Shop and Field Tests and Inspections

1. Welded Connections: In addition to visual inspection, welded connections will be tested and inspected as required by the Contract Documents and Specifications, according to AWS D1.1. Inspection procedures at Testing Agency's option, are listed below:
 - a. Procedures
 - 1) Liquid Penetrant Inspection: ASTM E 165.
 - 2) Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - 3) Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
 - 4) Ultrasonic Inspection: ASTM E 164.
 - b. Inspector shall:
 - 1) Verify Welding Procedure Specifications (WPSs) sheet has been provided and has been reviewed with each welder performing the weld. Welds not executed in conformance with the WPSs are rejectable.
 - 2) Verify fit-up meets tolerances of WPSs and mark joint prior to welding.
 - 3) Verify welding consumables per WPSs.
 - 4) Verify welding qualification and identifications.
 - 5) Observe preheat and interpass temperatures, and weld pass sequence for conformance with WPSs.
 - 6) All partial penetration, fillet, and other remaining welds shall be visually inspected.
 - 7) Where ultrasonic testing is performed, the entire weld shall be tested.

3.7 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with zinc-based solder according to ASTM A 780 and manufacturer's written instructions. At a minimum, the repair material thickness shall match that of the existing coating.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories and abutting structural steel.
 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- C. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Section.

END OF SECTION 051200

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Framing with dimension lumber.
 - 2. Framing with timber.
 - 3. Roof sheathing panels.
 - 4. Wood blocking and nailers.
 - 5. Wood furring.

1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.
- B. Timber: Lumber of 5 inches nominal (114 mm actual) or greater in least dimension.
- C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. RIS: Redwood Inspection Service.
 - 4. SPIB: The Southern Pine Inspection Bureau.
 - 5. WCLIB: West Coast Lumber Inspection Bureau.
 - 6. WWPA: Western Wood Products Association.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated wood.
 - 2. Expansion anchors.
 - 3. Metal framing anchors.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
- B. Maximum Moisture Content of Lumber: 19 percent.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.

4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: Standard, Stud, or No. 3 grade, unless noted otherwise on the drawings.
 1. Application: All interior partitions.
 2. Species:
 - a. Hem-fir (north); NLGA.
 - b. Hem-fir; WCLIB, or WWPA.
- B. Load-Bearing Partitions: No. 2 grade, unless otherwise noted on the drawings.
 1. Application: Interior load-bearing partitions.
 2. Species:
 - a. Hem-fir (north); NLGA.
 - b. Douglas fir-larch; WCLIB or WWPA.
 - c. Hem-fir; WCLIB or WWPA.
 - d. Douglas fir-larch (north); NLGA.
- C. Ceiling Joists: Construction or No. 2 grade, unless noted otherwise on the drawings.
 1. Species:
 - a. Hem-fir (north); NLGA.
 - b. Douglas fir-larch; WCLIB or WWPA.
 - c. Douglas fir-larch (north); NLGA.
 - d. Hem-fir; WCLIB or WWPA.
 - e. Western woods; WCLIB or WWPA.
- D. Joists, Rafters, and Other Framing Not Listed Above: No. 2 grade, unless noted otherwise on the drawings.
 1. Species:
 - a. Hem-fir (north); NLGA.
 - b. Douglas fir-larch; WCLIB or WWPA.
 - c. Douglas fir-larch (north); NLGA.

2.4 TIMBER FRAMING

- A. Provide timber framing complying with the following requirements, unless noted otherwise on the drawings, according to grading rules of grading agency indicated:
 1. Species and Grade: Douglas fir-larch, Douglas fir-larch (north), or Douglas fir-south; No. 1 grade; NLGA, WCLIB, or WWPA.
 2. Species and Grade: Hem-fir or hem-fir (north); No. 1 grade; NLGA, WCLIB, or WWPA.

3. Maximum Moisture Content: 20 percent.

2.5 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 1. Blocking.
 2. Nailers.
 3. Furring.
- B. For items of dimension lumber size, provide Construction or No. 2 and the following species:
 1. Hem-fir (north); NLGA.
 2. Hem-fir; WCLIB or WWPA.
 3. Western woods; WCLIB or WWPA.
 4. Northern species; NLGA.
- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 ROOF SHEATHING

- A. Plywood Panels: Structural 1 in thickness indicated.
 1. Span rating: Not less than 24/0.

2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Wood Screws: ASME B18.6.1.
- D. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

- E. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- F. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

2.8 METAL FRAMING ANCHORS

- A. Basis-of-Design Product: Subject to compliance with substitution requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Cleveland Steel Specialty Co.
 - 2. KC Metals Products, Inc.
 - 3. Phoenix Metal Products, Inc.
 - 4. Simpson Strong-Tie Co., Inc.
 - 5. USP Structural Connectors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.
 - 1. Use for wood-preserved-treated lumber and where indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.

- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Roof Sheathing: Install roof sheathing panels to comply with manufacturer's written instructions.
- E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.
- H. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- J. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD SLEEPER, BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Where wood-preserved-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

- D. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal (38-mm actual) thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Fasten plates to supporting construction unless otherwise indicated.
 - 1. For interior partitions and walls, provide 2-by-4-inch nominal- (38-by-89-mm actual-) size wood studs spaced 24 inches (610 mm) o.c. unless otherwise indicated.
 - 2. Provide continuous horizontal blocking at midheight of partitions more than 96 inches (2438 mm) high, using members of 2-inch nominal (38-mm actual) thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
 - 1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal (89-mm actual) depth for openings 48 inches (1200 mm) and less in width, 6-inch nominal (140-mm actual) depth for openings 48 to 72 inches (1200 to 1800 mm) in width, 8-inch nominal (184-mm actual) depth for openings 72 to 120 inches (1800 to 3000 mm) in width, and not less than 10-inch nominal (235-mm actual) depth for openings 10 to 12 feet (3 to 3.6 m) in width.

3.4 FLOOR JOIST FRAMING INSTALLATION

- A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches (38 mm) of bearing on wood or metal, or 3 inches (76 mm) on masonry. Attach floor joists as follows:
 - 1. Where supported on wood members, by toe nailing or by using metal framing anchors.
 - 2. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.
- B. Fire Cuts: At joists built into masonry, bevel cut ends 3 inches (76 mm) and do not embed more than 4 inches (102 mm).
- C. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches (1200 mm).
- D. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than 1/3 depth of joist; do not locate closer than 2 inches (50 mm) from top or bottom.

- E. Provide solid blocking of 2-inch nominal (38-mm actual) thickness by depth of joist at ends of joists unless nailed to header or band.
- F. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches (102 mm) or securely tie opposing members together. Provide solid blocking of 2-inch nominal (38-mm actual) thickness by depth of joist over supports.
- G. Anchor members paralleling masonry with 1/4-by-1-1/4-inch (6.4-by-32-mm) metal strap anchors spaced not more than 96 inches (2438 mm) o.c., extending over and fastening to three joists. Embed anchors at least 4 inches (102 mm) into grouted masonry with ends bent at right angles and extending 4 inches (102 mm) beyond bend.
- H. Provide solid blocking between joists under jamb studs for openings.
- I. Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above.
 - 1. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.
- J. Provide bridging of type indicated below, at intervals of 96 inches (2438 mm) o.c., between joists.
 - 1. Diagonal wood bridging formed from bevel-cut, 1-by-3-inch nominal- (19-by-64-mm actual-) size lumber, double-crossed and nailed at both ends to joists.
 - 2. Steel bridging installed to comply with bridging manufacturer's written instructions.

3.5 TIMBER FRAMING INSTALLATION

- A. Install timber with crown edge up and provide not less than 4 inches (102 mm) of bearing on supports. Provide continuous members unless otherwise indicated; tie together over supports as indicated if not continuous.
- B. Install wood posts using metal anchors indicated.

3.6 PROTECTION

- A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 073113 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Asphalt shingles.
 - 2. Underlayment.
 - 3. Ridge vents.
 - 4. Metal flashing and trim.

1.3 DEFINITION

- A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Egyptian Theatre, 229 South Broadway, Coos Bay, Oregon

1.5 SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.
 - 1. Asphalt Shingles: Full size.
 - 2. Ridge and Hip Cap Shingles: Full size.
 - 3. Ridge Vent: 12 inch (300 mm) long Sample.
 - 4. Exposed Valley Lining: 12 inches (300 mm) square.
- C. Samples for Initial Selection: For each type of asphalt shingle indicated.
 - 1. Include similar Samples of accessories involving color selection.
- D. Samples for Verification: For the following products, of sizes indicated:

1. Asphalt Shingles: Full size.
2. Ridge and Hip Cap Shingles: Full size.
3. Ridge Vent: 12 inches (300 mm) long Sample.
4. Exposed Valley Lining: 12 inches (300 mm) square.

- E. Qualification Data: For Installer.
- F. Product Test Reports: For each type of asphalt shingle and underlayment product indicated, for tests performed by manufacturer and witnessed by a qualified testing agency.
- G. Evaluation Reports: For synthetic underlayment and high-temperature, self-adhering sheet underlayment, from ICC-ES or other testing and inspecting agency acceptable to authorities having jurisdiction, indicating that product is suitable for intended use under applicable building codes.
- H. Sample Warranty: For manufacturer's warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For asphalt shingles to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Asphalt Shingles: 100 sq. ft. (9.3 sq. m) of each type, in unbroken bundles.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated location protected from weather, sunlight, and moisture according to manufacturer's written instructions.
- B. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.
- C. Protect unused roofing materials from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.
- D. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended in writing by manufacturer.

