MULTI-STEP BIDDING PROCESS
FOR
GENERAL CONTRACTORS

Single Project---Short-Listing

Request for Submittals

April 27, 2010

GOVERNOR'S CARRIAGE HOUSE STABILIZATION

DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT

SALT LAKE CITY, UTAH

DFCM Project Number 10032310

MJSA Architects

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Current copies of the following documents are hereby made part of these contract documents by reference. These documents are available on the DFCM web site at http://dfcm.utah.gov/StdDocs/index.html "Standard Documents" – "Reference Documents I" – "Item 6. Supplemental General Conditions" or are available upon request from DFCM:

DFCM Supplemental General Conditions dated July 1, 2009 *
DFCM Supplemental General Conditions dated July 15, 2008
DFCM General Conditions dated May 25, 2005

*** NOTE: THE NEW SUPPLEMENTAL GENERAL CONDITIONS EFFECTIVE JULY 1, 2009 ADDRESSING HEALTH INSURANCE AND IMMIGRATION ARE REFERENCED AT THE LINK ABOVE.**

The Agreement and General Conditions dated May 25, 2005 have been updated from versions that were formally adopted and in use prior to this date. The changes made to the General Conditions are identified in a document entitled Revisions to General Conditions that is available on DFCM's web site at http://dfcm.utah.gov

NOTICE TO CONTRACTORS

The State of Utah - Division of Facilities Construction and Management (DFCM) is requesting submissions for the following project:

Project Name: **Governor's Carriage House Stabilization**
Division of Facilities Construction & Management – Salt Lake City, Utah

Project No. **10032310**

Project Description: **This project will include stone restoration, water management, roof to wall seismic upgrades and new roofing system.**

Cost Estimate: **$1,000,000**

DFCM is entering into a Multi-Step Bidding Process for Construction services. A short-listing of contractors will be based on the selection criteria outlined in the bidding documents contained herein. Short-listed contractors will be invited to submit bids on the project described above. **The only contractors allowed to bid on this project will be contractors short-listed by the selection committee.**

All contractors responding to this procurement must comply with and require all of their subcontractors to comply with the license laws as required by the State of Utah.

The bidding documents including plans and specification, short-listing requirements and schedule will be available 10:00 AM on **Tuesday, April 27, 2010** on the DFCM web page at http://dfcm.utah.gov and from DFCM, 4110 State Office Building, Salt Lake City, Utah 84114, telephone 801-538-3018. For questions regarding this solicitation, please contact **Michael Ambre**, DFCM, at 801-209-9104. No others are to be contacted regarding this solicitation.

A **mandatory** pre-submittal meeting to discuss the multi-step bidding process will be held at **3:00 PM** on **Monday, May 3, 2010** at the DFCM Office, 4110 State Office Building, Salt Lake City, Utah.

When bidding on this project, short-listed contractors will be required to submit a Bid Bond in the amount of five percent (5%) of the bid amount, made payable to the Division of Facilities Construction and Management on DFCM's Bid Bond Form. A Bid Bond must accompany each bid.

The Division of Facilities Construction & Management reserves the right to reject any or all submittals/bids or to waive any formality or technicality in any submittal/bid in the interest of the State.

DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT
JOANNA REESE, CONTRACT COORDINATOR
4110 State Office Bldg., Salt Lake City, Utah 84114

DESCRIPTION OF WORK

The only contractors allowed to bid on this project will be contractors short-listed by the selection committee.

Project Description:

The Work of the overall Project includes the improvement to the historic 1907 Carriage House with related roof and site drainage. Improvements to include structural upgrade of the existing roof structure and its attachment to the un-reinforced masonry building structure; restoration or replacement of historic exterior stonework; restoration or replacement of exterior doors and windows; complete replacement of the roofing and roof drainage systems; and relocation or replacement of security cameras and miscellaneous cables, conduits, etc

Individual contractors or alliances between two or more contractors are allowed in this process to form a team. However, one contractor or firm MUST be declared as the lead firm representing the team. If the team is short-listed through this multi-step process, the state will only enter into contracts with the lead contractor or firm. The lead contractor or firm must be licensed by the State of Utah and comply with and require all of its subcontractors to comply with the license laws as required by the State of Utah.

MULTI-STEP BIDDING PROCESS
SHORT-LISTING OF GENERAL CONTRACTORS

The short-listing of contractors will be based on the selection criteria outlined in this document.

1. Multi-Step Bidding Documents

The Multi-Step bidding documents consist of all of the information contained in this solicitation and all documents listed in the Table of Contents. All said documents are incorporated in this document by reference.

2. Availability of Documents

Bidding documents are available free of charge at the locations stated on the Schedule. The bidding documents are also available at DFCM's internet web site at http://dfcm.utah.gov.

3. Drawings and Specifications and Interpretations

Drawings, specifications and other contract documents may be obtained as stated in the Notice to Contractors. If any firm is in doubt as to the meaning or interpretation of any part of the drawings, specifications, scope of work or contract documents, they shall submit, in writing, a request for interpretation to the authorized DFCM representative by the deadline identified in the schedule. Answers to questions and interpretations will be made via addenda issued by DFCM. Neither DFCM nor the designer shall be responsible for incorrect information obtained by contractors from sources other than the official drawings/specifications and addenda issued by DFCM.

4. Contact Information

Except as authorized by the DFCM Representative or as otherwise stated in the bidding documents or the pre-submittal meeting, communication during the multi-step bidding process shall be directed to the specified DFCM's Representative. In order to maintain the fair and equitable treatment of everyone, contractors shall not unduly contact or offer gifts or gratuities to owners, users or selection committee members in an effort to influence the selection process or in a manner that gives the appearance of influencing the selection process. This prohibition applies before the bidding documents are issued as the project is developed, and extends through the award of a contract. Failure to comply with this requirement may result in a disqualification from the multi-step bidding process. Contractors should be aware that selection committee members will be required to certify that they have not been contacted by any of the contractors in an attempt to influence the selection process.

5. Requests for Information

All requests for information shall be in writing and directed to:

Project Manager Michael Ambre
Division of Facilities Construction and Management
4110 State Office Building
Salt Lake City, Utah 84114
E-mail: **mambre@utah.gov**
Phone: **801-209-9104**
Facsimile: 801-538-3267

6. Schedule

The Schedule lists the important events, dates, times and locations of meetings and submittals that must be met by the contractor.

7. Pre-Submittal Meeting

A **mandatory** pre-submittal meeting will be held on the date and time and at the location listed on the Schedule. During the meeting, questions will be answered about the multi-step bidding process. Questions about the project, plans and specifications will also be addressed. Attendance at this meeting is mandatory for General Contractors.

8. Submittal Due Dates and Times

All required submittals must be delivered to, and received by, the Division of Facilities Construction and Management by the time deadline established in the Schedule. Submittals received after the specified time deadline will not be accepted. Please allow adequate time for delivery. If using a courier service, the contractor is responsible for ensuring that delivery will be made directly to the required location prior to the deadline.

9. Last Day to Submit Questions

Questions must be submitted in writing to the DFCM project manager by the deadline listed on the Schedule.

10. Addendum

All clarifications will be in writing and issued as addenda to the RFS. Addenda will be posted on DFCM's web site at http://dfcm.utah.gov. **Contractors are responsible for obtaining information contained in the addenda from the web site. Any addenda issued prior to the submittal deadline shall become part of the multi-step bidding process and any information required must be included in the contractor's submittal.** Addenda issued prior to the submittal deadline shall become part of the bidding process and must be acknowledged on the bid form. Failure to acknowledge addenda may result in disqualification from bidding. DFCM shall not be responsible for incorrect information obtained by contractors from sources other than official addenda issued by DFCM.

11. Bid Bond Requirements

A bid bond properly signed by a qualified surety, as indicated on the DFCM Bid Bond form provided along with this Instruction to Bidders, in the amount of 5% of the bid, shall accompany the bid submission to DFCM. THIS BID BOND MUST BE ON THE DFCM BID BOND FORM PROVIDED WITH THIS INSTRUCTION TO BIDDERS IN ORDER TO BE CONSIDERED AN ACCEPTABLE BID unless only one bid is received by DFCM, or the failure to comply with the bid bond requirements is determined by the Director of DFCM to be nonsubstantial based on the following:

(a) the bid bond is submitted on a form other than DFCM's required Bid Bond form and the bid bond meets all other requirements including being issued by a surety firm authorized to do business in the State of Utah and be listed in the U.S. Department of the Treasury Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies for an amount not less than the amount of the bond to be issued. A co-surety may be utilized to satisfy this requirement; and

(b) the contractor provides a bid bond properly signed by a qualified surety and on the required DFCM Bid Bond form by the close of business of the next succeeding business day after the DFCM notifies the bidder of the defective bid bond.

12. Performance and References

DFCM will rate each firm's performance on every project worked on (rating scale: 1 = low; 5 = high). The rating may include comments from agencies. The firm will have an opportunity to review and comment on their ratings. Ratings on DFCM projects over the previous five years will be provided to the selection committee for their consideration in evaluating and scoring the past performance of each firm. If a firm has not completed at least three DFCM projects in the last five years, they shall provide by the time indicated on the Schedule, a list of references on additional projects for a total of five projects. References should include: (a) name and address of the project; (b) name and phone number of the person able to answer questions about the project; (c) date of when the work was completed; (d) the cost of the project and the type of project (school, office, warehouse, etc).

13. Statement of Qualifications

The Contractor (firm) shall provide five copies of a statement of qualifications by the time indicated on the Schedule. The statement should describe: (a) the financial viability of your firm; (b) the experience, skill level and qualifications of your firm - identify the specific project manager and site superintendent that will be assigned to this project; (c) provide examples of similar projects completed by your firm and the specific project manager and site superintendent that will be assigned to this project; explain/submit a list of recently completed exterior masonry restoration projects, including project name and location, names of owner and architect, and description of materials and processes, systems, or techniques used. Masonry Restoration Subcontractor must be an experienced stone restoration firm (minimum of five years experience) that has completed work similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance; (d) describe your firm's areas of expertise and other special qualifications as they pertain to this project; (e) document your firm's track record of completing projects on time and within budget; (f) explain your firm's reputation and commitment to high-quality workmanship; and (g) document your firm's ability to comply with the bonding requirements outlined earlier in this document. The statement of qualifications should be concise **(limit four pages)** yet contain sufficient information for evaluation by the selection committee. Note: If multiple firms combine to form a team, only the lead contractor or firm will be allowed to bid on projects. In addition, if any member of the team (contractor or firm) withdraws from the team, the entire team is disqualified and will not be allowed to bid.

14. Termination or Debarment Certification

Each firm must submit a certification that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from soliciting work by any governmental department or agency. The firm must also certify that neither the firm nor its principals have been terminated during the performance of a contract or withdrew from a contract to avoid termination. If the firm cannot certify to these statements, the firm shall submit a written explanation. Firms are to submit the certifications with their Statement of Qualifications.

15. Project Management Plan

Each Contractor (firm) shall provide five copies of a document describing their management plan by the time indicated on the Schedule. The document should include: (a) the process used for selecting and managing subcontractors; (b) a description of how the your firm is organized - pertaining to this project, document who will be in charge with decision making authority; (c) a project schedule detailing your firm's plan to ensure that the project will be completed on time (include timeline for ordering long lead materials and equipment); (d) a description of the process (action plan) your firm will take to bring the project back on schedule if it falls behind; (e) the procedures your firm has in place to minimize change orders; (f) the methodology used to ensure the accuracy of your bid; (g) your firm's approach to site security and project safety; (h) your firm's understanding of DFCM's construction general conditions and contract requirements; and (i) any other information that will assist the selection committee in evaluating your firm's approach to project management.

Include an organization chart of key personnel and a description of their duties. The management plan document should be concise **(limit three pages)** yet contain sufficient information for evaluation by the selection committee. The organization chart is a separate document and is not counted as one of the three pages.

16. Selection Committee

The selection committee will evaluate and score each firm/team. Committee members may include individuals from DFCM, User Agency/Institution, and a representative from the design or construction disciplines.

17. Interviews.

If interviews are required, firms will be notified of the date and time of their interview. Otherwise, the selection committee reserves the right to short-list firms/teams based on their submitted past performance ratings/references, statement of qualifications and project management plan.

If necessary, interviews will be conducted with all responsive and responsible contractors. Firms that are late or do not appear for the interview may be disqualified by the committee. The evaluation will be made using the selection criteria contained in this document. Information provided by the past performance/references, statement of qualifications, project management plan and the interview will be evaluated using the selection criteria as the basis for the selection. The purpose of the interview is to allow contractors an opportunity to present their qualifications, discuss past performance/references and describe their project management plan. It will also provide an opportunity for the selection committee to ask questions about these items. Firms may elect to have management personnel, project managers and superintendents in attendance. Attendance of subcontractors is at the discretion of the contractor. The method of presentation is at the discretion of the contractor.

18. Selection Criteria

The following criteria and weighting will be used in evaluating each firm/team. The selection committee will consider all criteria in performing a comprehensive evaluation of each firm/team. Each firm/team will be scored by each selection committee member in the categories listed below.

A. Performance Rating/References. The committee will receive a past performance rating and/or reference score for each firm/team. DFCM will compute the score for each firm/team based upon the information outlined earlier in this document. **Possible Points: 25**

B. Statement of Qualifications. The committee will evaluate and score each firm's/team's qualifications in accordance with the information outlined earlier in this document as well as additional information about the firm's/team's qualifications presented during the interview. **Possible Points: 40**

C. Project Management Plan. The committee will evaluate and score each firm's/team's project management approach in accordance with the information outlined earlier in this document as well as additional information about the firm's/team's project management approach presented during the interview. **Possible Points: 35**

TOTAL POINTS = 100 POINTS

19. Short-Listing

DFCM will **short-list up to six firms** receiving the highest score above the minimum score of 85 points from the selection committee. No firms receiving fewer than 85 points will be short-listed. Only short-listed firms will be invited to bid on this project. During the bidding process, the final contractor selection will be based on the lowest responsive and responsible bidder.

20. Product Approvals

Where reference is made to one or more proprietary products in the contract documents, but restrictive descriptive materials of one or more manufacturer(s) is referred to in the contract documents, the products of other manufacturers will be accepted, provided they equal or exceed the standards set forth in the drawings and specifications and are compatible with the intent and purpose of the design, subject to the written approval of the Designer. Such written approval must occur prior to the deadline established for the last scheduled addendum to be issued. The Designer's written approval will be included as part of the addendum issued by DFCM. If the descriptive material is not restrictive, the products of other manufacturers specified will be accepted without prior approval provided they are compatible with the intent and purpose of the design as determined by the Designer.

21. Trade Secrets or Confidential Matters

Any submitter may designate those portions of the submittals which contain trade secrets or other confidential matters that the Governmental Records and Access Management Act (GRAMA) would allow to be a protected record. Any disclosure of submittals or portions thereof shall be in accordance with GRAMA and State law.

22. Financial Responsibility of Contractors, Subcontractors and Sub-subcontractors

Contractors shall respond promptly to any inquiry in writing by DFCM to any concern of financial responsibility of the Contractor, Subcontractor or Sub-subcontractor. Failure to respond may result in the Contractor (firm) receiving a poor performance rating on this project.

23. Licensure

The Contractor shall comply with and require all of its Subcontractors to comply with the license laws as required by the State of Utah.

24. Permits

In concurrence with the requirements for permitting in the General Conditions, it is the responsibility of the Contractor to obtain the fugitive dust plan requirements from the Utah Division of Air Quality and the SWPPP requirements from the Utah Department of Environmental Quality and submit the

completed forms and pay any permit fee that may be required for this specific project. Failure to obtain the required permit may result in work stoppage and/or fines from the regulating authority that will be the sole responsibility of the Contractor. Any delay to the project as a result of any such failure to obtain the permit or noncompliance with the permit shall not be eligible for any extension in the Contract Time.

25. Time is of the Essence

Time is of the essence in regard to all the requirements of the contract documents.

26. Bids

Before submitting a bid, each bidder shall carefully examine the contract documents; shall visit the site of the work; shall fully inform themselves as to all existing conditions and limitations; and shall include in the bid the cost of all items required by the contract documents including those added via addenda. If the bidder observes that portions of the contract documents are at variance with applicable laws, building codes, rules, regulations or contain obvious erroneous or uncoordinated information, the bidder shall promptly notify the DFCM Project Manager. Changes necessary to correct these issues will be made via addenda issued by DFCM.

The bid, bearing original signatures, must be typed or handwritten in ink on the Bid Form provided in the procurement documents and submitted in a sealed envelope at the location specified by the Notice to Contractor's prior to the published deadline for the submission of bids.

Bid bond security, in the amount of five percent (5%) of the bid, made payable to the Division of Facilities Construction and Management, shall accompany bid. THE BID BOND MUST BE ON THE BID BOND FORM PROVIDED IN THE PROCUREMENT DOCUMENTS IN ORDER TO BE CONSIDERED AN ACCEPTABLE BID.

If the bid bond security is submitted on a form other than the Owner's required bid bond form, and the bid security meets all other legal requirements, the bidder will be allowed to provide an acceptable bid bond by the close of business on the next business day following notification by DFCM of submission of a defective bid bond security. **A cashier's check cannot be used as a substitute for a bid bond.**

27. Listing of Subcontractors

Listing of Subcontractors shall be as summarized in the "Instructions and Subcontractors List Form", included as part of the contract documents. The Subcontractors List shall be delivered to DFCM or faxed to DFCM at (801)538-3677 within 24 hours of the bid opening. Requirements for listing additional subcontractors will be listed in the contract documents.

DFCM retains the right to audit or take other steps necessary to confirm compliance with requirements for the listing and changing of subcontractors. Any contractor who is found to not be in compliance with these requirements may receive a poor performance rating on this project.

28. Contract and Bond

The Contractor's Agreement will be in the form found in the specifications. The contract time will be as indicated in the bid. The successful bidder, simultaneously with the execution of the Contract Agreement, will be required to furnish a performance bond and a payment bond, both bearing original signatures, upon the forms provided in the procurement documents. The performance and payment bonds shall be for an amount equal to one hundred percent (100%) of the Contract Sum and secured from a company that meets the requirements specified in the requisite forms. Any bonding requirements for Subcontractors will be specified in the Supplementary General Conditions.

29. Award of Contract

The Contract will be awarded as soon as possible to the lowest, responsive and responsible bidder, based on the lowest combination of base bid and acceptable prioritized alternates, provided the bid is reasonable, is in the interests of DFCM to accept and after applying the Utah Preference Laws in U.C.A. Title 63, Chapter 56. DFCM reserves the right to waive any technicalities or formalities in any bid or in the bidding. Alternates will be accepted on a prioritized basis with Alternate 1 being highest priority, Alternate 2 having second priority, etc.

30. Right to Reject Bids

DFCM reserves the right to reject any or all Bids.

31. Withdrawal of Bids

Bids may be withdrawn on written request received from bidders within 24 hours after the bid opening if the contractor has made an error in preparing the bid.

MULTI-STEP PROJECT SCHEDULE

PROJECT NAME: **GOVERNOR'S CARRIAGE HOUSE STABILIZATION**
DIVISION OF FACILITIES CONSTRUCTION & MANAGEMENT

DFCM PROJECT NO. : **10032310**

Event	Day	Date	Time	Place
Document Available, including Plans and Specifications	Tuesday	April 27, 2010	10:00 AM	DFCM 4110 State Office Building SLC, UT and DFCM web site*
Mandatory Pre-Submittal Meeting	Monday	May 3, 2010	3:00 PM	DFCM 4110 State Office Building SLC, UT
Last Day to Submit Questions on Shortlisting (In Writing)	Wednesday	May 5, 2010	4:00 PM	*Michael Ambre*- DFCM E-mail mambre@utah.gov Fax 801-538-3267
Addendum on Shortlisting	Thursday	May 6, 2010	4:00 PM	DFCM web site*
List of References, Statement of Qualifications, Project Management Plan, and Termination/Debarment Certification Due	Tuesday	May 11, 2010	12:00 NOON	DFCM 4110 State Office Building SLC, UT
Interviews by Selection Committee (if necessary)	Monday	May 17, 2010	3:00 PM	DFCM 4110 State Office Building SLC, UT
Short-List Announced	Tuesday	May 18, 2010	4:00 PM	DFCM web site*
Notice: Only Short-Listed Firms Will Be Allowed To Bid On This Project				
Mandatory Pre-Site Meeting	Thursday	May 20, 2010	9:00 AM	
Last Day to Submit Questions (In Writing)	Monday	May 24, 2010	12:00 PM	*Michael Ambre* - DFCM E-mail mambre@utah.gov Fax 801-538-3267
Final Addendum (exception for bid delays)	Thursday	May 27, 2010	4:00 PM	DFCM web site*
Prime Contractors Turn in Bid and Bid Bond/Bid Opening in DFCM Conference Room	Tuesday	June 1, 2010	2:00 PM	DFCM 4110 State Office Building SLC, UT
Subcontractors List Due	Wednesday	June 2, 2010	2:00 PM	DFCM 4110 State Office Building SLC, UT Fax 801-538-3677
Project Completion Date	Friday	December 17, 2010	5:00 PM	

*** DFCM's web site address is http://dfcm.utah.gov**

BID FORM

NAME OF BIDDER _____ DATE _____

To the Division of Facilities Construction and Management
4110 State Office Building
Salt Lake City, Utah 84114

The undersigned, responsive to the "Notice to Contractors" and in accordance with the "Instructions to Bidders", in compliance with your invitation for bids for the **Governor's Carriage House Stabilization – Division of Facilities Construction & Management – Salt Lake City, Utah – DFCM Project No. 10032310** and having examined the Contract Documents and the site of the proposed Work and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of labor, hereby proposes to furnish all labor, materials and supplies as required for the Work in accordance with the Contract Documents as specified and within the time set forth and at the price stated below. This price is to cover all expenses incurred in performing the Work required under the Contract Documents of which this bid is a part:

I/We acknowledge receipt of the following Addenda: _____

For all work shown on the Drawings and described in the Specifications and Contract Documents, I/we agree to perform for the sum of:

_____ DOLLARS ($_____)
(In case of discrepancy, written amount shall govern)

I/We guarantee that the Work will be Substantially Complete by December 17, 2010 should I/we be the successful bidder, and agree to pay liquidated damages in the amount of **$500.00** per day for each day after expiration of the Contract Time as stated in Article 3 of the Contractor's Agreement.

This bid shall be good for 45 days after bid opening.

Enclosed is a 5% bid bond, as required, in the sum of _____

The undersigned Contractor's License Number for Utah is _____._____

Upon receipt of notice of award of this bid, the undersigned agrees to execute the contract within ten (10) days, unless a shorter time is specified in the Contract Documents, and deliver acceptable Performance and Payment bonds in the prescribed form in the amount of 100% of the Contract Sum for faithful performance of the contract.

The Bid Bond attached, in the amount not less than five percent (5%) of the above bid sum, shall become the property of the Division of Facilities Construction and Management as liquidated damages for delay and additional expense caused thereby in the event that the contract is not executed and/or acceptable l00% Performance and Payment bonds are not delivered within the time set forth.

Type of Organization:

_____
(Corporation, Partnership, Individual, etc.)

Any request and information related to Utah Preference Laws:

_____

Respectfully submitted,

_____
Name of Bidder

ADDRESS:

_____

_____

_____
Authorized Signature

BID BOND

(Title 63, Chapter 56, U. C. A. l953, as Amended)

KNOW ALL PERSONS BY THESE PRESENTS:

That _____ hereinafter referred to as the "Principal," and_____, a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____ and authorized to transact business in this State and U. S. Department of the Treasury Listed, (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); hereinafter referred to as the "Surety," are held and firmly bound unto the STATE OF UTAH, hereinafter referred to as the "Obligee," in the amount of $_____(5% of the accompanying bid), being the sum of this Bond to which payment the Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has submitted to Obligee the accompanying bid incorporated by reference herein, dated as shown, to enter into a contract in writing for the _____Project.

NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that if the said principal does not execute a contract and give bond to be approved by the Obligee for the faithful performance thereof within ten (10) days after being notified in writing of such contract to the principal, then the sum of the amount stated above will be forfeited to the State of Utah as liquidated damages and not as a penalty; if the said principal shall execute a contract and give bond to be approved by the Obligee for the faithful performance thereof within ten (10) days after being notified in writing of such contract to the Principal, then this obligation shall be null and void. It is expressly understood and agreed that the liability of the Surety for any and all defaults of the Principal hereunder shall be the full penal sum of this Bond. The Surety, for value received, hereby stipulates and agrees that obligations of the Surety under this Bond shall be for a term of sixty (60) days from actual date of the bid opening.

PROVIDED, HOWEVER, that this Bond is executed pursuant to provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to same extent as if it were copied at length herein.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their several seals on the date indicated below, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

DATED this _____ day of _____, 20_____ .

Principal's name and address (if other than a corporation):

_____

By:_____

Title: _____

Principal's name and address (if a corporation):

_____

By _____

Title: _____

(Affix Corporate Seal)

Surety's name and address:

_____

_____

By:_____

Attorney-in-Fact (Affix Corporate Seal)

STATE OF _____)
) ss.
COUNTY OF _____)

On this ____ day of _____, 20_____, personally appeared before me _____, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney-in-fact of the above-named Surety Company, and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this _____ day of _____, 20_____.
My Commission Expires: _____
Resides at: _____

_____

NOTARY PUBLIC

Agency: _____
Agent: _____
Address: _____
Phone: _____

Approved As To Form: May 25, 2005
By Alan S. Bachman, Asst Attorney General

INSTRUCTIONS AND SUBCONTRACTORS LIST FORM

The three low bidders, as well as all other bidders that desire to be considered, are required by law to submit to DFCM within 24 hours of bid opening a list of **ALL** first-tier subcontractors, including the subcontractor's name, bid amount and other information required by Building Board Rule and as stated in these Contract Documents, based on the following:

DOLLAR AMOUNTS FOR LISTING

PROJECTS UNDER $500,000: ALL FIRST-TIER SUBS $20,000 OR OVER MUST BE LISTED
PROJECTS $500,000 OR MORE: ALL FIRST-TIER SUBS $35,000 OR OVER MUST BE LISTED

- Any additional subcontractors identified in the bid documents shall also be listed.
- The DFCM Director may not consider any bid submitted by a bidder if the bidder fails to submit a subcontractor list meeting the requirements of State law.
- List subcontractors for base bid as well as the impact on the list that the selection of any alternate may have.
- Bidder may not list more than one subcontractor to perform the same work.
- If there are no subcontractors for the job that are required to be reported by State law (either because there are no subcontractors that will be used on the project or because there are no first-tier subcontractors over the dollar amounts referred to above), then you do not need to submit a sublist. If you do not submit a sublist, it will be deemed to be a representation by you that there are no subcontractors on the job that are required to be reported under State law. At any time, DFCM reserves the right to inquire, for security purposes, as to the identification of the subcontractors at any tier that will be on the worksite.

LICENSURE:

The subcontractor's name, the type of work, the subcontractor's bid amount, and the subcontractor's license number as issued by DOPL, if such license is required under Utah Law, shall be listed. Bidder shall certify that all subcontractors, required to be licensed, are licensed as required by State law. A subcontractor includes a trade contractor or specialty contractor and does not include suppliers who provide only materials, equipment, or supplies to a contractor or subcontractor.

'SPECIAL EXCEPTION':

A bidder may list 'Special Exception' in place of a subcontractor when the bidder intends to obtain a subcontractor to perform the work at a later date because the bidder was unable to obtain a qualified or reasonable bid under the provisions of U.C.A.Section 63A-5-208(4). The bidder shall insert the term 'Special Exception' for that category of work, and shall provide documentation with the subcontractor list describing the bidder's efforts to obtain a bid of a qualified subcontractor at a reasonable cost and why the bidder was unable to obtain a qualified subcontractor bid. The Director must find that the bidder complied in good faith with State law requirements for any 'Special Exception' designation, in order for the bid to be considered. If awarded the contract, the Director shall supervise the bidder's efforts to obtain a qualified subcontractor bid. The amount of the awarded contract may not be adjusted to reflect the actual amount of the subcontractor's bid. Any listing of 'Special Exception' on the sublist form shall also include amount allocated for that work.

GROUNDS FOR DISQUALIFICATION:

The Director may not consider any bid submitted by a bidder if the bidder fails to submit a subcontractor list meeting the requirements of State law. Director may withhold awarding the contract to a particular bidder if one or more of the proposed subcontractors are considered by the Director to be unqualified to do the Work or for

such other reason in the best interest of the State of Utah. Notwithstanding any other provision in these instructions, if there is a good faith error on the sublist form, at the sole discretion of the Director, the Director may provide notice to the contractor and the contractor shall have 24 hours to submit the correction to the Director. If such correction is submitted timely, then the sublist requirements shall be considered met.

CHANGES OF SUBCONTRACTORS SPECIFICALLY IDENTIFIED ON SUBLIST FORM:

Subsequent to twenty-four hours after the bid opening, the contractor may change its listed subcontractors only after receiving written permission from the Director based on complying with all of the following criteria.

(1) The contractor has established in writing that the change is in the best interest of the State and that the contractor establishes an appropriate reason for the change, which may include, but not is not limited to, the following reasons: the original subcontractor has failed to perform, or is not qualified or capable of performing, and/or the subcontractor has requested in writing to be released.
(2) The circumstances related to the request for the change do not indicate any bad faith in the original listing of the subcontractors.
(3) Any requirement set forth by the Director to ensure that the process used to select a new subcontractor does not give rise to bid shopping.
(4) Any increase in the cost of the subject subcontractor work is borne by the contractor.
(5) Any decrease in the cost of the subject subcontractor work shall result in a deductive change order being issued for the contract for such decreased amount.
(6) The Director will give substantial weight to whether the subcontractor has consented in writing to being removed unless the Contractor establishes that the subcontractor is not qualified for the work.

EXAMPLE:

Example of a list where there are only four subcontractors:

TYPE OF WORK	SUBCONTRACTOR, "SELF" OR "SPECIAL EXCEPTION"	SUBCONTRACTOR BID AMOUNT	CONTRACTOR LICENSE #
ELECTRICAL	ABCD Electric Inc.	$350,000.00	123456789000
LANDSCAPING	"Self" *	$300,000.00	123456789000
CONCRETE (ALTERNATE #1)	XYZ Concrete Inc	$298,000.00	987654321000
MECHANICAL	"Special Exception" (attach documentation)	Fixed at: $350,000.00	(TO BE PROVIDED AFTER OBTAINING SUBCONTRACTOR)

* Bidders may list "self", but it is not required.

PURSUANT TO STATE LAW - SUBCONTRACTOR BID AMOUNTS CONTAINED IN THIS SUBCONTRACTOR LIST SHALL NOT BE DISCLOSED UNTIL THE CONTRACT HAS BEEN AWARDED.

STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and Management

DFCM

SUBCONTRACTORS LIST

FAX TO 801-538-3677

PROJECT TITLE: _____

Caution: You must read and comply fully with instructions.

TYPE OF WORK	SUBCONTRACTOR, "SELF" OR "SPECIAL EXCEPTION"	SUBCONTRACTOR BID AMOUNT	CONT. LICENSE #

We certify that:

1. This list includes all subcontractors as required by the instructions, including those related to the base bid as well as any alternates.
2. We have listed "Self" or "Special Exception" in accordance with the instructions.
3. All subcontractors are appropriately licensed as required by State law.

FIRM: _____

DATE: _____ SIGNED BY: _____

NOTICE: FAILURE TO SUBMIT THIS FORM, PROPERLY COMPLETED AND SIGNED, AS REQUIRED IN THESE CONTRACT DOCUMENTS, SHALL BE GROUNDS FOR OWNER'S REFUSAL TO ENTER INTO A WRITTEN CONTRACT WITH BIDDER. ACTION MAY BE TAKEN AGAINST BIDDERS BID BOND AS DEEMED APPROPRIATE BY OWNER. ATTACH A SECOND PAGE IF NECESSARY.

300/300/____/FVA/____/_____/__/_
Project No. _____

CONTRACTOR'S AGREEMENT

FOR:

_____
_____
_____

THIS CONTRACTOR'S AGREEMENT, made and entered into this __ day of _____, 2006, by and between the DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT, hereinafter referred to as "DFCM", and _____, incorporated in the State of Utah and authorized to do business in the State of Utah, hereinafter referred to as "Contractor", whose address is _____Utah _____.

WITNESSETH: WHEREAS, DFCM intends to have _____ Work performed at _____
_____

WHEREAS, Contractor agrees to perform the Work for the sum stated herein.

NOW, THEREFORE, DFCM and Contractor for the consideration provided in this Contractor's Agreement, agree as follows:

ARTICLE 1. SCOPE OF WORK. The Work to be performed shall be in accordance with the Contract Documents prepared by _____ and entitled "_____."

The DFCM General Conditions ("General Conditions") dated May 25, 2005 and Supplemental General Conditions dated July 15, 2008 and July 1, 2009 (also referred to as "General Condition"), on file at the office of DFCM and available on the DFCM website, are hereby incorporated by reference as part of this Agreement and are included in the specifications for this Project. All terms used in this Contractor's Agreement shall be as defined in the Contract Documents, and in particular, the General Conditions.

The Contractor Agrees to furnish labor, materials and equipment to complete the Work as required in the Contract Documents which are hereby incorporated by reference. It is understood and agreed by the parties hereto that all Work shall be performed as required in the Contract Documents and shall be subject to inspection and approval of DFCM or its authorized representative. The relationship of the Contractor to the DFCM hereunder is that of an independent Contractor.