1.11 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Manufacturing defects.
 - 2. Material Warranty Period: 50 years from date of Substantial Completion.
 - 3. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds of up to 110 mph for 10 years from date of Substantial Completion.
 - 4. Algae-Resistance Warranty Period: Asphalt shingles will not discolor for 20 years from date of Substantial Completion.
 - 5. Non-prorated Warranty Period: 10 years from date of Substantial Completion.
- B. Roofing Installer's Warranty: On warranty form at end of this Section, signed by Installer, in which Installer agrees to repair or replace components of asphalt-shingle roofing that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Exterior Fire-Test Exposure: Provide asphalt shingles and related roofing materials identical to those of assemblies tested for Class A fire resistance according to ASTM E 108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

2.2 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Laminated-Strip, SBS-Modified Asphalt Shingles: ASTM D 3462/D 3462M, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing; complying with UL 2218, Class 4.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Malarkey Roofing Products, Legacy Scotchgard SBS-Modified Laminated Shingle or comparable product by one of the following:
 - a. Atlas Roofing Corporation.
 - b. GAF

2. Butt Edge: Straight cut
 3. Strip Size: Manufacturer's standard
 4. Algae Resistance: Granules resist algae discoloration.
 5. Color and Blends: Silverwood
- B. Three-Tab-Strip, SBS-Modified Asphalt Shingles: ASTM D 3462/D 3462M, glass-fiber reinforced, mineral-granule surfaced, and self-sealing; with tabs regularly spaced and complying with UL 2218, Class 4.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Malarkey Roofing Products, Legacy Scotchgard SBS-Modified Laminated Shingle or comparable product by one of the following:
 - a. Atlas Roofing Corporation
 - b. GAF
 2. Strip Size: Manufacturer's standard
 3. Color and Blends: As indicated by manufacturer's designations: Silverwood
- C. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles

2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226/D 226M, ASTM D 4869/D 4869M, asphalt-saturated organic felts, nonperforated.
1. Type: Type II
- B. Glass-Reinforced Felt: ASTM D 6757, glass-reinforced, asphalt-saturated organic felt.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 2. Basis-of-Design Product: Subject to compliance with requirements, provide Malarkey Right Start UDL Underlayment or comparable product by one of the following:
 - a. GAF
 - b. Atlas Roofing Corporation.
 - c. Owens Corning.
- C. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970/D 1970M, minimum of 50-mil (1.3-mm) thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Atlas Roofing Corporation.
 - b. Carlisle Residential; a division of Carlisle Construction Products.
 - c. GAF Materials Corporation.
 - d. Grace, W. R. & Co. - Conn.

- e. Malarkey Roofing Products.
- D. Self-Adhering Sheet Underlayment, High Temperature: Minimum of 40-mil-(1.0-mm) thick; with slip-resisting, polymer-film-reinforced or glass-reinforced top surface laminated to layer of butyl or SBS-modified asphalt adhesive; with release backing; cold applied; and evaluated and documented to be suitable for use for intended purpose under applicable codes by a testing and inspecting agency acceptable to authorities having jurisdiction. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Atlas Roofing Corporation.
 - b. Carlisle Residential; a division of Carlisle Construction Products.
 - c. GAF Materials Corporation.
 - d. Grace, W. R. & Co. - Conn.
 - 2. Thermal Stability: Stable after testing at 240 deg F (116 deg C) according to ASTM D 1970/D 1970M.
 - 3. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C) according to ASTM D 1970/D 1970M.
- E. Granular-Surfaced Valley Lining: ASTM D 6380, Class M, organic ASTM D 3909, mineral-granular-surfaced, glass-felt-based, asphalt roll roofing; 36 inches (914 mm) wide.

2.4 VENTS

- A. Rigid Ridge Vent: Manufacturer's standard, rigid section high-density polypropylene or other UV-stabilized plastic ridge vent for use under ridge shingles.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Air Vent, Inc.; a Gibraltar Industries company.
 - b. Cor-A-Vent, Inc.
 - c. GAF Materials Corporation.
 - d. Owens Corning.

2.5 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
- B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch- (3-mm-) diameter, sharp-pointed, with a minimum 3/8-inch- (9.5-mm-) diameter flat head and of sufficient length to penetrate 3/4 inch (19 mm) into solid wood decking or extend at least 1/8 inch (3 mm) through OSB or plywood sheathing.
 - 1. Shank: Barbed
 - 2. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

- C. Felt-Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, 1-inch (25-mm) minimum diameter.
- D. Synthetic-Underlayment Fasteners: As recommended in writing by synthetic-underlayment manufacturer for application indicated.

2.6 METAL FLASHING AND TRIM

- A. Sheet Metal: Zinc-tin alloy-coated stainless steel prefinished flashing.
- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item.
 - 1. Parapet and Apron Flashings: Fabricate with lower flange a minimum of 5 inches (125 mm) over and 4 inches (100 mm) beyond each side of downslope asphalt shingles and 6 inches (150 mm) up the vertical surface.
 - 2. Step Flashings: Fabricate with a headlap of 2 inches (50 mm) and a minimum extension of 5 inches (125 mm) over the underlying asphalt shingle and up the vertical surface.
 - 3. Cricket or Backer Flashings: Fabricate with concealed flange extending a minimum of 24 inches (600 mm) beneath upslope asphalt shingles and 6 inches (150 mm) beyond each side of chimney and mechanical penetrations and 6 inches (150 mm) above the roof plane.
- C. Vent Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch (1.6 mm) thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches (100 mm) from pipe onto roof.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provisions have been made for flashings and penetrations through asphalt shingles.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
- B. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the parapet. Lap sides a minimum of 6 inches (150 mm) over underlying course. Lap ends a minimum of 4 inches (100 mm). Stagger end laps between succeeding courses at least 72 inches (1830 mm). Fasten with felt-underlayment roofing] nails.
 - 1. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than 6 inches (150 mm) in direction that sheds water. Lap ends of felt not less than 6 inches (150 mm) over self-adhering sheet underlayment.
 - 2. Install fasteners at no more than 36 inches (914 mm) o.c.
- C. Double-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Install a 19-inch- (485-mm-) wide starter course at eaves and completely cover with full-width second course. Install succeeding courses lapping previous courses 19 inches (485 mm) in shingle fashion. Lap ends a minimum of 6 inches (150 mm). Stagger end laps between succeeding courses at least 72 inches (1830 mm). Fasten with felt-underlayment roofing nails.
 - 1. Apply a continuous layer of asphalt roofing cement over starter course and on felt-underlayment surface to be concealed by succeeding courses as each felt course is installed. Apply over entire roof.
 - 2. Install felt underlayment on roof sheathing not covered by self-adhering sheet underlayment. Lap edges over self-adhering sheet underlayment not less than 6 inches (150 mm) in direction that sheds water.
 - 3. Terminate felt underlayment flush sidewalls, curbs, chimneys, and other roof projections.
 - 4. Install fasteners at no more than 36 inch (914 mm) o.c.
- D. Synthetic Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides and ends and treat laps as recommended in writing by manufacturer. Stagger end laps between succeeding courses at interval recommended in writing by manufacturer. Fasten according to manufacturer's written instructions. Cover underlayment within period recommended in writing by manufacturer.
 - 1. Install in single layer on roofs sloped at 4:12 and greater.
 - 2. Install in double layer on roofs sloped at less than 4:12.
- E. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install lapped in direction that sheds water. Lap sides not less than 3-1/2 inches (89 mm). Lap ends not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Roll laps with roller. Cover underlayment within seven days.
 - 1. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment.
 - 2. Parapets: Extend from up parapet 12 inches (300 mm) above roof surface.
 - 3. Valleys: Extend from lowest to highest point 18 inches (450 mm) on each side.
 - 4. Hips: Extend 18 inches (450 mm) on each side.

5. Ridges: Extend 36 inches (914 mm) on each side without obstructing continuous ridge vent slot.
6. Dormers, Chimneys, Skylights, and Other Roof-Penetrating Elements: Extend beyond penetrating element 18 inches (450 mm) and return vertically against penetrating element not less than 6 inches (150 mm)
7. Roof Slope Transitions: Extend 18 inches (450 mm) on each roof slope.

3.3 METAL FLASHING INSTALLATION

- A. General: Install metal flashings and other sheet metal to comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."
 1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
- B. Step Flashings: Install with a headlap of 2 inches (50 mm) and extend over the underlying asphalt shingle and up the vertical surface. Fasten to roof deck only.
- C. Cricket or Backer Flashings: Install against the roof-penetrating element extending concealed flange beneath upslope asphalt shingles and beyond each side.
- D. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.4 ASPHALT-SHINGLE INSTALLATION

- A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and recommendations in NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
- B. Install starter strip along lowest roof edge, consisting of an asphalt-shingle strip with tabs removed at least 7 inches (175 mm) wide with self-sealing strip face up at roof edge.
- C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with 6-inch (150-mm) manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- E. Install asphalt shingles by single-strip column or racking method, maintaining uniform exposure. Install full-length first course followed by cut second course, repeating alternating pattern in succeeding courses.
- F. Fasten asphalt-shingle strips with a minimum of six roofing nails located according to manufacturer's written instructions.
 1. Where roof slope is less than 4:12, seal asphalt shingles with asphalt roofing cement spots.