ARTICLE 2. CONTRACT SUM. The DFCM agrees to pay and the Contractor agrees to accept in full performance of this Contractor's Agreement, the sum of _____**DOLLARS AND NO CENTS ($_____)**, which is the base bid, and includes the cost of a 100%

Performance Bond and a 100% Payment Bond as well as all insurance requirements of the Contractor. Said bonds have already been posted by the Contractor pursuant to State law. The required proof of insurance certificates have been delivered to DFCM in accordance with the General Conditions before the execution of this Contractor's Agreement.

ARTICLE 3. TIME OF COMPLETION AND DELAY REMEDY. The Work shall be Substantially Complete by _____ after the date of the Notice to Proceed. Contractor agrees to pay liquidated damages in the amount of _____ per day for each day after expiration of the Contract Time until the Contractor achieves Substantial Completion in accordance with the Contract Documents, if Contractor's delay makes the damages applicable. The provision for liquidated damages is: (a) to compensate the DFCM for delay only; (b) is provided for herein because actual damages can not be readily ascertained at the time of execution of this Contractor's Agreement; (c) is not a penalty; and (d) shall not prevent the DFCM from maintaining Claims for other non-delay damages, such as costs to complete or remedy defective Work.

No action shall be maintained by the Contractor, including its or Subcontractor or suppliers at any tier, against the DFCM or State of Utah for damages or other claims due to losses attributable to hindrances or delays from any cause whatsoever, including acts and omissions of the DFCM or its officers, employees or agents, except as expressly provided in the General Conditions. The Contractor may receive a written extension of time, signed by the DFCM, in which to complete the Work under this Contractor's Agreement in accordance with the General Conditions.

ARTICLE 4. CONTRACT DOCUMENTS. The Contract Documents consist of this Contractor's Agreement, the Conditions of the Contract (DFCM General Conditions, Supplementary and other Conditions), the Drawings, Specifications, Addenda and Modifications. The Contract Documents shall also include the bidding documents, including the Notice to Contractors, Instructions to Bidders/Proposers and the Bid/Proposal, to the extent not in conflict therewith and other documents and oral presentations that are documented as an attachment to the contract.

All such documents are hereby incorporated by reference herein. Any reference in this Contractor's Agreement to certain provisions of the Contract Documents shall in no way be construed as to lessen the importance or applicability of any other provisions of the Contract Documents.

ARTICLE 5. PAYMENT. The DFCM agrees to pay the Contractor from time to time as the Work progresses, but not more than once each month after the date of Notice to Proceed, and only upon Certificate of the A/E for Work performed during the preceding calendar month, ninety-five percent (95%) of the value of the labor performed and ninety-five percent (95%) of the value of materials furnished in place or on the site. The Contractor agrees to furnish to the DFCM invoices for materials purchased and on the site but not installed, for which the

Contractor requests payment and agrees to safeguard and protect such equipment or materials and is responsible for safekeeping thereof and if such be stolen, lost or destroyed, to replace same.

Such evidence of labor performed and materials furnished as the DFCM may reasonably require shall be supplied by the Contractor at the time of request for Certificate of Payment on account. Materials for which payment has been made cannot be removed from the job site without DFCM's written approval. Five percent (5%) of the earned amount shall be retained from each monthly payment. The retainage, including any additional retainage imposed and the release of any retainage, shall be in accordance with UCA 13-8-5 as amended. Contractor shall also comply with the requirements of UCA 13-8-5, including restrictions of retainage regarding subcontractors and the distribution of interest earned on the retention proceeds. The DFCM shall not be responsible for enforcing the Contractor’s obligations under State law in fulfilling the retention law requirements with subcontractors at any tier.

ARTICLE 6. INDEBTEDNESS. Before final payment is made, the Contractor must submit evidence satisfactory to the DFCM that all payrolls, materials bills, subcontracts at any tier and outstanding indebtedness in connection with the Work have been properly paid. Final Payment will be made after receipt of said evidence, final acceptance of the Work by the DFCM as well as compliance with the applicable provisions of the General Conditions.

Contractor shall respond immediately to any inquiry in writing by DFCM as to any concern of financial responsibility and DFCM reserves the right to request any waivers, releases or bonds from Contractor in regard to any rights of Subcontractors (including suppliers) at any tier or any third parties prior to any payment by DFCM to Contractor.

ARTICLE 7. ADDITIONAL WORK. It is understood and agreed by the parties hereto that no money will be paid to the Contractor for additional labor or materials furnished unless a new contract in writing or a Modification hereof in accordance with the General Conditions and the Contract Documents for such additional labor or materials has been executed. The DFCM specifically reserves the right to modify or amend this Contractor's Agreement and the total sum due hereunder either by enlarging or restricting the scope of the Work.

ARTICLE 8. INSPECTIONS. The Work shall be inspected for acceptance in accordance with the General Conditions.

ARTICLE 9. DISPUTES. Any dispute, PRE or Claim between the parties shall be subject to the provisions of Article 7 of the General Conditions. DFCM reserves all rights to pursue its rights and remedies as provided in the General Conditions.

ARTICLE 10. TERMINATION, SUSPENSION OR ABANDONMENT. This Contractor’s Agreement may be terminated, suspended or abandoned in accordance with the General Conditions.

ARTICLE 11. DFCM'S RIGHT TO WITHHOLD CERTAIN AMOUNT AND MAKE USE THEREOF. The DFCM may withhold from payment to the Contractor such amount as, in DFCM's judgment, may be necessary to pay just claims against the Contractor or Subcontractor at any tier for labor and services rendered and materials furnished in and about the Work. The DFCM may apply such withheld amounts for the payment of such claims in DFCM's discretion. In so doing, the DFCM shall be deemed the agent of Contractor and payment so made by the DFCM shall be considered as payment made under this Contractor's Agreement by the DFCM to the Contractor. DFCM shall not be liable to the Contractor for any such payment made in good faith. Such withholdings and payments may be made without prior approval of the Contractor and may be also be prior to any determination as a result of any dispute, PRE, Claim or litigation.

ARTICLE 12. INDEMNIFICATION. The Contractor shall comply with the indemnification provisions of the General Conditions.

ARTICLE 13. SUCCESSORS AND ASSIGNMENT OF CONTRACT. The DFCM and Contractor, respectively bind themselves, their partners, successors, assigns and legal representatives to the other party to this Agreement, and to partners, successors, assigns and legal representatives of such other party with respect to all covenants, provisions, rights and responsibilities of this Contractor’s Agreement. The Contractor shall not assign this Contractor’s Agreement without the prior written consent of the DFCM, nor shall the Contractor assign any moneys due or to become due as well as any rights under this Contractor’s Agreement, without prior written consent of the DFCM.

ARTICLE 14. RELATIONSHIP OF THE PARTIES. The Contractor accepts the relationship of trust and confidence established by this Contractor's Agreement and covenants with the DFCM to cooperate with the DFCM and A/E and use the Contractor's best skill, efforts and judgment in furthering the interest of the DFCM; to furnish efficient business administration and supervision; to make best efforts to furnish at all times an adequate supply of workers and materials; and to perform the Work in the best and most expeditious and economic manner consistent with the interests of the DFCM.

ARTICLE 15. AUTHORITY TO EXECUTE AND PERFORM AGREEMENT. Contractor and DFCM each represent that the execution of this Contractor's Agreement and the performance thereunder is within their respective duly authorized powers.

ARTICLE 16. ATTORNEY FEES AND COSTS. Except as otherwise provided in the dispute resolution provisions of the General Conditions, the prevailing party shall be entitled to reasonable attorney fees and costs incurred in any action in the District Court and/or appellate body to enforce this Contractor's Agreement or recover damages or any other action as a result of a breach thereof.

IN WITNESS WHEREOF, the parties hereto have executed this Contractor's Agreement on the day and year stated hereinabove.

CONTRACTOR:

_____
Signature Date

Title: _____

_____
Please type/print name clearly

State of _____)
)
County of _____)

On this ____ day of _____, 20____, personally appeared before me, _____, whose identity is personally known to me (or proved to me on the basis of satisfactory evidence) and who by me duly sworn (or affirmed), did say that he (she) is the _____ (title or office) of the firm and that said document was signed by him (her) in behalf of said firm.

_____
Notary Public

(SEAL)

My Commission Expires _____

APPROVED AS TO AVAILABILITY OF FUNDS:

_____
David D. Williams, Jr. Date
DFCM Administrative Services Director

DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT

_____
Lynn A. Hinrichs Date
Assistant Director Construction Management

APPROVED AS TO FORM:
ATTORNEY GENERAL
July 1, 2009
By: Alan S. Bachman
Asst Attorney General

APPROVED FOR EXPENDITURE:

_____
Division of Finance Date

PERFORMANCE BOND

(Title 63, Chapter 56, U. C. A. 1953, as Amended)

That _____ hereinafter referred to as the "Principal" and _____, a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____ and authorized to transact business in this State and U. S. Department of the Treasury Listed (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); hereinafter referred to as the "Surety," are held and firmly bound unto the State of Utah, hereinafter referred to as the "Obligee, " in the amount of _____ DOLLARS ($_____) for the payment whereof, the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written Contract with the Obligee, dated the _____ day of _____, 20____, to construct _____ in the County of _____, State of Utah, Project No. _____, for the approximate sum of _____ _____ Dollars ($_____), which Contract is hereby incorporated by reference herein.

NOW, THEREFORE, the condition of this obligation is such that if the said Principal shall faithfully perform the Contract in accordance with the Contract Documents including, but not limited to, the Plans, Specifications and conditions thereof, the one year performance warranty, and the terms of the Contract as said Contract may be subject to Modifications or changes, then this obligation shall be void; otherwise it shall remain in full force and effect.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the state named herein or the heirs, executors, administrators or successors of the Owner.

The parties agree that the dispute provisions provided in the Contract Documents apply and shall constitute the sole dispute procedures of the parties.

PROVIDED, HOWEVER, that this Bond is executed pursuant to the Provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to the same extent as if it were copied at length herein.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this _____ day of _____, 20_____.

WITNESS OR ATTESTATION:

_____

PRINCIPAL:

_____

By: _____

(Seal)

Title: _____

WITNESS OR ATTESTATION:

_____

SURETY:

_____

By: _____
Attorney-in-Fact

(Seal)

STATE OF _____)
) ss.
COUNTY OF _____)

On this _____ day of _____, 20___, personally appeared before me _____, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney in-fact of the above-named Surety Company and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah inreference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this _____ day of _____, 20_____.
My commission expires: _____
Resides at: _____

_____
NOTARY PUBLIC

Agency: _____
Agent: _____
Address: _____
Phone: _____

Approved As To Form: May 25, 2005
By Alan S. Bachman, Asst Attorney General

PAYMENT BOND

(Title 63, Chapter 56, U. C. A. l953, as Amended)

KNOW ALL PERSONS BY THESE PRESENTS:

That _____ hereinafter referred to as the "Principal," and _____ _____, a corporation organized and existing under the laws of the State of _____authorized to do business in this State and U. S. Department of the Treasury Listed (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); with its principal office in the City of _____, hereinafter referred to as the "Surety," are held and firmly bound unto the State of Utah hereinafter referred to as the "Obligee," in the amount of _____ _____ Dollars ($_____) for the payment whereof, the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written Contract with the Obligee, dated the _____ day of _____, 20____, to construct _____ in the County of _____, State of Utah, Project No. _____ for the approximate sum of _____ _____ Dollars ($_____), which contract is hereby incorporated by reference herein.

NOW, THEREFORE, the condition of this obligation is such that if the said Principal shall pay all claimants supplying labor or materials to Principal or Principal's Subcontractors in compliance with the provisions of Title 63, Chapter 56, of Utah Code Annotated, l953, as amended, and in the prosecution of the Work provided for in said Contract, then, this obligation shall be void; otherwise it shall remain in full force and effect.

That said Surety to this Bond, for value received, hereby stipulates and agrees that no changes, extensions of time, alterations or additions to the terms of the Contract or to the Work to be performed thereunder, or the specifications or drawings accompanying same shall in any way affect its obligation on this Bond, and does hereby waive notice of any such changes, extensions of time, alterations or additions to the terms of the Contract or to the Work or to the specifications or drawings and agrees that they shall become part of the Contract Documents.

PROVIDED, HOWEVER, that this Bond is executed pursuant to the provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to the same extent as if it were copied at length herein.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this _____ day of _____, 20____.

WITNESS OR ATTESTATION:

_____

(Seal)

PRINCIPAL:

_____

By: _____

Title: _____

WITNESS OR ATTESTATION:

_____

SURETY:

_____

By: _____

Attorney-in-Fact (Seal)

STATE OF _____)
) ss.
COUNTY OF _____)

On this _____ day of _____, 20_____, personally appeared before me _____ _____, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney-in-fact of the above-named Surety Company, and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this _____ day of _____, 20_____.
My commission expires: _____
Resides at: _____

_____
NOTARY PUBLIC

Agency: _____
Agent: _____
Address: _____
Phone:

Approved As To Form: May 25, 2005
By Alan S. Bachman, Asst Attorney General

Building Utah's Future, Preserving Utah's Heritage

Governor's Carriage House Stabilization

603 E. South Temple Street
Salt Lake City, Utah

DFCM Project No. 10032310

State of Utah
Department of Administrative Services
Division of Facilities Construction & Management
4110 State Office Building
Salt Lake City, Utah 84114
801.538.3018

April 12, 2010

Project Manual – Bid Set

Historic view of the Thomas Kearns Mansion (now Executive Residence) Carriage House, 1907

MJSA
ARCHITECTURE ▫ INTERIOR DESIGN
357 West Pierpont Avenue Salt Lake City, Utah 84101
Tel 801 364 5167 ▫ Fax 801 364 5167

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Project Directory

Owner's Representative
Mike Ambre
Division of Facilities and Construction Management
State of Utah
4110 State Office Building
Salt Lake City, Utah 84114
P 801.538.3018
F 801.538.3267
M 801.209.9104
E mambre@utah.gov

Architect
Charles Shepherd, RA
MJSA Architects
357 W. Pierpont Avenue
Salt Lake City, Utah 84101
P 801.364.5161
F 801.364.5167
E cshepherd@mjsaa.com

Civil Engineer – Utilities & Underground Drainage
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Civil Engineer – Site Paving
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E info@pavementmanagement.com

Electrical Engineer
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M 801.891.6679
E enayat@eceonline.com

Structural Engineer
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Travis Thurgood, EIT
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Bountiful, Utah 84010
P 801.298.1118
F 801.298.1122
E ken.willmore@wcaeng.com
E travis.thurgood@wcaeng.com

SECTION 01100 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

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

B. Related Section:

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

1.3 PROJECT INFORMATION

A. Project Identification: Governor’s Carriage House Improvements

1. Project Location: 603 E. South Temple Street, Salt Lake City, Utah

B. Owner: State of Utah, Division of Facilities Construction & Management, 4110 State Office Building, Salt Lake City, Utah 84114. Phone: 801.538.3018

1. Owner's Representative: Mike Ambre.

2. Owner’s Project Number: 07293310.

C. Architect: MJSA Architecture, 357 West Pierpont Ave., Salt Lake City, Utah 84101.

D. Other Owner Consultants: The Owner has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. Willmore Cole & Associates (structural engineering).

1.4 WORK COVERED BY CONTRACT DOCUMENTS

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

1. The Work of the overall Project includes improvement to the historic 1907 Carriage House with related roof and site drainage. Project includes the structural upgrade of the existing roof structure and its attachment to the unreinforced masonry building structure; restoration and limited replacement of historic exterior stonework; restoration and limited replacement of exterior doors and windows; new custom overhead sectional door; complete replacement of the roofing, roof drainage systems and flashings with underground drainage extending to an existing dry well; replacement of exterior light fixtures; and relocation, removal or replacement of security cameras and miscellaneous cables, conduits, repair of existing asphalt paving with an alternate for concrete paving in lieu of asphalt.

2. The Project must be executed with careful Owner coordination, maintaining site access and limited building operation to allow the Executive Residence and site to remain operational during the work.

B. Type of Contract

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

1.5 ACCESS TO SITE

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

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

1. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

   a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
   b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

2. Access to the work on the north side of the Carriage House shall be via the driveway and parking area accessed directly north of the building and accessed by the driveway from 1st Avenue. Contractor shall have access to this are for the duration of the project. Contractor shall not use the driveway or parking area for storage of materials.
3. Contractor and Sub-Contractors shall limit their use of the site to that area where they are authorized to work. Contractor and Sub-Contractors shall not have access to the grounds of the Governor's Mansion except as it is necessary for the completion of their work.

C. Staging and Parking: Minimize staging and parking requirements. Coordinate with Owner and limit use of parking as allowed by Owner.

D. Staging and Parking at North of the Carriage House: Minimize staging and storage of materials. Parking of vehicles in this area shall be limited to those necessary for the delivery of materials.

E. 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.

F. Condition of Existing Site: Protect portions of site, landscape and related features affected by construction operations. Maintain entire project site in an orderly and neat condition. Clean site at the end of every work day removing all loose or unsightly material, packaging or trash. Do not allow any material or refuse to blow out of project site or wash into drains or landscaping.

G. Security: All work persons working on the site shall receive security clearance through the State of Utah security. It is the responsibility of the Contractor to provide employees who will pass such a security clearance. The following are the steps which the Contractor will need to take to supply these security clearances:

a) Must be 18 years or older.
Each bidder and each person signing on behalf of any bidder certifies as to its own entity, under penalty of perjury, that the named Contractor has registered and is participating in the Status Verification System to verify the work eligibility status of the contractor's new employees that are employed in the State of Utah in accordance with UCA Section 63G-11-103.

b) The Contractor shall require that the following provision be placed in each subcontract at every tier: "The subcontractor shall certify to the main (prime or general) contractor by affidavit that the subcontractor has verified through the Status Verification System the employment status of each new employee of the respective subcontractor, all in accordance with Section 63G-11-103 and to comply with all applicable employee status verification laws.. Such affidavit must be provided prior to the notice to proceed for the subcontractor to perform the work."

c) The DFCM will not consider a proposal for award, nor will it make any award where there has not been compliance with this article (Section, if applicable).

d) Manually or electronically signing the Proposal is deemed the Contractor's certification of compliance with all provisions of this employment status verification certification required by all applicable status verification laws including UCA Section 63G-11-103.

e) They must be able to pass a clearance through the Social Security Administration.
- Call 1-800-772-6270. You will need to supply them with the individual name; social security number and date of birth
- They will let you know if this individual has a valid social security card. If they do not, you will need to have the employee go to the Social Security Administration Office to straighten it out.

f) You will need to contact the Immigration Naturalization Service (INS) to verify that they are eligible to work in the United States and can supply you with a green card. This also can be verified to you through an I-9 form.

g) All Contractors and Sub-Contractors shall go through Public Safety for a criminal background check.

Upon completion of all items above, the Contractor and sub-contractors will have the security approval to work on this Project.

1.6 COORDINATION WITH OCCUPANTS

A. Partial Owner Occupancy: Owner will occupy the premises (i.e., site, Carriage House and adjacent buildings) during entire construction period, with the exception of areas under construction. Cooperate with Owner and neighbors during construction operations to minimize

conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

1. Security operations will remain in the Carriage House during the entire project duration. Provide temporary protected access to at least one entry at all times.
2. Existing storage use and canine access and accommodations to be maintained.
3. Maintain access to existing walkways, corridors, and other adjacent occupied or in-use facilities. Do not close or obstruct driveways, walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.

B. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.7 PEDESTRIAN PROTECTION

A. Pedestrian and Visitor Protection: Contractor is responsible to provide all necessary control and protection as required by IBC 2006 Chapter 33. Coordinate location, installation and sequencing with Owner and driveway and other access requirements.

B. Appearance: All pedestrian protection and related elements to be maintained in good repair and good appearance (e.g., fully painted wood, screened fencing, etc.).

1.8 WORK RESTRICTIONS

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

1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:30 a.m. to 6:30 p.m., Monday through Friday, except as otherwise indicated.

1. Weekend Hours: Saturday, not allowed; Sunday, not allowed.
2. Early Morning Hours (before 8 am): Minimize noisy work, including mechanical demolition, solid compaction, waste removal operations, vehicle or equipment operation, etc. to the greatest extent possible.
3. Hours for Utility Shutdowns: Coordinate with Owner, adjacent affected property owners, Salt Lake City Corporation, and other Authorities Having Jurisdiction.

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 five days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner's written permission and the written permission of any impacted property owners and any Authority Having Jurisdiction.

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

1. Notify Owner not less than 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 any entrances, operable windows, or outdoor air intakes.

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

G. Employee Identification: Provide identification tags for Contractor personnel working on the Project site. Require personnel to utilize identification tags at all times.

H. Employee Screening: Comply with Owner's requirements regarding drug and background screening of Contractor personnel working on the Project site.

1. Maintain list of approved screened personnel with Owner's Representative.

1.9 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 1 General Requirements: Requirements of Sections in Division 1 apply to the Work of all Sections in the Specifications.

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

1.10 MISCELLANEOUS PROVISIONS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100

SECTION 01210 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

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

B. Types of allowances include the following:

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

C. Related Sections:

1. Division 1 Section "Unit Prices" for procedures for using unit prices.
2. Division 1 Section "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.
3. Divisions 2 through 16 Sections for items of Work covered by allowances.

1.3 SELECTION AND PURCHASE

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

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

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

1.4 SUBMITTALS

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

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

C. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

D. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION

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

1.6 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.7 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.

C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.

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

1.8 TESTING AND INSPECTING ALLOWANCES

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

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

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

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

1.9 ADJUSTMENT OF ALLOWANCES

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

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

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Lump-Sum Allowance: Include the sum of $2,500 for possible structural upgrade or related repairs of cupola.

1. Any needed structural repairs to be determined upon removal of cupola from roof top.
2. This allowance shall include material cost, installation, and Contractor overhead and profit.

END OF SECTION 01210

SECTION 01230 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

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

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

1.4 PROCEDURES

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

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

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Add Paving Replacement for West Drive Through.

1. Base Bid: Not applicable / no work specified.
2. Alternate: Remove existing asphalt paving, prepare base and install concrete paving as detailed/specified.

B. Alternate No. 2: Add Re-cladding of East Foundation Sandstone.

1. Base Bid: Cleaning, minor resurfacing, Dutchman repairs, basic repointing and patching of holes only.
2. Alternate: Re-clad deteriorated sandstone using quarry-faced, full-stone granite Dutchman. (Provide credit for noted Base Bid work.)

C. Alternate No. 3: Add Recreated Decorative Window Grilles.

1. Base Bid: Not applicable / no work specified.
2. Alternate: Fabricate, finish and install decorative window grilles as scheduled.

D. Alternate No. 4: Add Custom Doors, West Elevation.

1. Base Bid: Paint existing doors and frames; no work specified at Second Level infill.
2. Alternate: Remove existing door/frame/transom (Main Level) and CMU/stucco infill (Second Level). Fabricate and install scheduled/detailed wood stile and rail doors and frames, related flashing, scheduled hardware, etc. (Provide credit for noted Base Bid work.)

END OF SECTION 01230

SECTION 01250 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

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

B. Related Sections include the following:

1. Division 1 Section "Unit Prices" for administrative requirements for using unit prices.
2. Division 1 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

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

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect 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. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within 14 days 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.

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

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 Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

1.5 CHANGE ORDER PROCEDURES

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

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction 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 Construction 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 01250

SECTION 01270 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for unit prices.

B. Related Sections include the following:

1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
2. Division 1 Section "Quality Requirements" for general testing and inspecting requirements.
3. Division 4 Section “Exterior Stone Restoration" for procedures for measurement and requirements for repointing and other scheduled restoration work

1.3 DEFINITIONS

A. Unit price is an amount proposed by bidders, a price per unit of measurement for materials and/or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

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

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

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A list of unit prices to be provided is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

A. Unit Prices Set No. 1 – Masonry Restoration:

1. Description: Masonry repair and restoration as described on enlarged elevation drawings and related specifications for the following repair/restoration codes:
   S1
   S2
   S3
   S4
   S5
2. Unit of Measurement: Cost per linear foot ($/LF) or cost per square foot ($/SF) as applicable for each repair/restoration code.

END OF SECTION 01270

SECTION 01290 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections include the following:

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

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

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

1. Correlate 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. Submittals Schedule.
   c. Contractor's Construction Schedule.

2. Submit the Schedule of Values to Architect 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 the 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 Architect.
    c. Architect's project number.
    d. Contractor's name and address.
    e. Date of submittal.

2. Submit draft of AIA Document G703 Continuation Sheets.
3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

    a. Related Specification Section or Division.
    b. Description of the Work.
    c. Name of subcontractor.
    d. Name of manufacturer or fabricator.
    e. Name of supplier.
    f. Change Orders (numbers) that affect value.
    g. Dollar value.

        1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. 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 on site, but not yet installed.
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 Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect 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: Progress payments shall be submitted to Architect by the seventh of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

D. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as 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. Architect 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 Construction Change Directives issued before last day of construction period covered by application.

F. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect. 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 liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

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 final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application that is lawfully entitled to a lien.
5. Waiver Forms: Submit waivers of lien on forms, executed in a manner 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. Submittals Schedule (preliminary if not final).
6. List of Contractor's staff assignments.
7. Copies of building permits.
8. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
9. Initial progress report.
10. Report of preconstruction conference.

11. Certificates of insurance and insurance policies.
12. Performance and payment bonds.
13. Data needed to acquire Owner's insurance.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290

SECTION 01310 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Coordination Drawings.
2. Administrative and supervisory personnel.
3. Project meetings.
4. Requests for Interpretation (RFIs).

B. Related Sections include the following:

1. Division 1 Section "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
2. Division 1 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.3 DEFINITIONS

A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.4 COORDINATION

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. Make adequate provisions to accommodate items scheduled for later installation.
3. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

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.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.

1.5 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 Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All 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. Phasing.
c. Critical work sequencing and long-lead items.
d. Designation of key personnel and their duties.
e. Procedures for processing field decisions and Change Orders.
f. Procedures for RFIs.
g. Procedures for testing and inspecting.
h. Procedures for processing Applications for Payment.
i. Distribution of the Contract Documents.
j. Submittal procedures.
k. Preparation of Record Documents.
l. Use of the premises and existing building.
m. Work restrictions.
n. Owner's occupancy requirements.
o. Responsibility for temporary facilities and controls.
p. Construction waste management and recycling.
q. Parking availability.
r. Office, work, and storage areas.
s. Equipment deliveries and priorities.

t. First aid.
u. Security.
v. Progress cleaning.
w. Working hours.

3. Minutes: Record and distribute meeting minutes.

C. Progress Meetings: Conduct progress meetings at regular intervals. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

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

1) Review schedule for next period.

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

1) Status of submittals.
2) Status of correction of deficient items.
3) Field observations.
4) RFIs.
5) Status of proposal requests.
6) Pending changes.
7) Status of Change Orders.
8) Documentation of information for payment requests.

3. Minutes: Record the meeting minutes.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.

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

1.6 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.

1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned 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 interpretation and the following:

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

    a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.

C. Hard-Copy RFIs: CSI Form 13.2A or similar.

1. Identify each page of attachments with the RFI number and sequential page number.

D. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.

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

E. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI. RFIs received 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 Architect's actions on submittals.
    f. Incomplete RFIs or RFIs with numerous errors.

2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 1 Section "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

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

G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310

SECTION 01320 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

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

1. Contractor's Construction Schedule.
2. Daily construction reports.
3. Special reports.

B. Related Sections include the following:

1. Division 1 Section "Payment Procedures" for submitting the Schedule of Values.
2. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
3. Division 1 Section "Submittal Procedures" for submitting schedules and reports.
4. Division 1 Section "Photographic Documentation" for submitting construction photographs.
5. Division 1 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 SUBMITTALS

A. Contractor's Construction Schedule: Submit three opaque copies of initial schedule, large enough to show entire schedule for entire construction period.

B. Daily Construction Reports: Submit three copies at monthly intervals.

C. Special Reports: Submit three copies at time of unusual event.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."

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

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

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart type Contractor's Construction Schedule within 30 days of date established for the Notice to Proceed. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. For construction activities that require 3 months or longer completing, indicate an estimated completion percentage in 10 percent increments within time bar.

2.3 SPECIAL REPORTS

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

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

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before next regularly scheduled progress meeting.

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

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

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

END OF SECTION 01320

SECTION 01322 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Periodic construction photographs.
3. Final Completion construction photographs.

B. Related Sections include the following:

1. Division 1 Section "Submittal Procedures" for submitting photographic documentation.
2. Division 1 Section "Selective Demolition" for photographic documentation before selective demolition operations commence.

1.3 SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same label information as corresponding set of photographs.

B. Construction Photographs: Submit one digital image of each photographic view within seven days of taking photographs.

1. Identification: Provide the following information as a part of, or accompanying, the digital image:

   a. Date photograph was taken if not date stamped by camera.
   b. Description of vantage point, indicating location, direction (by compass point), and elevation of construction.

2. Digital Images: Submit a complete set of digital image electronic files as a Project Record Document on CD-ROM. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.

1.4 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in uncompressed TIFF format, produced by a digital camera with minimum sensor size of 4.0 megapixels, and at an image resolution of not less than 1024 by 768 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

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

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

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

1. Date and Time: Include date and time in filename for each image.
2. Field Office Images: Maintain one set of images on CD-ROM in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Architect.

C. Preconstruction Photographs: Before commencement of demolition, take color, digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points.

1. Take a sufficient number of photographs to show existing conditions adjacent to property before starting the Work.
2. Take a sufficient number of photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
3. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

D. Periodic Construction Photographs: Take color, digital photographs at sufficient locations and intervals to document demolition and construction progress. Select vantage points to show status of construction and progress since last photographs were taken.

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

1. Circumstances that could require additional photographs include, but are not limited to, the following:

a. Special events planned at Project site.
b. Immediate follow-up when on-site events result in construction damage or losses.
c. Photographs to be taken at fabrication locations away from Project site.

d. Substantial Completion of a major phase or component of the Work.
e. Owner's request for special publicity photographs.

END OF SECTION 01322

SECTION 01330 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Sections include the following:

1. Division 1 Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
2. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
3. Division 1 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
4. Division 1 Section "Photographic Documentation" for submitting construction photographs.
5. Division 1 Section "Quality Requirements" for submitting test and inspection reports and for mockup requirements.
6. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
7. Divisions 2 through 16 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect’s responsive action.

B. Informational Submittals: Written information that does not require Architect’s responsive action. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

A. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.

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

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

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

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

1. Initial Review: Allow 21 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect 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 21 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 21 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

D. Identification: Place a permanent label or title block on each submittal 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 on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information on label for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name and address of Contractor.
    e. Name and address of subcontractor.
    f. Name and address of supplier.
    g. Name of manufacturer.
    h. Submittal number or other unique identifier, including revision identifier.
    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.

E. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

F. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

2. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.

1. Transmittal Form: Use AIA Document G810.
2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.

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

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.

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

J. Use for Construction: Use only final accepted submittals for construction.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

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 printed 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 written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Standard color charts.
e. Manufacturer's catalog cuts.
f. Wiring diagrams showing factory-installed wiring.
g. Printed performance curves.
h. Operational range diagrams.
i. Mill reports.
j. Standard product operation and maintenance manuals.
k. Compliance with specified referenced standards.
l. Testing by recognized testing agency.
m. Application of testing agency labels and seals.

n. Notation of coordination requirements.

4. Submit Product Data before or concurrent with Samples.
5. Number of Copies: Submit three copies of Product Data, unless otherwise indicated. Architect will return two copies. Mark up and retain one returned copy as a Project Record Document.

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, unless submittal of Architect's CAD Drawings is otherwise permitted.

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

a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams.
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shopwork manufacturing instructions.
g. Templates and patterns.
h. Schedules.
i. Design calculations.
j. Compliance with specified standards.
k. Notation of coordination requirements.
l. Notation of dimensions established by field measurement.
m. Relationship to adjoining construction clearly indicated.
n. Seal and signature of professional engineer if specified.
o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

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 24 by 36 inches (610 by 914 mm).
3. Number of Copies: Submit three opaque copies of each submittal, unless copies are required for operation and maintenance manuals. Submit five copies where copies are required for operation and maintenance manuals. Architect will retain two copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing.

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 appropriate Specification Section.

3. 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.

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

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

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit two sets of Samples. Architect will retain one Sample set; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.

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

E. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation" for Construction Manager's action.

F. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures."

G. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."

H. 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.

4. Number of Copies: Submit three copies of subcontractor list, unless otherwise indicated. Architect will return two copies.

   a. Mark up and retain one returned copy as a Project Record Document.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit three copies of each submittal, unless otherwise indicated. Architect will not return copies.
2. Certificates and Certifications: Provide a notarized 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.
3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section "Quality Requirements."

B. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."

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

D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

E. Installer Certificates: Prepare 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.

F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

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

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

I. Material Test Reports: Prepare 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.

J. Product Test Reports: Prepare written reports indicating 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.

K. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

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

L. Schedule of Tests and Inspections: Comply with requirements specified in Division 1 Section "Quality Requirements."

M. Preconstruction Test Reports: Prepare 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.

N. Compatibility Test Reports: Prepare 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.

O. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, 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.

P. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section "Operation and Maintenance Data."

Q. Design Data: Prepare 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.

R. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

S. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

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

T. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

U. Construction Photographs: Comply with requirements specified in Division 1 Section "Photographic Documentation."

2.3 DELEGATED DESIGN

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

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, registered to practice in the State of Utah, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

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

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

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

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

3.2 ARCHITECT'S / ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.

C. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

D. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01330

SECTION 01400 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

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

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

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections include the following:

1. Division 1 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
2. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
3. Divisions 2 through 16 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

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

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

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

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

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

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

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

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradesmen of the corresponding generic name.

H. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of three previous projects sufficiently similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

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

1.5 SUBMITTALS

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

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

1. Specification Section number and title, and, in the case of General or Typical Notes, the drawing sheet number and title.
2. Description of test and inspection.
3. Identification of applicable standards.
4. Identification of test and inspection methods.
5. Number of tests and inspections required.
6. Time schedule or time span for tests and inspections.
7. Entity responsible for performing tests and inspections.

8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

C. Reports: Prepare and submit certified written reports that include the following:

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

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

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

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

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

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

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

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

1. Requirement for specialists shall not supersede building codes and regulations governing the Work.

G. Testing Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

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

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

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Provide sizes and configurations of test assemblies and mockups, to adequately demonstrate capability of products to comply with performance requirements.

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

1.7 QUALITY CONTROL

A. Tests and inspections are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

1. Contractor shall engage a qualified testing agency to perform these quality-control services.
2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
6. Testing agencies and Inspectors shall submit additional copies of each written report directly to Owner and Architect.

B. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 1 Section "Submittal Procedures."

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

D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

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

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

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

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

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

1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Contractor, with the written consent and approval of the Owner, will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect, Owner and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor, Owner, and to authorities having jurisdiction.

4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

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

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

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

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

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."

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

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01400

SECTION 01420 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION OF REQUIREMENTS

A. General: This Section specifies procedural and administrative requirements for compliance with governing regulations and codes and standards imposed upon the Work. These requirements include obtaining permits, licenses, inspections, releases and similar documentation, as well as payments, statements and similar requirements associated with regulations, codes and standards.

1. The term, "Regulations" is defined to include laws, statutes, ordinances and lawful orders issued by governing authorities, as well as those rules, conventions and agreements within the construction industry which effectively control the performance of the work regardless of whether they are lawfully imposed by governing authority or not.

B. Governing Regulations: Refer to General Conditions for requirements related to compliance with governing regulations.

1.3 DEFINITIONS

A. General Explanation: A substantial amount of specification language consists of definitions of terms found in other contract documents, including drawings. (Drawings are recognized as being diagrammatic in nature and not completely descriptive of the requirements indicated thereon.) Certain terms used in contract documents are defined in this article. Definitions and explanations contained in this Section are not necessarily either complete or exclusive, but are general for the Work to the extent that they are not stated more explicitly in another element of the Contract Documents.

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

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

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

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

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

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

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

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

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

K. "Conserve": Except as otherwise defined in greater detail, the term "conserve" is used to describe the process of the maintenance and stabilization of original historic finishes and features.

L. "Consolidate": Except as otherwise defined in greater detail, the term "consolidate" is used to describe the process of restoring existing damaged or deteriorated elements of plaster or other materials back to the original condition. This process includes the identification of existing faulty or deteriorated plaster and plaster elements.

M. "Protect": Except as otherwise defined in greater detail, the term "protect" is used to describe the process of shielding from harm existing fixtures, elements or materials.

N. "Replicate": Except as otherwise defined in greater detail, the term "replicate" is used to describe the duplication of existing elements, with new material.

O. "Restore": Except as otherwise defined in greater detail, the term "restore" is used to describe the process to accurately depict the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from the other periods in its history and reconstruction of missing features from the restoration period.

P. "Refurbish": Except as otherwise defined in greater detail, the term "refurbish" is used to describe the process of modernizing the elements within a structure to meet current and aesthetic requirements.

Q. "Stabilize": To apply measures designed to reestablish a weather-resistant enclosure and the structural reinforcement of an item or portion of a building while maintaining the essential form as it exists at present.

R. "Protect and Maintain": To remove deteriorating corrosion, reapply appropriate protective coatings, and install protective measures such as temporary guards; to provide the least degree of intervention.

S. "Repair": To stabilize, consolidate, or conserve; to retain existing materials and features while employing as little new material as possible. Repair includes patching, piecing-in; splicing, consolidating, or otherwise reinforcing or upgrading materials. Within restoration, repair also includes limited replacement in kind, rehabilitation, and reconstruction, with compatible substitute materials for deteriorated or missing parts of features when there are surviving prototypes.

T. "Remove": To detach items from existing construction and legally dispose of them off-site unless otherwise indicated to be removed and salvaged, or removed and reinstalled.

U. "Remove and Reinstall": To detach items from existing construction, repair and clean them for reuse, and reinstall them where indicated.

V. "Existing to Remain": Existing items of construction that are not to be removed and that are not otherwise indicated to be removed and salvaged, or removed and reinstalled.

W. "Material in Kind": Material that matches existing materials, as much as possible, in species, cut, color, grain, and finish.

1.4 INDUSTRY STANDARDS

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

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

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

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

1.5 ABBREVIATIONS AND ACRONYMS

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

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

AA	Aluminum Association, Inc. (The) www.aluminum.org	(703) 358-2960
AAADM	American Association of Automatic Door Manufacturers www.aaadm.com	(216) 241-7333
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664

AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
ABAA	Air Barrier Association of America www.airbarrier.org	(866) 956-5888
ABMA	American Bearing Manufacturers Association www.abma-dc.org	(202) 367-1155
ACI	ACI International (American Concrete Institute) www.aci-int.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AGC	Associated General Contractors of America (The) www.agc.org	(703) 548-3118
AHA	American Hardboard Association (Now part of CPA)	
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
ALCA	Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)	
ALSC	American Lumber Standard Committee, Incorporated www.alsc.org	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020

AOSA	Association of Official Seed Analysts, Inc. www.aosaseed.com	(405) 780-7372
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
APA EWS	APA - The Engineered Wood Association; Engineered Wood Systems (See APA - The Engineered Wood Association)	
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
ARMA	Asphalt Roofing Manufacturers Association www.asphaltroofing.org	(202) 207-0917
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (The American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (973) 882-1170
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9585
AWCI	AWCI International (Association of the Wall and Ceiling Industry International) www.awci.org	(703) 534-8300
AWI	Architectural Woodwork Institute www.awinet.org	(571) 323-3636
AWPA	American Wood-Preservers' Association www.awpa.com	(205) 733-4077
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711

BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010
BICSI	BICSI www.bicsi.org	(800) 242-7405 (813) 979-1991
CDA	Copper Development Association www.copper.org	(800) 232-3282 (212) 251-7200
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CPPA	Corrugated Polyethylene Pipe Association www.cppa-info.org	(800) 510-2772 (202) 462-9607
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(866) 797-4272 (416) 747-4000
CSI	Cast Stone Institute www.caststone.org	(717) 272-3744
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087

DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
EIA	Electronic Industries Alliance www.eia.org	(703) 907-7500
EIMA	EIFS Industry Members Association www.eima.com	(800) 294-3462 (770) 968-7945
EJCDC	Engineers Joint Contract Documents Committee www.ejdc.org	(703) 295-5000
ESD	ESD Association www.esda.org	(315) 339-6937
FM Approvals	FM Approvals www.fmglobal.com	(781) 762-4300
FM Global	FM Global (Formerly: FMG - FM Global) www.fmglobal.com	(401) 275-3000
FMRC	Factory Mutual Research (Now FM Global)	
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc. www.floridaroof.com	(407) 671-3772
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council www.fsc.org	49 228 367 66 0
GA	Gypsum Association www.gypsum.org	(202) 289-5440
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GRI	(Now GSI)	
GS	Green Seal www.greenseal.org	(202) 872-6400
GSI	Geosynthetic Institute www.geosynthetic-institute.org	(610) 522-8440
HI	Hydraulic Institute www.pumps.org	(888) 786-7744 (973) 267-9700
HI	Hydronics Institute www.gamanet.org	(908) 464-8200

HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAS	International Approval Services (Now CSA International)	
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IESNA	Illuminating Engineering Society of North America www.iesna.org	(212) 248-5000
IEST	Institute of Environmental Sciences and Technology www.iest.org	(847) 255-1561
IGCC	Insulating Glass Certification Council www.igcc.org	(315) 646-2234
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11
	Available from ANSI www.ansi.org	(202) 293-8020
ISSFA	International Solid Surface Fabricators Association www.issfa.net	(877) 464-7732 (702) 567-8150
ITS	Intertek Testing Service NA www.intertek.com	(972) 238-5591
ITU	International Telecommunication Union www.itu.int/home	41 22 730 51 11
LMA	Laminating Materials Association (Now part of CPA)	

LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864
MH	Material Handling (Now MHIA)	
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(312) 332-0405
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(800) 797-6623 (281) 228-6200
NADCA	National Air Duct Cleaners Association www.nadca.com	(202) 737-2926
NAIMA	North American Insulation Manufacturers Association www.naima.org	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCPI	National Clay Pipe Institute www.ncpi.org	(262) 248-9094
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 775-3550
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(888) 300-6382 (303) 697-8441

NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NGA	National Glass Association www.glass.org	(866) 342-5642 (703) 442-4890
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
NTRMA	National Tile Roofing Manufacturers Association (Now TRI)	
NWWDA	National Wood Window and Door Association (Now WDMA)	
OPL	Omega Point Laboratories, Inc. (Now ITS)	
PDCA	Painting & Decorating Contractors of America www.pdca.com	(800) 332-7322 (314) 514-7322
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PGI	PVC Geomembrane Institute http://pgi-tp.ce.uiuc.edu	(217) 333-3929
PLANET	Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America) www.landcarenetwork.org	(800) 395-2522 (703) 736-9666
RCSC	Research Council on Structural Connections www.boltcouncil.org	

RIS	Redwood Inspection Service www.calredwood.org	(888) 225-7339 (415) 382-0662
SAE	SAE International www.sae.org	(877) 606-7323 (724) 776-4841
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)	
SGCC	Safety Glazing Certification Council www.sgcc.org	(315) 646-2234
SIA	Security Industry Association www.siaonline.org	(703) 683-2075
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)	
SMA	Screen Manufacturers Association www.smacentral.org	(561) 533-0991
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division) www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
SPRI	Single Ply Roofing Industry www.spri.org	(781) 647-7026
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWRI	Sealant, Waterproofing, & Restoration Institute www.swrionline.org	(816) 472-7974

TCA	Tile Council of America, Inc. www.tileusa.com	(864) 646-8453
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute, Inc. www.tpinst.org	(703) 683-1010
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USGBC	U.S. Green Building Council www.usgbc.org	(202) 828-7422
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association (Now WCSC)	
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association) www.windowcoverings.org	(800) 506-4636 (212) 297-2109
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (847) 299-5200
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California) www.wicnet.org	(916) 372-9943
WIC	Woodwork Institute of California (Now WI)	
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 570-5441
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

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

BOCA	BOCA International, Inc. (See ICC)	
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICBO	International Conference of Building Officials (See ICC)	
ICBO ES	ICBO Evaluation Service, Inc. (See ICC-ES)	
ICC	International Code Council www.iccsafe.org	(888) 422-7233 (703) 931-4533
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543
SBCCI	Southern Building Code Congress International, Inc. (See ICC)	
UBC	Uniform Building Code (See ICC)	

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

CE	Army Corps of Engineers www.usace.army.mil	
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-7923
DOC	Department of Commerce www.commerce.gov	(202) 482-2000
DOD	Department of Defense http://.dodssp.daps.dla.mil	(215) 697-6257
DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FAA	Federal Aviation Administration www.faa.gov	(866) 835-5322

FCC	Federal Communications Commission www.fcc.gov	(888) 225-5322
FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
GSA	General Services Administration www.gsa.gov	(800) 488-3111
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBL	Lawrence Berkeley National Laboratory www.lbl.gov	(510) 486-4000
NCHRP	National Cooperative Highway Research Program (See TRB)	
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
PBS	Public Building Service (See GSA)	
PHS	Office of Public Health and Science www.osophs.dhhs.gov/ophs	(202) 690-7694
RUS	Rural Utilities Service (See USDA)	(202) 720-9540
SD	State Department www.state.gov	(202) 647-4000
TRB	Transportation Research Board http://gulliver.trb.org	(202) 334-2934
USDA	Department of Agriculture www.usda.gov	(202) 720-2791
USPS	Postal Service www.usps.com	(202) 268-2000

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

ADAAG	Americans with Disabilities Act (ADA) Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080

CFR	Code of Federal Regulations Available from Government Printing Office www.gpoaccess.gov/cfr/index.html	(866) 512-1800 (202) 512-1800
DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
	Available from Defense Standardization Program www.dps.dla.mil	
	Available from General Services Administration www.gsa.gov	(202) 619-8925
	Available from National Institute of Building Sciences www.wbdg.org/ccb	(202) 289-7800
FTMS	Federal Test Method Standard (See FS)	
MIL	(See MILSPEC)	
MIL-STD	(See MILSPEC)	
MILSPEC	Military Specification and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01420

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

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

B. Related Sections include the following:

1. Division 1 Section "Summary" for limitations on utility interruptions and other work restrictions.
2. Division 1 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
3. Division 1 Section "Execution Requirements" for progress cleaning requirements.
4. Divisions 2 through 16 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.

B. Electric Power Service: Pay electric power service use charges for electricity used by all entities for construction operations, if required and metered by Owner. Provide connections and extensions of services as required for construction operations.

C. Water Service: Water from Owner's existing water system is available for use without metering and without payment of use charges. Contractor shall provide connections and extensions of services as required for construction operations.

1.5 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.6 QUALITY ASSURANCE

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

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

1.7 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pavement: Comply with Division 2 pavement Sections.

B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 9-gage, 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.

C. Lumber and Plywood: Comply with requirements in Division 6 Section "Rough Carpentry."

D. Gypsum Board: Minimum 1/2 inch (12.7 mm) thick by 48 inches (1219 mm) wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.

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

F. Paint: Comply with requirements in Division 9 painting Sections.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading. Existing building may be used as Field Office from Notice-to-Proceed to Substantial Completion.

B. Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles. Furnish room with conference table and chairs.

3. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
4. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

2.3 EQUIPMENT

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

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter at each return air grille in system and remove at end of construction.

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 companies, Owner, and existing and adjacent users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Water Service: Use of Owner's existing water service 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.

1. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

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: Use of Owner's existing electric power service will be permitted, as long as equipment for connection to service is maintained in a condition acceptable to Owner.

G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Install and operate temporary lighting system to minimize impact on occupants of adjacent buildings.

H. Telephone Service: Provide temporary telephone service in common-use facilities.

1. At each telephone, post a list of important telephone numbers.

a. Police and fire departments.
b. Ambulance service.
c. Contractor's home office.
d. Architect's office.
e. Engineers' offices.
f. Owner's office.
g. Principal subcontractors' field and home offices.

I. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail, in common-use facilities.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines. Comply with NFPA 241.
2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction, including Salt Lake City Corporation.

1. Protect existing site improvements to remain including curbs, pavement, and utilities. Do not allow construction operations to interfere with adjacent driveway access or improvements.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Parking: Provide temporary parking areas for construction personnel. Do not use parking or access drives on adjacent properties for parking or construction operations.

D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

E. Project Identification and Temporary Signs: Provide Project identification and other signs. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized commercial or other signs are not permitted.

1. Provide temporary, directional signs for construction personnel and visitors.
2. Maintain and touchup signs so they are legible at all times.

F. 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 Division 1 Section "Execution Requirements" for progress cleaning requirements.

G. 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.

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

I. Temporary Use of Permanent Stairs: Cover permanent stairs with protective covering of plywood or similar material so existing materials and finishes will not be damaged.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

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

2. During stone restoration work, provide an enclosure around area of work, including scaffolding, to minimize and to control dust contamination during the work.

B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

1. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

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

D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

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

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

F. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

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

H. 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.

I. 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.

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.

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

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than

Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

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

END OF SECTION 01500

SECTION 01524 - CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Disposing of nonhazardous demolition and construction waste.

B. Related Requirements:

1. Division 1 Section "Selective Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements, and for disposition of hazardous waste.
2. Division 2 Section "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

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

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

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

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:

1. Salvage of existing stone for re-use in repair or "Dutchman" of existing stone.

3.2 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

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

END OF SECTION 01524

SECTION 01600 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

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

B. Related Sections:

1. Division 1 Section "Substitution Procedures" for requests for substitutions.
2. Division 1 Section "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

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

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

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

1.4 ACTION SUBMITTALS

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

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor through Construction Manager] of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

    a. Form of Approval: As specified in Division 1 Section "Submittal Procedures."
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

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

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

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

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

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

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to Divisions 2 through 16. Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

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

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

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

   a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions will be considered, unless otherwise indicated.

4. Manufacturers:

   a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions will be considered, unless otherwise indicated].

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

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

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

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

2.2 COMPARABLE PRODUCTS

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

1. Evidence the proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents and will produce the indicated results, and is compatible with other portions of the Work.