2. When ambient temperature during installation is below 50 deg F (10 deg C) seal asphalt shingles with asphalt roofing cement spots.
- G. Ridge Vents: Install continuous ridge vents over asphalt shingles according to manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.
- H. Hip and Ridge Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.
 1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

3.5 ROOFING INSTALLER'S WARRANTY

- A. The following information is to be based on the required Warranties specified in Part -2 Products of this specification with the **<bold items>** to be completed by the Roofing Installer and submitted to the owner following Substantial Completion.
- B. WHEREAS **<Insert name>** of **<Insert address>**, herein called the "Roofing Installer," has performed roofing and associated work ("the work") on the following project:
 1. Owner: **<Insert name of Owner>**.
 2. Address: **<Insert address>**.
 3. Building Name/Type: **<Insert information>**.
 4. Address: **<Insert address>**.
 5. Area of the Work: **<Insert information>**.
 6. Acceptance Date: **<Insert date>**.
 7. Warranty Period: **<Insert time>**.
 8. Expiration Date: **<Insert date>**.
- C. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant the work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- D. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of the work as are necessary to correct faulty and defective work and as are necessary to maintain the work in a watertight condition.
- E. This Warranty is made subject to the following terms and conditions:
 1. Specifically excluded from this Warranty are damages to the work and other parts of the building, and to building contents, caused by:
 - a. Lightning;
 - b. Peak gust wind speed exceeding **<Insert wind speed>** mph (m/sec);
 - c. Fire;
 - d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;

- e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. Vapor condensation on bottom of roofing; and
 - g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When the work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 3. Roofing Installer is responsible for damage to the work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of the work.
 4. During Warranty Period, if Owner allows alteration of the work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of the alterations, but only to the extent the alterations affect the work covered by this Warranty. If Owner engages Roofing Installer to perform the alterations, Warranty shall not become null and void unless Roofing Installer, before starting the alterations, notified Owner in writing, showing reasonable cause for claim, that the alterations would likely damage or deteriorate the work, thereby reasonably justifying a limitation or termination of this Warranty.
 5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a use or service more severe than originally specified, this Warranty shall become null and void on date of the change, but only to the extent the change affects the work covered by this Warranty.
 6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect the work and to examine evidence of such leaks, defects, or deterioration.
 7. This Warranty is recognized to be the only warranty of Roofing Installer on the work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of the work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

F. IN WITNESS THEREOF, this instrument has been duly executed this **<Insert day>** day of **<Insert month>**, **<Insert year>**.

1. Authorized Signature: **<Insert signature>**.
2. Name: **<Insert name>**.
3. Title: **<Insert title>**.

END OF SECTION 073113

SECTION 316333 – PIN PILES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes pin piles (also noted as “micro-piles”); designed, furnished, installed, and tested in accordance with these contract documents.
 - 1. Select the pin pile type and the installation method, and determine the lengths, diameters, and wall thicknesses (minimum outside diameter 12-inches, minimum wall thickness 0.50-inch and minimum length of 100 feet). Install in accordance with testing requirements of this specification.
 - 2. Pin Piles are steel pipe pile casings in drilled or jetted cavities, with steel reinforcement in the center of the pipe, and the pipe filled with grout under pressure.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Engineer and install pin piles to withstand design loads within limits and under conditions required.
 - 1. Allowable vertical load-bearing capacity of piles shall be 25 tons, as noted on drawings.
 - 2. Allowable tensile capacity of piles shall be 5 tons.

1.3 SUBMITTALS

- A. Submit in accordance with Division/Section “Submittal Procedures”.
- B. Preliminary Submittals
 - 1. Qualifications of Personnel: Submit a list containing at least seven projects on which the personnel have installed pin piles in the last three years, with information specified below.
 - 2. Qualifications of Pin Pile Design Engineer and Supervisors: Submit, as specified below.
- C. Submittals Before Installation
 - 1. Submit shop drawings and structural design calculations for the pin pile system or systems intended for use, including the pin pile components and bond length details. The submittal shall be stamped by a Registered Engineer in the State of Oregon.
 - 2. Submit a detailed description of the construction procedure proposed.
 - a. Submit manufacturer’s information, model, size, and type of equipment to be used for installing pin piles with appropriate manufacturer’s literature.
 - b. Submit a detailed narrative describing the construction method to be employed and encompassing all aspects, peripheral or otherwise, of the site operation.
 - 3. Submit a pin pile installation schedule giving:
 - a. Pin pile number.

- b. Pin pile design load.
- c. Type and size of reinforcing steel.
- d. Total bond length for each pin pile.
- e. Total length of each pin pile.
- 4. Submit certified mill test reports, properly marked, for the reinforcing steel. The ultimate strength, yield strength, elongation, and material properties composition shall be shown.
- 5. Submit the grout mix designs and the procedures for placing the grout.
- 6. Testing Procedures:
 - a. Submit detailed descriptions of methods proposed to be followed for testing as specified in Article 3.2 below, prior to beginning tests. Include drawings and details to clearly describe methods.
 - b. Submit calibration reports and data for each test jack, pressure gauge, and master pressure gauge to be used.
 - 1) The calibration test shall have been performed by an independent testing laboratory and test shall have been performed within 60 calendar days of the date submitted.
 - 2) Testing shall not commence until the Geotechnical Engineer has accepted the jack, pressure gauge, and master pressure gauge calculations.
- 7. Allow the Engineer two weeks to review the submittal after a complete set has been received.