2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.
6. Cost differential, evaluation or comparison.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01600

SECTION 01635 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Sections:

1. Divisions 2 through 16 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

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

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

1.4 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 or similar.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product, fabrication or installation cannot be provided.
b. Coordination information, including a list of changes or modifications 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 performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate any deviations 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 specified products, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager 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 Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

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

1.6 PROCEDURES

A. Coordination: Modify affected work as necessary to integrate the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

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

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

    a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    b. Substitution request is fully documented and properly submitted.
    c. Requested substitution will not adversely affect Contractor's construction schedule.
    d. Requested substitution has received necessary approvals of authorities having jurisdiction.
    e. Requested substitution is compatible with other portions of the Work.
    f. Requested substitution has been coordinated with other portions of the Work.
    g. Requested substitution provides specified warranty.
    h. 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: Architect will consider requests for substitution if received within 60 days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.

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

    a. Requested substitution 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 Architect 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. Substitution request is fully documented and properly submitted.
    e. Requested substitution will not adversely affect Contractor's construction schedule.
    f. Requested substitution has received necessary approvals of authorities having jurisdiction.
    g. Requested substitution is compatible with other portions of the Work.
    h. Requested substitution has been coordinated with other portions of the Work.
    i. Requested substitution provides specified warranty.
    j. 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.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01635

SECTION 01700 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

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

1. Construction layout.
2. Field engineering and surveying.

B. Related Sections include the following:

1. Division 1 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
2. Division 1 Section "Submittal Procedures" for submitting surveys.
3. Division 1 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: 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 and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; natural gas piping; and underground telecommunication and electrical services.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

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

a. Description of the Work.
b. List of detrimental conditions, including substrates.
c. List of unacceptable installation tolerances.
d. Recommended corrections.

3.2 PREPARATION

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

B. 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, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

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

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

3.4 FIELD ENGINEERING

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

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

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

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

2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one subcontractor has worked. 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 materials more than 7 days during normal weather or 3 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. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

E. During demolition, protect adjoining historic materials to remain. Apply protective covering where required to ensure protection from damage or deterioration.

F. 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.

3.6 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes not scheduled for demolition. Comply with requirements in Division 1 Section "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair. Consult Architect prior to unscheduled removal, replacement, or repair of historic material.

END OF SECTION 01700

SECTION 01731 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

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

B. Related Sections include the following:

1. Division 1 Section "Selective Demolition" for demolition of selected portions of the building.
2. Divisions 2 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

    a. Requirements in this Section apply to mechanical and electrical installations. Refer to Divisions 15 and 16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect; that will be relocated; and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.

6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations from a professional engineer showing integration of reinforcement with original structure.

1.5 QUALITY ASSURANCE

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

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

   a. Foundation construction.
   b. Bearing and retaining walls.
   c. Structural concrete.
   d. Structural steel, wood rafters, etc.
   e. Lintels.

B. 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, including, but not limited to the following:

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-suppression systems.
4. Mechanical systems piping and ducts.
5. Control systems.
6. Communication and security systems.
7. Conveying systems.
8. Electrical wiring systems.
9. Operating systems of special construction in Division 13 Sections.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior masonry wall construction.
4. Equipment supports.
5. Piping, ductwork, vessels, and equipment.
6. Noise- and vibration-control elements and systems.

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

E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

PART 2 - PRODUCTS

2.1 MATERIALS

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

B. In-Place Materials: Use materials 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 match the visual and functional performance of in-place materials. Obtain prior approval from Architect of proposed materials to be used.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers. Obtain prior approval from Architect for all proposed patching materials
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

B. 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.

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

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

3.3 PERFORMANCE

A. 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. 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 as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
5. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

    a. Clean piping, conduit, etc., before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition. Coordinate the material and manner in which the patching is anticipated with the Architect and obtain written approval prior proceeding with patching.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01731

SECTION 01732 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.

B. Related Sections include the following:

1. Division 1 Section "Summary" for use of premises and Owner-occupancy requirements.
2. Division 1 Section "Photographic Documentation" for preconstruction photographs taken before selective demolition operations.
3. Division 1 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
4. Division 1 Section "Construction Waste Management" for disposal of demolished materials.
5. Division 1 Section "Cutting and Patching" for cutting and patching procedures.

1.3 DEFINITIONS

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

B. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

C. Existing to Remain: 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. Special care is to be taken relative the removal and salvaged items.

1.4 MATERIALS OWNERSHIP

A. Historic items, relics, and any similar objects including, but not limited to, cornerstones and their contents, artifacts and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1. Coordinate with Architect, who will establish special procedures for removal and salvage.

1.5 SUBMITTALS

A. Qualification Data: For demolition firm.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
2. Interruption of utility services. Indicate how long utility services will be interrupted. Coordinate, in advance, interruptions of utility services which may have any impact to neighboring structures or entities.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Locations of proposed dust- and noise-control temporary partitions and means of egress.
5. Means of protection for items to remain and items in path of waste removal from building.

C. Pre-demolition Photographs: With digital photos, show existing conditions of adjoining construction and site improvements, including finish surfaces, which might be misconstrued as damage caused by selective demolition operations. Comply with Division 1 Section "Photographic Documentation." Submit before Work begins.

1.6 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI A10.6 and NFPA 241.

D. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.7 PROJECT CONDITIONS

A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before selective demolition, Owner will remove the following items:

a. Known historic artifacts.

B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
   1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Owner. Owner will remove hazardous materials under a separate contract.

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

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

   1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 WARRANTY

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated 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, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

   1. Owner will arrange to shut off indicated services/systems when requested by Contractor.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Division 1 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide 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.
2. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
3. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 1 Section "Temporary Facilities and Controls."

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

9. Dispose of demolished items and materials promptly. Comply with requirements in Division 1 Section "Construction Waste Management."

B. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment as required.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition, refurbished and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Division 1 Section "Construction Waste Management."

B. Burning: Do not burn demolished materials.

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

3.6 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.7 SELECTIVE DEMOLITION SCHEDULE

A. Existing Items to Be Removed and Salvaged:

1. Security cameras.

B. Existing Items to Be Removed and Reinstalled: Items as shown on the plans including but not limited to: Exterior granite stone, exterior limestone, and historic lighting.

END OF SECTION 01732

SECTION 01770 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

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

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.

B. Related Sections:

1. Division 1 Section "Photographic Documentation" for submitting final completion construction photographic documentation.
2. Division 1 Section "Execution Requirements" for progress cleaning of Project site.
3. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
4. Divisions 2 through 16 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete with request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.

8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Advise Owner of changeover in heat and other utilities.
10. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
11. Complete final cleaning requirements, including touchup painting.
12. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

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

1.5 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. Use CSI Form 14.1A.

1. Organize list of spaces in sequential order.

2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page number.

4. Submit list of incomplete items in the following format:

    a. PDF electronic file.
    b. Three paper copies of product schedule or list, unless otherwise indicated. Architect will return two copies.

1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. 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 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 meet Green Seal 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 portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. 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. Remove labels that are not permanent.
j. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.

k. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

l. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
m. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste disposal requirements in [Division 1 Section "Temporary Facilities and Controls."] [Division 1 Section "Construction Waste Management."]

END OF SECTION 01770

SECTION 01781 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.

B. Related Sections include the following:

1. Divisions 2 through 16 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit three set(s) of marked-up Record Prints and copies thereof.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
   b. Accurately record information in an understandable drawing technique.
   c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

   a. Dimensional changes to Drawings.
   b. Locations and depths of existing underground utilities.

c. Locations of existing concealed internal utilities not scheduled for demolition.
d. Changes made by Change Order or Construction Change Directive.
e. Field records for variable and concealed conditions.
f. Record specific information on the Work that is shown only schematically in the Contract Documents.

3. Mark the Contract Drawings completely and accurately.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect.
e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual procedure, record, test, or requirement where demolition operations vary from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2.3 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 01781

SECTION 01782 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Maintenance manuals for the care and maintenance of products, materials, and finishes systems and equipment.

B. Related Sections include the following:

1. Division 1 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Division 1 Section "Closeout Procedures" for submitting operation and maintenance manuals.
3. Division 1 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
4. Divisions 2 through 16 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

A. Final Submittal: Submit 2 of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.

1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

1.5 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate

information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents.

2.2 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name, address, and telephone number of Contractor.
6. Name and address of Architect.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each

volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.

b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.

4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.

5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.

b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

C. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

1. Do not use original Project Record Documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared Record Drawings in Division 1 Section "Project Record Documents."

D. Comply with Division 1 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01782

SECTION 02200 - EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Topsoil stockpiling, trenching or excavation and backfilling for utility systems and related appurtenances;
2. Excavation, backfilling and compacting for structures, pavements and sidewalks including dewatering, erosion control, and other items of earthwork as shown on Drawings and specified herein.

B. Related Documents:

1. The Contract Documents, as defined in the General Conditions, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:

1. Section 02222 - Excavating, Backfilling and Compacting for Utilities.

1.2 SUBMITTALS

A. Test Reports:

1. Field density (compaction) test reports of each test made.
2. Optimum moisture-maximum density curves for each type of soil encountered.

B. Fill Samples and Tests:

1. Provide for each type fill material to be used on project, with testing results indicating compliance with requirements specified, for approval prior to start of work.
2. The Owner shall authorize each type of fill to be used on the project as structural fill. (See articles 2.01 through 2.04 of this section).

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable requirements of federal, state and local laws, regulations and codes having jurisdiction at project site

B. Reference Standards: Applicable requirements of standards and specifications referenced herein apply to the work of this Section.

C. Field Quality Control: Testing and Inspection: Contractor will obtain and pay for services of an independent commercial testing laboratory for performing field quality control testing of soils during construction; costs of retesting because of noncompliance with requirements specified, including recompaction of deficient areas, are at Contractor's expense.

1.4 PROJECT CONDITIONS

A. Coordination: Coordinate all work with City and Utility Company Personnel.

B. Cooperation: Coordinate this work with the work of other Sections to avoid any delay in progress of building or any interference with progress of other work. Where required for proper construction operations, perform portions of work included in this Section separate from general building excavation as directed.

C. Payment for Soils Work:

1. The Contractor shall be responsible for the cost of preparing the site for the proposed construction including excavation, stockpiling, providing suitable fill material for satisfactory subgrade and final site preparation, removal and replacement of unsuitable material exposed on surface or encountered within existing soil as it is excavated to six inches below spread footings or slabs on grade as well as to the depth and extent specified or shown on the Drawings for installation of all site improvements including foundations, utilities, paving, sidewalks, and on-site structures. The cost for this shall be included in the Contractor's base bid, and shall be at no additional cost to Owner.
2. The Owner shall have final authority and make the final decision during construction on the depth and extent to which unsatisfactory materials need to be removed and replaced. Any additional excavation, soil remediation or replacement must be authorized by the Owner prior to starting that work.

D. Excavation Classification: All excavation work is unclassified and includes removal and disposal of earth fills, rock, rubble, trash and other materials encountered in excavation and grading operations. The Contractor's basic bid includes all costs for providing a site acceptable for the proposed construction. No additional payment shall be made for removal and replacement of unacceptable materials encountered during site preparation. In the event rock is encountered, rock removal shall not be performed. The Owner shall be the final authority and shall make the final decision during Construction to the depth and extent to which unsatisfactory materials must be removed and replaced.

E. Existing utilities:

1. Locations indicated are approximate
2. Contact local utility location service (Blue Stakes) 48 hours prior to excavation and verify exact locations of all existing utilities.
3. Perform necessary exploratory tests for verification if necessary. The Owner, the Architect and the Engineer will assume no responsibility for hazardous conditions, losses and accidents arising out of failure to perform by the Contractor or other Parties or both.
4. Should incorrectly charted or uncharted piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility services in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of utility owner.

F. Disposition of utilities:

1. Observe rules and regulations governing respective utilities during execution of work of this Section.
2. Adequately protect all active utilities from damage:
3. Remove or relocate active utilities only as shown or as specified.

G. Benchmarks, Monuments and Other Reference Points: Protect from damage and displacement; if disturbed or destroyed, replace at Contractor's expense.

H. Keep dirt, dust, noise and other objectionable nuisances to a minimum. The Contractor is responsible to comply with all applicable local ordinances.

I. Protection:

1. Barricades:

a. Furnish and maintain barricades, signs and markings for excavated areas in accordance with requirements of all local codes and as herein specified.
b. Paint and maintain barricades in good condition. Mount flashing yellow lights and maintain same.

2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
3. Protect excavation bottom against freezing when atmospheric temperature is less than 35 degrees F.

PART 2 PRODUCTS

2.1 FILL AND BACKFILL MATERIALS - GENERAL

A. A cut and fill balance has not been made. Contractor is responsible for establishing quantity of additional fill required or excess that must be hauled away. No additional compensation will be made for importation of additional material or for disposal of surplus material off site, as specified herein.

2.2 STRUCTURAL FILL

A. Acceptable Materials: One or combination of following, as required, as approved by Owner and recommended by Soils Engineer:

1. On-Site Excavated Material, excluding debris, other deleterious materials and unacceptable soils as defined by Section 2.02 B..
2. Imported Materials

a. ASTM D2487 Soil Classification Groups GW, GM, GP-GM, GW-GM, SM, SW. Maximum percentage passing #200 Sieve: 15%
b. ASTM D2487 Soil Classification Groups SP and GP may not be used.

B. Unacceptable Materials: ASTM D2487 Soil Classification Groups SC, CL, CH, PT, OH, OL, ML, MH, generally described as and including following:

1. Peat, mulch and/or other highly organic swamp soils.
2. Organic and inorganic clays of low to high plasticity.
3. Silts and Elastic silts.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas in which work is to be performed. Report in writing to Owner all prevailing conditions that will adversely affect satisfactory execution of work. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Starting work constitutes acceptance of the existing conditions and the Contractor shall then, at his expense, be responsible for correcting all unsatisfactory and defective work encountered.

3.2 PREPARATION

A. The civil drawings show the original topography and proposed limits of construction.

B. In case of conflict between final grade elevations (finish grade) shown by spot elevations and by contours, contact the Engineer for clarification before proceeding.

C. Conform to dimensions and elevations indicated. Do not exceed plus or minus five-tenths of one-foot variation from design grading elevations shown unless approved by the Engineer in writing.

D. Dewatering:

1. Prevent ground and subsurface water from flowing into excavations, from flooding project site and surrounding properties, and from collecting and ponding; provide and maintain all temporary drainage and dewatering systems required.
2. Install pumps, sumps and suction and discharge lines, as required.
3. Install temporary deviations from grades indicated to channel water away from excavations.
4. Leave no sumps or pockets at completion of each day's grading operations.
5. If water is encountered during footing and foundation excavation, install pumps of capacity to remove water while excavations are being made and continue pumping for 24 hours following placing of concrete footings and erection of foundation walls to grade. Maintain dewatering operations until construction of permanent drainage is completed.

E. Shoring and Bracing:

1. Install as required to protect slopes and earth banks from cave-ins, and to protect adjacent surfaces and structures from settlement. Remove before backfilling is completed, but not until after permanent supports are in place.

2. When work is interrupted by rains, do not resume operations until moisture content and field density tests of upper 6" of in-place materials have been made by the Soils Engineer and approved by Owner.
3. Shoring, bracing or underpinning required for the project (if any) shall be designed by a professional engineer registered in the State of Utah.

F. Do not place fill or backfill material in water, on material containing frost, or during unfavorable weather conditions. When inclement weather is expected, grade and seal surface of fill as required to limit percolation of surface water.

G. Establish and identify required lines, levels, contours and datum.

H. Topsoil Stripping and Conservation: Following requirements may be waived by Soils Engineer in areas that do not contain satisfactory topsoil:

1. Remove topsoil of horticultural value from areas to be covered by new building construction and from areas to be paved, excavated, or regraded. Remove without contamination with subsoil. Strip to 6" minimum depth. Keep free of roots, stones and other undesirable materials. Do not strip topsoil when wet.
2. Stockpile in locations convenient to areas shown to receive topsoil later or where directed by Soils Engineer. Do not stockpile to depth exceeding 8 feet. Do not drive heavy equipment over stockpiled material or spread topsoil.

I. Proof-rolling:

1. Proof-roll over entire areas receiving fill material, after topsoil and existing fill is removed, in presence of the owner's representative.

J. Following topsoil stripping, existing fill removal and proof-rolling operations, but before placing fill and backfill, clean ground surfaces free of all trash; debris; loose, frozen, wet or soft soil; and other undesirable surface materials before proceeding with work.

K. Soil Remediation:

1. Undercut and remove soft or unstable soils that fail to compact and replace with acceptable fill material compacted to density specified in Section 3.04. Place soil in lifts of 8" loose depths and compact each lift to density specified when using heavy compaction equipment, and lifts not more than 4" loose depth for material compacted by hand operated tampers.
2. Before compaction, moisten or aerate each layer as needed to provide optimum moisture content. Compact each layer to required percentage of density for each area classification. Do not place backfill or fill materials on surfaces that are muddy, frozen, or contain frost or ice.
3. Place backfill and fill material evenly adjacent to structures, piping or conduit to required elevations. Carry material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

3.3 GRADING

A. Earthwork contractor shall bring finish grades to the finished grades shown on the Drawings in all areas. In landscaped areas, the landscape contractor shall complete the grading. Earthwork contractor shall remove all excess topsoil from site and stockpile only the amount necessary to complete finish work.

B. Grade to required profiles, contours, elevations and subgrade levels shown on Drawings, with allowances made for depths required for placement of topsoil and construction of paving, walks, equipment slabs or pads and floor slabs.

1. Lawn and landscaped areas: Finish areas to receive topsoil to within not more than 0.1 foot above or below required subgrade elevations.
2. Walks: Shape surfaces of areas under walks to line, grade, and cross section, with finish surface within 0.1 foot of required subgrade elevation.
3. Pavements: Shape surface under pavement to line, grade and cross section, with finish surface within ½ inch of required subgrade elevation.
4. Building slabs: Under building slabs grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within ½ inch tolerance when tested with a 10 foot straight edge.

C. Control grading around buildings and on site; slope ground away from buildings to prevent water from running into excavated areas or damaging other structures so that entire project is well drained and free from water pockets.

D. Provide uniform levels and slopes between elevations shown on Drawings, and between elevations shown and existing finished grades shown to be maintained. Round abrupt changes in slopes.

3.4 STRUCTURAL FILL

A. General:

1. Soils Engineer based upon test results, is sole judge as to when specified compaction densities have been obtained. When retesting is needed to verify that unacceptable site preparation has been remedied, the cost for retesting shall be paid by the Contractor.
2. Contractor is responsible for correcting at his expense, including costs of testing, all areas with insufficient compaction.
3. Place acceptable material in horizontal lifts not exceeding 8" in loose depth, with each lift

extending for entire length and width of each area being filled. Level material which is frozen or contains frost.

4. Reduce or increase moisture content of fill by drying or uniform sprinkling with water, as required to achieve moisture content within 2% of optimum as required for specified degree of compaction.
5. Disk each layer of fill to break down oversize clods, to thoroughly mix nonuniform materials, and to secure uniform moisture content, as required to insure uniform density and proper compaction.
6. Maintain positive surface slope to allow runoff and to prevent ponding of surface water. If surface water ponds, dewater as required. Remove all saturated or disturbed soil before placing additional fill material.
7. Number of compaction equipment passes required is dependent upon degree of compaction specified. Overlap rolling passes as required to completely cover area of fill.

8. After cuts are made and existing fill is removed, scarify entire area to 8" depth and compact to following minimum density for areas listed:

    a. Areas Receiving Structural Fill: 95% Modified Proctor Density (ASTM D-1557) within 2% of optimum moisture content.
    b. Under Paving and Walk Areas: 95% Modified Proctor Density within 2% of optimum moisture content.
    c. Under Lawn and Unpaved Areas: 90% Modified Proctor Density (ASTM D-1557).

B. Structural Fill:

1. Material: Acceptable materials complying with the requirements of Articles 2.01 and 2.02.
2. Location: Place as subgrade under building to a point 5 feet outside building walls. Place as subgrade under pavements and walkways to a point 2 feet beyond edge.
3. Construct to grades and for minimum depths indicated. Undercut existing grade as required.
4. Compact to 95% of Modified Proctor Density (ASTM D-1557), at moisture content within 2% of optimum; maintain specified moisture content until placement of floor and deck slabs, and obtain Owner's approval of method used for maintaining moisture control.

C. Nonstructural Fill:

1. Materials: Acceptable Materials complying with requirements of Articles 2.01 and 2.02.
2. Location: Use for all other fills, unless otherwise specified or directed by Owner.
3. Construction to grades and for minimum depths indicated. Undercut existing grade as required.
4. Compact to following densities for areas listed:

    a. Subgrade Below Paving, Walks, and Slabs on Grade: 95% of Modified Proctor Density at moisture content within 2% of optimum.
    b. Below Grassed and Planted Areas: 90% of Standard Proctor Density.

3.5 FOUNDATION AND FOOTING EXCAVATION

A. If grade beam foundation, excavate bottom of foundations to exact grade called for on Drawings. Do not disturb bottom of excavation. Fill over-excavated areas with concrete.

B. Excavate 4" lower than scheduled grade beam depths for void box placement.

C. Excavate beyond outside of walls to allow for inspection, placing and removal of forms and for installing of waterproofing and drain tile, except where concrete is authorized to be deposited directly against excavated surfaces. Leave excavation open until work has been inspected and approved.

D. If pile foundations, stop excavations from 6" to 12" above bottom of footing before piles are placed. After piles have been driven or drilled, remove loose or displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.

3.6 FOUNDATION BACKFILL

A. Material: Acceptable Structural Fill material complying with requirements of Articles 2.01 and 2.02.

B. Remove surface debris and debris in excavation before placing backfill.

C. Do not use material which is frozen or contains frost.

D. Allow footing and foundation walls to attain full design strength before placing backfill.

E. Exercise care during placing and compacting operations. Place to prevent wedging action, eccentric loading, and displacement of walls or structure.

1. Use hand operated compaction equipment within 4 feet of walls.
2. Where fill is placed along both sides of foundation walls, place and compact simultaneously on both sides of walls.
3. Repair, or remove and replace, all damage to foundation walls and structure occurring during placement and compaction operations at no additional cost to Owner.

G. Place material in horizontal lifts not exceeding 8" loose depth before compacting. Level each lift before compacting. When using hand compaction equipment, do not exceed 4" loose depth per horizontal lift.

H. Compact all backfill to 98% of Modified Proctor Density within 2% of optimum moisture content.

3.7 TRENCHING AND BACKFILLING FOR UTILITY SYSTEMS

A. Trench Excavation:

1. Provide open cut excavation, except short sections may be tunneled if approved by consultant and demonstrated by Contractor that pipe, cable or duct can be properly installed, backfilled and compacted. Heavy construction equipment, building materials, excavated soil and vehicular traffic shall not be allowed within 1/3 of the slope height from the top of any excavation.
2. Excavate to necessary width, depth and alignment for proper material installation. Cut trench banks as nearly vertical as practicable, but to safety standards of governing authorities. Stockpile material suitable for backfilling a sufficient distance from banks to avoid overloading and cave-ins.
3. Accurately grade trench bottoms to provide uniform bearing and support for each pipe section on undisturbed soil along full pipe length, except for areas where necessary to excavate for bell holes and for sealing pipe joints. Dig holes and depressions for joints after trench bottom has been graded, so pipe rests on prepared bottom for full length. Remove all stones to avoid point bearing. When excavating in rock, provide at least 4 inches of soil cushion on all sides of pipe and accessories. The use of 3/4" (max) gravel for pipe haunching and embedment shall be acceptable when it meets the approval of the pipe manufacturer and Owner's Construction Representative.
4. Remove wet or otherwise unstable or unacceptable material encountered beyond depths indicated and replace with sand, gravel or concrete.

B. Excavation for Appurtenances: Excavate for manholes and similar structures, to leave 12" minimum clearance between outer surfaces and embankment or timber used to hold and protect banks. Fill

over-excavation with sand, gravel or concrete.

C. Backfilling:

1. Do not backfill until utilities systems have been inspected by appropriate Engineer, testing firm, utility company representative, etc., and accepted by the Owner.
2. Backfill Materials: Acceptable Structural Fill materials at all other locations, complying with requirements of Articles 2.01 and 2.02.
3. Deposit material in lifts of 8" loose depth before compacting each lift to 95% of Modified Proctor Density within 2% of optimum moisture content under paving, walks, building slabs, and other slabs on grade, and compacting to 90% of Modified Proctor Density under lawns and planting areas. When using hand compaction equipment, place material in lifts not to exceed 4" loose depth.
4. Backfill trenches to top of ground level.
5. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and that are carried below bottom of such footings or that pass under wall footings. Place concrete to level of bottom of adjacent footing.
6. Restore ground surface, pavements, base courses, and compacted subgrade disturbed by utilities systems trenching and backfilling work to their original condition, construction and finishes.

3.8 FIELD QUALITY CONTROL

A. Testing and Inspection Services: Contractor will retain the services of a testing firm to perform observations, inspections and testing during execution of site work and any other tests deemed necessary to determine compliance with specifications.

B. Contractor shall coordinate with testing firm's Inspectors and Technicians to facilitate the execution of their duties.

C. Upon completion of excavation, testing firm shall inspect and test the work and determine the suitability of the soil and preparation of subsequent site work.

D. Testing firm will submit to Owner reports of all observations, inspections and tests.

END OF SECTION 02200

SECTION 02222 – EXCAVATING, BACKFILLING AND COMPACTING FOR UTILITIES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Obtain excavation permits from state and local authorities.

B. Excavate for utility systems and process piping systems, including manholes, catch basins, valves, and other appurtenances to the points of connection with the building utility or structure piping five (5) feet outside of the building or structure or as indicated.

C. Locate and protect existing utilities, structures, landscaping, and other existing features.

D. Dewater excavations as required.

E. Support excavations as required.

F. Place and compact bedding, pipe zone, and backfill materials over pipes and appurtenances to rough grade elevation.

G. Stockpile and dispose of material

1.02 QUALITY ASSURANCE

A. Provide soil testing during excavation and placement of fill and backfill materials in accordance with Section 01400.

B. Perform soil testing during excavation and placement of fill, bedding, initial backfill, and backfill materials to show compliance with the requirements of the Contract Documents.

1.03 REFERENCES

A. ASTM D422 Particle Size Analysis of Soils.

B. ASTM D424 Calculating the Plasticity Index.

C. ASTM D698 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, using 5.5-lb (2.49-kg) Rammer and 12-in (304.8 mm) Drop.

D. ASTM D1556 Density of Soil In Place by the Sand-Cone Method.

E. ASTM D1557 Moisture-Density Relations of Soils and Soil Aggregate Mixtures using 10-pound rammer and 18-inch drop. (Modified Proctor).

F. ASTM D1663 Test Method for Compressive Strength of Molded Soil-Cement Cylinders.

G. ASTM D2419 Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

H. ASTM D2487 Classification of Soils for Engineering Purposes.

I. ASTM D2901 Test Method for Cement Content of Freshly-Mixed Soil-Cement.

J. ASTM D2922 Density of Soil and Soil Aggregate In Place by Nuclear Methods (Shallow Depth).

K. ASTM D3017 Test Methods for Moisture Content.

L. ASTM D4253 Test Methods for Maximum Index Density of Soils, using a Vibratory Table.

M. ASTM D4254 Test Methods for Minimum Index Density of Soils and Calculation of Relative Density.

N. Federal Occupational Safety and Health Administration, *Federal Register*, Volume 37, No. 243, Subpart P, Section 1926-652.

1.05 DEFINITIONS

A. Suitable Material: Excavated material from the site or imported material from off-site meeting the requirements of structural fill or non-structural fill material.

B. Unsuitable Material: Excavated material from the site that does not meet the requirements of structural fill or non-structural fill. This material shall be removed from the site.

C. Structural Fill: Fill placed on prepared subgrade in areas which will ultimately be subjected to structural loadings due to footing, floor slabs, pavements, etc.

D. Non-structural Fill: Fill place on prepared subgrade outside of areas which will ultimately be subjected to structural loadings due to footing, floor slabs, pavements, etc.

E. Borrow Material: Material imported from off-site but made available at an Owner owned/designated site. It is anticipated that borrow material will meet the requirements for structural fill material. If the quantity of acceptable borrow material is not sufficient to complete the Work, the Contractor shall notify the Engineer in writing. The notification shall include an estimated quantity of material required to complete the Work and the Contractor's Geotechnical Engineer's explanation for non-complying material.

1.06 SUBMITTALS

Submit the following to the Engineer:

A. Certified sieve analysis of the following materials and samples of the materials when requested by the Engineer:

1. Bedding and initial backfill
2. Imported trench fill
3. Foundation material (if required)

B. One optimum moisture-maximum density curve for each type of soil encountered or incorporated into the Work.

C. Compaction testing results.

D. For record purposes only and not for review or approval, submit shop drawings and data showing the intended plan for dewatering operations. Include locations and capacities of dewatering wells, well points, pumps, sumps, collection, and discharge lines, standby units, water disposal methods, monitoring and settlement measuring equipment, and data collection and dissemination. Submit, together with a copy of the approved UPDES permit, as applicable, not less than 15 days prior to start of dewatering operations.

PART 2 - PRODUCTS

2.01 FOUNDATION MATERIAL

Foundation material shall be granular well-graded material with a maximum aggregate size of 2 inches and not more than 5 percent passing the 200 sieve.

2.02 BEDDING, PIPE ZONE, AND INITIAL BACKFILL MATERIAL

A. Sanitary Sewer and Storm Drain: Bedding, pipe zone, and initial backfill material shall be clean free-draining well-graded crushed gravel with a maximum aggregate size of 1inch. Crushed rock meeting the gradation requirements shown below shall be submitted for approval by the Engineer.

1-Inch Crushed Gravel

Sieve Size	Percent Passing by Weight
1"	100
3/4"	90-100
1/2"	20-55
#4	0-1
#8	0-5

B. Water, Gas, Electric, Telephone, or Buried Cables: Bedding, pipe zone, and initial backfill material shall be clean granular natural sand material, free from organic matter, conforming to the gradation requirements shown below:

3/8-Inch Crushed Gravel

Sieve Size	Percent Passing by Weight
3/8"	100
#4	35-100
#30	20-100

2.03 FINAL BACKFILL UNDER STRUCTURES, PAVEMENT, AND WALKS

A. Fill and final backfill for utilities under and immediately adjacent to structures, pavement prisms, and walks shall be structural fill material consisting of clean, well-graded, non-expansive granular sand and gravel material imported from off-site with a maximum size of 3 inches, no greater than 35 percent passing the No. 200 sieve, and a liquid limit of no greater than 30 percent. The material shall be capable of attaining the required densities when compacted.

B. Native material will be acceptable for final backfill under walks, pavement, or structures if it meets the requirements for structural fill material.

2.04 FINAL BACKFILL OUTSIDE OF STRUCTURES, PAVEMENT, AND WALKS

A. Fill and final backfill for utilities not under or immediately adjacent to structures, pavement prisms, and walks, shall be suitable non-structural fill material consisting of excavated material from the site, free of topsoil, debris, trash, roots, and other organic matter, frozen material, and stones larger than 3 inches in any dimension. If an adequate quantity of non-structural material is not available at the site, provide imported fill or borrow material consisting of any cohesive or granular material free from topsoil, debris, trash, roots, and other organic matter, frozen material, and stones larger than 3 inches in any dimension. The material shall not contain excessive moisture

and shall readily compact and support construction equipment.

B. Whenever the native excavated material is determined by the Engineer to be unsuitable, imported acceptable material, meeting the requirements for material within rights-of-way, and capable of attaining the required densities shall be used.

2.05 PLASTIC MARKING TAPE

Plastic marking tape shall be acid and alkali-resistant polyethylene film, 6 inches wide, with minimum thickness of 0.004 inch. Tape shall have a minimum strength of 1750 psi lengthwise and 1500 psi crosswise. The tape shall be manufactured with integral wires, foil backing, or other means to enable detection by a metal detector when the tape is buried up to 3 feet deep. The tape shall be of a type specifically manufactured for marking and locating underground utilities. The metallic core of the tape shall be encased in a protective jacket or provided with other means to protect it from corrosion. Tape color shall be as specified in the table below and shall bear a continuous printed inscription describing the specific utility.

Tape Color	Utility
Red	Electric
Yellow	Natural Gas, Oil, Dangerous Material
Orange	Telephone, Telegraph, Television, Police and Fire Communications
Blue	Potable Water System
Green	Industrial and Sanitary Sewer
Green & White	Compressed Air

PART 3 - EXECUTION

3.01 PROTECTION

A. Protect trees, shrubs, and lawn areas to receive planting, rock outcropping, and other features remaining as part of final landscaping.

B. Protect bench marks and existing structures, roads, sidewalks, paving, and curbs against damage from vehicular or foot traffic.

C. Protect excavations and workmen by shoring, bracing, sheet piling, underpinning, or by other methods, as required to prevent cave-ins or lose dirt from falling into excavations.

D. Shore or otherwise support adjacent structure(s) which may be damaged by excavation work. This includes service lines, pipe chases, utilities, retaining walls, etc.

E. Notify Engineer of any unexpected subsurface conditions. Discontinue work in the area until Engineer provides notification to resume work.

3.02 EXISTING UTILITIES

A. The drawings show existing utilities and their locations insofar as they are known. Utility locations and sizes may vary from those shown. Underground utilities or improvements may exist which have not been shown on the plans. All reasonable precautions shall be taken to field locate, preserve, and protect any and all such improvements.

Any improvements damaged by the Contractor which are not indicated by the drawings shall be repaired by the Contractor. Compensation for such repairs shall be covered by a Field Change Order and will be negotiated with the Engineer before corrections are made. Any such improvements damaged by the Contractor which are on the drawings shall be repaired at the expense of the Contractor.