D. Installation Records

- 1. Prepare and submit to the Engineer full length installation records for each pile installed. The records shall be submitted within 24 hours after installation is completed for the pile. The records shall include the following minimum information:
 - a. Final tip elevation.
 - b. Cut-off elevation.
 - c. Rated load capacities.
 - d. Description of unusual installation behavior or conditions.
 - e. Other data which may be useful in evaluating the pile.
 - f. Grout quantities pumped into pin piles.
 - g. Pipe pile material and dimensional properties.
 - h. Grade elevation.

1.4 QUALITY ASSURANCE

- A. Experience: Personnel performing this work shall have installed pin piles on at least seven projects over a period of at least three years. A brief description of each project and a reference shall be included for each project listed. As a minimum, the reference shall include the individual's name and current phone number, the names of the projects, dated pin piles were being placed, and names of Design Professional of Record, Geotechnical Engineer, and Contractor.
- B. Submit a list identifying the engineer, drill operators, on-site supervisors who will be assigned to the project. The list shall contain a summary of each individual's experience and it shall be complete enough for the Owner to determine whether or not each individual has satisfied the following qualification.

1. Assign an engineer to supervise the work with at least three years of experience in the design and construction of pin piles. The use of subcontractors or manufacturer's representative does not satisfy the requirements of this section.
 2. Drill operators on-site supervisors shall have a minimum of one year experience installing pin piles with the Contractor's organization.
- C. Work shall not be started on any piping nor materials ordered until approval of the Contractor's qualification are given. The Owner may suspend the pin pile work if the Contractor substitutes unqualified personnel for approved personnel during construction.
- D. The Owner will provide special inspection as required by Chapter 17 of the International Building code.
- E. The Owner will retain a Testing Laboratory to sample and test grout quality. One set of six grout samples shall be obtained each day during pile installation work, in general accordance with ASTM C 31. Two specimens shall be tested at 7 days and two at 28 days, in general accordance with ASTM C 39.

1.5 PROJECT CONDITIONS

- A. Site Information: Subsurface conditions were investigated by the Owner's Geotechnical Consultant, SHN Engineers, and documented in the Geotechnical report, dated December 3, 2012. For additional information contact Mark Denning, SHN Engineers at (541) 266-9890.
1. Data in reports are not intended as representations or warranties of continuity of any condition. It is expressly understood that the Owner will not be responsible for interpretations or conclusions drawn therefrom by the Contractor. The data are made available for the convenience of the Contractor.
 2. Additional test borings and other exploratory operations may be made by the Contractor at no additional cost to the Owner, provided such operations are acceptable to the Owner.
- B. Protect structures, underground utilities and other construction from damage caused by pile driving operations.
- C. Provide surveyed elevation benchmarks on structures where directed by Engineer before commencing work when structures are within 10-feet of pile-driving operations. Record and report elevation of each benchmark after driving piles and at least twice a day while pile driving is in progress. Should benchmark readings indicate displacement, halt driving operations until corrective action has been provided and is acceptable to Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Pipe for Pin Piles: Steel, conforming to American Petroleum Institute (API) N 80.
- B. Cement: Portland cement conforming to ASTM C 150, Type I or Type II and shall be the product of one manufacturer.
- C. Admixtures: Conform to the requirements of ASTM C 494.
 - 1. Admixtures which control bleed, improve flowability, reduce water content, and retard set may be used in the grout subject to the review and acceptance of the Engineer.
 - 2. Expansive admixtures shall only be added to the grout used for filling sealed encapsulations and anchorage covers.
 - 3. Accelerators will not be permitted.
 - 4. Admixtures shall be compatible with the grout and pumping methods proposed for use and mixed in accordance with the admixture manufacturer's recommendations.
- D. Reinforcement:
 - 1. Deformed billet steel conforming to ASTM A 615 grades 60 or 75, or ASTM A 722 grade 150 as required by pin pile designer.
 - 2. Couplers shall conform to The International Building Code, and be covered by a current ICBO Evaluation Report.
- E. Plates and Shapes: Conform to ASTM A 36, or A 572 grade 50, hot dip galvanized. Refer to 051200 for galvanizing requirements.
- F. Centralizers: Fabricate from plastic, steel, or other material which is not detrimental to the reinforcing steel. Wood shall not be used.
- G. Double Corrosion Protection: High Density Polyethylene (HDPE), corrugated, and internally grouted sheath.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The pin pile installation technique shall be such that it mobilizes the effective load carrying capacity of the installation type selected. Under this section, select the drilling method, the grouting procedure, and the grouting pressure used for the installation of the pin piles.
- B. Install pin piles with flush joints. Advance pin pile casing to the bottom of the borehole prior to pressure grouting lower bond zone.
- C. Flushing and drilling of pile shall be employed. The drilling shall be accomplished so that the pile is not moved out of horizontal alignment. Provide necessary pumps and piping.

- D. Determine the pin pile casing size and bond length and central tendon reinforcement steel sizing necessary to develop the design load requirements.
- E. Provide centralizers at 10-foot centers maximum. The upper most centralizer shall be located a maximum of 5-feet from the top of the pin pile. Centralizers shall permit the free flow of grout without misalignment of the central reinforcing bar.
- F. Lower the central reinforcing steel with centralizers spaced at 10-foot maximum centers into the pipe casing and set. The original reinforcing steel shall be inserted into the drill hole to the desired depth without difficulty. Partially inserted reinforcing bars shall not be driven or forced into the hole.
- G. Inject grout, beginning at the lower end of the drilled borehole. The pipe casing shall be filled with a 4,000 psi minimum compressive strength grout without voids from bottom to top of pin pile.
- H. Check pile top elevations and adjust all installed pin piles to the planned elevations.
- I. Grouting:
 - 1. Provide means and methods of measuring the grout quantity and pumping pressure of the grout during the grouting operations. Contractor shall keep records showing the quantities and pressures for inspection by the Engineer and the Geotechnical Engineer.
 - 2. The grouting process shall produce a grout free of lumps and undisposed cement. A positive displacement grout pump shall be used. The pump shall be equipped with a pressure gauge to monitor grout pressures. The pressure gauge shall be capable of measuring pressures of at least 150 psi. The grouting equipment shall be sized to enable the grout to be pumped in one continuous operation. The mixer shall be capable of continuously agitating the grout.
 - 3. The grout pressures and grout pumping shall be controlled to prevent excessive soil heaving due to grouting operations.
 - 4. Grout within the pin piles shall be allowed to attain adequate strength prior to load testing.
- J. Pile Splices: Construct as to develop the full strength of pile section.
 - 1. Lengths of pile to be spliced shall be secured in proper alignment and in such a manner that no eccentricity between the axes of the two lengths to be spliced, or angle between them results.
- K. Placement Tolerances: Place piles within three inches from location indicated for center of gravity of each single pile or pile groups; two inches for piles under walls.

3.2 PILE LOAD TESTS

- A. Verification pile load tests shall be performed for one pile. The verification test shall be performed in accordance with ASTM D 1143.

- B. It should be anticipated that one pile shall be proof tested. A unit cost for each proof test should be included in the bid.
- C. The proof tested pin piles shall be loaded to 150% of the compression and tension design load. The central reinforcing bar shall be proportioned such that the maximum stress does not exceed 80% of the ultimate strength of the steel. The jack shall be positioned at the beginning of the test such that unloading and repositioning of the jack during the test will not be required. As an alternative, each proof test pile can be tension load tested to 150% of the maximum compression or tension load, whichever is larger.
- D. The proof load tests shall be made by incrementally loading the pin pile in accordance with the following schedule: (Utilize for both compression and tension loading.)

LOAD	HOLD TIME	MAX. VERTICAL DEFLECTION
AL (Alignment Load)	0 Min.	
0.25 DL (Design Load)	1 Min.	
0.50 DL	1 Min.	
0.75 DL	1 Min.	
1.00 DL	1 Min.	
1.25 DL	1 Min.	
1.50 DL	10 Min.	0.5-inches
AL (Alignment Load)	0 Min.	

- E. The test load shall be applied in increments of 25% of the design load. Each load increment shall be held for a minimum of one minute. Measurement of pile movement shall be obtained to within 0.01-inch at each load increment. The load-hold period shall start as soon as the test load is applied and the pile movement, with respect to a fixed reference, shall be measured and recorded at 1 minute, 2, 3, 4, 5, and 10 minutes.
- F. The pile shall sustain the compression and tension design capabilities (1.0 DL) with no more than 0.5-inch total vertical movement at the top of the pile that is measured relative to the top of the pile prior to the start of testing.
- G. The test will be considered successful if the total movement between the 1 minute and the 10 minute reading is 0.04-inch or less. If the movement between 1 and 10 minutes exceed 0.04-inch, the load may be held an additional 50 minutes and a creep curve plotted of movement versus the logarithm of time. If the creep curve shows a decreasing creep rate that is less than 0.08-inch, the test is successful. If the creep rate exceeds 0.08-inch per log cycle of time, then the load capacity of the pile shall be downgraded to a value of 65% of the load that the pile can support without excessive creep. Additional production piles may need to be installed for the reduced load capacity.
- H. The verification test will be considered successful in the pin pile meets the criteria for a proof tested pin pile in this section and a failure does not occur at the 2.0 DL maximum compression and tension loads.
- I. The Contractor shall give the Engineer written confirmation concerning pin pile construction within seven working days after the completion of the verification tests. This written

confirmation will either confirm the pin pile design load capacities, or reject the piles based upon the result of the verification tests.

- J. When a pin pile fails, the Contractor shall modify the design, the construction procedure, or both. These modifications may include, but are not limited to, installing replacement pin piles, modifying the installation methods, increasing the embedment length or changing the pin pile diameter. Any modification which requires changes to the structure shall have prior review and acceptance of the Engineer. Any modification of design or construction procedures shall be at the Contractor's expense.

END OF SECTION 316333

Appendix A

*SHN Consulting Engineers & Geologists, Inc.
Geotechnical Report, dated December 3, 2012*



Reference 611011

December 3, 2012

Mr. Randy Dixon, Operations Manager
City of Coos Bay
500 Central Avenue
Coos Bay, OR 97420

Subject: Geotechnical Design Criteria, Egyptian Theatre, Coos Bay, Oregon

Dear Mr. Dixon:

This letter provides documentation for design of remedial systems to repair the back wall to the existing Egyptian Theatre. SHN previously performed a Geotechnical Evaluation for the subject structure. The findings in our report dated September 14, 2010 provide the basis the proposed remedial design. We concluded in 2010 that the tilting of the back wall was due to overloading of the existing pile foundation system when the fly-loft was added to the existing structure that was constructed in the 1920s. In our analysis, we did not know the foundation details such as type, diameter, depth, and number of piles in a group. However, it was assumed that foundation elements consisted of 12-inch diameter timber piles at least 80 feet deep.

We understand that the most recent remediation plans are to provide additional support to the back fill using a new system of piling to support a continuous grade beam. Although they provide some support, it is planned to ignore the existing pile system. This is prudent because the condition of these piles near the surface is unknown, but is expected to be poor.

Because of space limitations, it is proposed to use small diameter micropiles (also called mini-piles or pin piles), typically 300 mm (12 inches) diameter or less. Piles are expected to derive their support from friction alone: no end-bearing component will be considered. The soil conditions at the Egyptian Theatre were found to be poor but uniform, with engineering properties that are comparable with those that support the Coos Bay City Hall and Library structures. Micropiles can be installed with low head-room machines, which will allow installation of piles along the back wall between the two existing pilasters, providing the brick infill is removed.

For design, we recommend the following geotechnical engineering properties be used above and below a depth of 30 feet, Tables 1 and 2, respectively:

Table 1 Average Soil Properties Above a Depth of 30 Feet		
Property	Symbol	Value
Moisture Content	w	80 %
Dry Density	γ_{dry}	35 pcf
Total Unit Weight	γ_{wet}	95 pcf
Effective Unit Weight	γ_{eff}	33 pcf
Angle of Internal Friction	ϕ	14°
Cohesion	c	225 psf
Coefficient of Consolidation	C'_v	0.165

Table 2 Average Soil Properties Below a Depth of 30 Feet		
Property	Symbol	Value
Moisture Content	w	85 %
Dry Density	γ_{dry}	50 pcf
Total Unit Weight	γ_{wet}	100 pcf
Effective Unit Weight	γ_{eff}	38 pcf
Angle of Internal Friction	ϕ	18°
Cohesion	c	500 psf
Coefficient of Consolidation	C'_v	0.032

For design of micropiles, we recommend the following design parameters based on an assumed shear strength that is uniform for the length of the pile:

Table 3 Allowable Pile Capacities for Various Micropile Diameter and Length				
Pile Diameter, inches	Shear Strength	50-foot pile	75-foot pile	100-foot pile
6	125 lb/foot	3.125 ton	4.70 ton	6.25 ton
9	280 lb/foot	6.25 ton	10.5 ton	12.5 ton
12	500 lb/foot	12.5 ton	18.75 ton	25 ton

The values in Table 3 are allowable and include a factor of safety of 2. Piles should be spaced at least 2.5 times the diameter on centers.

If the existing piles are exposed on the inside and outside of the back wall, it may be possible install micropiles between the existing piles without any reduction in capacity. The feasibility of this

Mr. Randy Dixon

Geotechnical Design Criteria, Egyptian Theatre, Coos Bay, Oregon

December 3, 2012

Page 3 of 3

option will depend on the condition and thickness of the existing pile cap. If the pile cap is fully exposed, it may be possible to estimate the number of piles, and clear-space dimension between piles. It seems more practical to install micropiles close to the back wall, instead of around or spanning the existing pile cap.

There are several different types of micropiles that may be used. Therefore we recommend that the general pile design parameters be used as guidelines for estimating general sizing. Load tests should be performed to more accurately measure pile load capacities. At least two load tests are recommended. Accordingly, we recommend that the contractor should be actively engaged in the pile design.

We trust this provides the preliminary design criteria needed for structural design. Should you have questions, please contact the undersigned at 360-487-9393.

Sincerely,

SHN Consulting Engineers and Geologists, Inc.

Richard W. Hanford, PE, GE
Consulting Geotechnical Engineer

RWH:dkl