B. Request various agencies or utility companies concerned to field-mark substructures and utilities before excavating.

C. Where it is necessary to remove, replace, or relocate such improvements in order to execute the Work, coordinate with, and obtain approval from the utility company or agency concerned.

D. If the Contractor damages any existing utility lines that are not shown, or if the locations of suspected utilities are not known to the Contractor, report immediately to the Engineer and the Owner of the utilities.

3.03 TRENCH EXCAVATING

A. Obtain required permits from local or state agencies.

B. In areas requiring reseeding or sodding, strip topsoil to a minimum depth of 12 inches, or as directed by the Engineer, and stockpile away from trench and other excavated materials for reuse.

C. Vertically cut existing pavement, sidewalk, curb and gutter, driveways, etc., along the lines forming the trench in such a manner as not to damage the adjoining pavement. Break up the portion to be removed, and remove from the site of the work immediately without causing damage to the pavement outside the limits of the trench.

D. Perform trench excavation to the alignment and grade as shown on the drawings, or as required by the Engineer.

E. As directed by the Engineer, when unsuitable foundation material is encountered at subgrade, remove unsuitable material and replace with foundation material. Contact Engineer prior to excavation of unsuitable material and placement of foundation material to gain authorization to do so.

F. Place excavated material in a manner that will not endanger the work and will cause the least possible interference with public travel.

G. Provide for uninterrupted flow of irrigation ditches, streams, wastewater, and storm drainage. Provide free access to all fire hydrants, water valves, meters, and drives.

H. Keep excavation clear of water during the progress of the Work.

I. The Contractor shall backfill, to existing grades, and barricade all trenches within roadways and parking areas at the close of each day, unless approved by the Engineer. No trenches shall be backfilled except in these areas until pipelines are properly tested.

J. The use of a trench digging machine will be permitted except in places where machines may cause damage to existing structures, in which case, hand methods shall be employed.

K. Place barriers along each excavation, at each end of excavations, along soft shoulder areas within roadways, and at other locations along the excavation as may be necessary or as required by the Engineer. Trenches shall be delineated night and day as required by applicable codes until backfilling is complete.

L. Equipment with tracks which is to be used on pavement shall be equipped with suitable pads to prevent damage to the pavement. The Contractor shall be responsible for damage done to improved surfaces. Damaged surfaces shall be repaired or replaced by and at the expense of the Contractor in a manner satisfactory to the Engineer and at no additional cost to the Owner.

M. Trenches, at the top of the initial backfill, shall be of necessary width for the proper laying of the pipe, but in no case shall the trench be less than 12 inches wider than the outside diameter of the pipe or more than two 2 feet wider than the pipe outside diameter.

N. Trenches shall not be excavated until the pipe to be laid therein is on the site and is scheduled to be placed. The bottom of the trenches shall be accurately graded to a depth of 6 inches below the bottom of the pipe to allow for placing of granular pipe zone bedding material.

Care shall be taken not to excavate below the depths indicated. Where bell and spigot pipe is used, the minimum cover depth shall be maintained over the bell as well as under the straight portion of the pipe. Over-excavation shall be backfilled in 6-inch lifts to the proper grade with foundation or bedding material, as required by the Engineer, and shall be thoroughly consolidated and compacted as specified at no additional cost to the Owner.

O. Wasting of Material. Contractor shall remove and dispose of surplus, unsuitable and excess excavated material. Contractor shall secure waste sites for excess material. No additional payment shall be made for removal and disposal of material.

3.04 ROCK EXCAVATING

A. Rock shall be defined as follows:

1. Rock excavation shall consist of solid material and obstructions encountered with a volume in excess of 2 cubic yard. Sidewalks, pavement, and curb and gutter that cannot be excavated with a track-mounted power excavator (equivalent to Caterpillar Model No, 215C LC, rated at not less than 115 HP flywheel power and 32,000-pound drawbar pull, and equipped with a short stick and a 42-inch wide, short tip radius rock bucket rated at .81 cubic yard (heaped) capacity) without systematic drilling and blasting shall be excluded.

2. Hard and compact materials such as cemented gravels, glacial till, fractured quartzites, and relatively soft or disintegrated rock will not be considered as rock excavation. Rock excavation will not be considered as such because of intermittent drilling, blasting or ripping that is performed merely to increase production.

B. Excavation of the material claimed as rock shall not be performed until the material has been classified and cross-sectioned by the Engineer.

C. Rock payment lines are limited to the following:

Six (6) inches below invert elevation of pipe and two feet wider than inside diameter of the pipe, but not more than three (3) feet maximum trench width.

D. Excavate for and remove rock by the mechanical method.

1. Cut away rock at excavation bottom to form level bearing surface.
2. Remove shaled layers to provide sound and unshattered base for footings and foundations.
3. Remove excavated material.
4. For utility installations, cut away rock in bottom of trench to follow the proposed grade of the utility line. Eliminate sharp steps or protrusions.

E. Provide for visual inspection of bearing surfaces and cavities formed by removed rock.

F. Correct unauthorized rock removal in accordance with backfilling and compaction requirements of Section 02222.

3.05 STABILITY OF EXCAVATIONS

A. Slope sides of excavations to comply with OSHA 29 CFR Part 1926 or latest revision. Provide and install trench support systems where sloping is not possible because of space restrictions or stability of material excavated.

B. Provide proper support for all excavations to protect life, property, utilities, pavement, and the Work and to provide safe working conditions in the trench in accordance with Occupational Safety and Health Administration (OSHA) regulations, *Federal Register* Vol. 37, No. 243, Subpart P., Sec. 1926.652 or latest edition.

C. Contractor shall be responsible to determine when and where the use of trench support is employed over the use of trench boxes or sloping the sides of the excavation to the angle of repose of the material being excavated. Contractor shall be responsible for the support system used. Support systems shall be in accordance with Section 02160 - Excavation Support Systems.

D. Remove all timber and sheeting from excavations or trenching before backfilling. Cut sheeting off 2-feet below final grade if allowed by Engineer.

E. Contractor shall prevent damage to the existing improvements. Where existing improvements are damaged or affected as a result of the Contractor's work, the Contractor shall replace or repair such damage at no additional cost to the Owner.

3.06 DEWATERING

A. Provide all equipment, labor, materials, tools, and incidentals necessary to design, construct, install, and operate dewatering facilities for construction of the Work.

B. Do not discharge drainage water into storm drains unless approval by the governing agency and the Engineer is given. No discharge into sanitary sewers is allowed.

C. Water shall not be allowed to flow through the pipe lines during construction.

3.07 BACKFILLING AND COMPACTING

A. Assure that trenches are free of debris, snow, ice, and water and that ground surfaces are not in frozen condition.

B. Backfill in a systematic manner and as soon as possible after pipeline installation and leak detection testing is complete.

C. Compact materials in accordance with paragraph 3.14 Field Quality Control.

D. Foundation. When unstable earth, muck, or other foundation material is encountered in the excavation, additional excavation shall be made as directed by the Engineer, and shall be replaced with foundation materials. A minimum of 12 inches below the pipe zone will be removed and backfilled with foundation material to give a stable subgrade.

No additional payment for foundation material will be made unless the Engineer is notified of the condition and approves the use of foundation materials.

In rock excavation where over-excavation occurs the excavation shall be backfilled with foundation material to 6 inches below the pipe zone.

E. Bedding and Pipe Zone. Place bedding material to required thickness and consolidate or compact. Shovel-slice or rod the bedding in the haunch area to assure that the pipe remains true to grade, voids are eliminated beneath the pipe, and the bedding is properly compacted or consolidated.

F. Initial Backfill. Place and compact initial backfill material simultaneously on each side of the pipe for the full width of the trench in layers of 6 inches or less, to a point 12 inches over the top of the pipe and in such a manner as not to injure, damage or disturb the pipe.

G. Final Backfill.

1. Under structures, pavement prisms, walks, and where specified by the Engineer, the backfill material shall be placed in continuous horizontal layers, not exceeding 6 inches in thickness or as required by Construction Manager. Adjust moisture content of fill or backfill material, as determined by ASTM D698, as necessary to $\pm$2 percent of optimum moisture as required to obtain specified degree of compaction. Utilize borrow material as available. Provide import structural fill material as required.

2. In all areas outside of structures, pavement prisms, and walks, place non-structural fill or backfill material in continuous horizontal layers not exceeding 12 inches in thickness degree of compaction. Moisten or aerate native materials as necessary to $\pm$1 to 3 percent of optimum moisture as determined by ASTM D698.

H. In areas where the pipe is placed near the existing ground surface, mound backfill material over pipe to a depth of 4 feet of cover, or as designated on the plans. Mounding shall be accomplished with consideration for drainage problems that may develop. Mounding shall only be used where shown on the plans.

I. Distribute the backfill material in such a manner as to avoid the formation of lenses or layers of material differing substantially in characteristics from surrounding material. Do not include any roots, sod, frozen material or other perishable or unsuitable material in backfill.

J. Whenever the excavated material is not suitable for backfill, furnish or transport from other areas within the project, suitable excavated material which meets the requirements for final backfill.

K. Remove from site and dispose of excess or undesirable excavated material not suitable or required for backfill in an appropriate acceptable manner.

L. Backfill for Appurtenances. After the manhole, catch basin, inlet, or similar structure has been

constructed and the concrete has been allowed to cure for seven (7) days, backfill shall be placed in such a manner that the structure will not be damaged by the shock of falling earth. The backfill material shall be deposited and compacted as specified for final backfill, and shall be placed in such a manner as to prevent eccentric loading and excessive stress on the structure.

3.08 SPECIAL REQUIREMENTS

A. Water Lines. Trenches shall be of a depth to provide a minimum cover of 5 feet from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe.

B. Electrical Distribution System. Direct burial cable and conduit or duct line shall have a minimum cover of 24 inches from the finished grade, unless otherwise indicated.

C. Gas Distribution. Trenches shall be excavated to the depth that will provide not less than 36 inches of cover. Trenches shall be graded as specified for pipe-laying requirements.

D. Plastic Marking Tape. Warning tapes shall be installed directly above the pipe at a depth of 18 inches below finished grade unless otherwise shown or required by the Engineer.

3.09 SOIL STORAGE (STOCKPILE) AREAS

A. Prepare areas to receive stockpile material. Clear and grub as necessary to prevent stockpiled material from contamination with unsuitable material.

B. Provide adequate drainage for stockpiles and surrounding areas by means of temporary ditches, dikes or other approved methods.

C. Stockpile suitable excavated material in an orderly manner, and at a distance from the bank of the excavation sufficient to avoid overloading or cave-ins.

D. Protect stockpiled material from contamination with unsuitable excavated material that may destroy the quality of the suitable stockpiled material. Replace stockpiled material, not adequately protected, that becomes unsuitable with suitable material at no cost to the Owner.

E. Do not place stockpile material in permanent fill material locations unless approved by the Engineer.

F. When stockpile areas are no longer needed, prior to completion of the work, grade the stockpile area to original contours and abandon/fill temporary ditches.

3.10 BORROW AREAS

A. Excavate borrow areas in such a manner as will afford adequate drainage.

B. Transport overburden and spoils material to the designated spoil area or otherwise dispose of as directed by the Engineer.

C. Operate borrow areas to minimize detrimental effects on natural environmental conditions.

D. Maintain access roads as required to permit access.

E. Slope sides of excavations or provide excavation support systems in accordance with Section 02160.

F. Trim and drain borrow areas to neat lines after the excavation is complete.

3.11 COLD WEATHER

A. Contractor shall remove and dispose of snow or ice from the construction area as necessary to perform the required work. The removal of additional deposits of snow shall not be cause for the Contractor to request an extension of contract time or additional payment.

B. The Contractor shall provide cold weather protection materials and equipment, such as heaters and blankets, as required.

C. Excavations, trenches, excavated material, and imported material shall be protected from frost or freezing, as necessary, until the excavation or trench has been backfilled.

D. The presence of frozen material or material containing frost shall not be cause for the Contractor to request an extension of contract time or additional payment.

E. The Contractor shall remove and dispose of frozen material that cannot be incorporated into the backfill.

3.12 FIELD QUALITY CONTROL

A. Densities of in-place materials shall equal or exceed the minimum densities as indicated below when compared to the maximum dry density as determined by ASTM D698:

COMPACTION REQUIREMENTS

Location or Use of Fill	Percentage of Maximum Density
Foundation, bedding, and initial trench backfill or fill material	96
Final fill and backfill beneath structures, paved areas (including sidewalks and gravel roadways)	96
Final fill and backfill, not beneath paved areas or structures	90
Topsoil	80
Overexcavation	95

B. Passing overexcavation tests are required on the fills and backfills at the following frequencies:

Bedding	-	1 Test per 200 L.F. of Trench
Initial Backfill	-	1 Test per 200 L.F. of Trench
Final Backfill or Fill (outside pavement section)	-	1 Test per 200 L.F. of Trench per lift
Final Backfill or Fill (under pavement section)	-	1 Test per 50 L.F. of Trench per lift
Overexcavation	-	1 Test per 50 L.F. of Trench per lift

C. Densities of in-place material shall be as determined by ASTM D2922.

D. Compaction tests not meeting specification requirements shall be retested, after recompaction, at Contractor's expense. The Engineer shall select the depth that the test is to be taken. The Contractor shall be responsible to dig all density testing pits at the location and depth requested.

No additional payment will be made for test pits dug for compaction tests or for replacing and recompacting the backfill material.

E. Fill or backfill not compacted to the required density will be removed, recompacted, and retested at the Contractor's expense until the requirements are met. The retesting shall be at the Contractor's expense.

F. Any trenches and excavation pits improperly backfilled, or where settlement occurs, shall be reopened to the depth required for proper compaction, then refilled and compacted with the surface restored to the required grade and compaction, rounded over, and smoothed off or pavement sections restored.

G. The Contractor shall be responsible for providing Proctor Density test results for backfill material, bedding material, and any special import backfill used. Prior to commencement of any construction the Contractor shall obtain samples of backfill material for Proctor tests. Where existing material is to be used as backfill material the Contractor shall be responsible for providing the machinery and labor to obtain soils samples of the backfill material for Proctor tests. On this project at least one sample per 1000 feet of pipe to be installed shall be required.

H. Additional Proctor tests may be required if backfill material changes in characteristics. Proctor tests shall be run by an Owner-approved testing laboratory. The cost of obtaining soil samples and conducting Proctor tests shall be paid by the Contractor.

I. No pipeline installation will begin until written results of the Proctor tests for that area have been submitted to the Engineer. The Contractor shall use the Proctor test results for testing compaction of backfill material.

3.13 LIMITS OF CONSTRUCTION

A. The Contractor shall complete all work within the easement lines and rights-of-way as shown on the drawings or as directed by the Engineer. All corrections for disturbance, damage, or irregularity shall be the responsibility of the Contractor and shall hold the Owner harmless of all suits, liability and damages. All ditches, canals, and roadways shall be placed back into their original or better condition.

3.14 CLEAN UP

A. Remove all excess material, debris, sheeting, etc. from the site upon completion of the Work and dispose of properly.

B. Keep cleanup operations to within 500 feet of excavation at all times.

C. Failure to keep the cleanup operations to within 500 feet of excavation shall be sufficient cause for the Engineer to stop forward progress of excavating equipment and hold progress payments until the cleanup is up to acceptable limits and standards.

D. Any pavement, trees, shrubbery, fences, poles, or other property or structures damaged, removed, or disturbed by the Contractor, whether deliberately or through failure to carry out the requirements of the contract documents, state laws, municipal ordinances or the specific direction of the Engineer or through failure to employ usual and reasonable safeguards shall be replaced or repaired at the expense of the Contractor.

END OF SECTION 02222

SECTION 02520 - CONCRETE DRIVEWAY, PARKING, WALK, CURB AND GUTTER

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Subgrade preparation for walkways, driveways, ramps, curbs and gutters, waterways.

B. Base course for walkways, driveways, parking, ramps, curbs and gutters, waterways.

C. Concrete walkways, driveways, ramps, curbs and gutters, waterways and other concrete flat work, complete with reinforcement as required.

1.2 RELATED WORK

A. Section 02200: Earthwork

1.3 REFERENCE STANDARDS

A. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

B. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

C. ASTM C33 - Concrete Aggregates.

D. ASTM C94 - Ready-Mixed Concrete.

E. ASTM C150 - Portland Cement.

F. ASTM C260 - Air-Entraining Admixtures for Concrete.

G. ASTM C309 - Liquid Membrane - Forming Compounds for Curing Concrete.

H. ASTM C1116 - Fiber Reinforcement.

I. ASTM D1557 - Tests for Moisture - Density Relations of Soils using 10 lb (4.5 kg) Rammer and 18 inch (457 mm) Drop.

J. ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.4 INSPECTION AND TESTING

A. Three (3) concrete test cylinders will be taken for every 100 cu. yds. of concrete placed.

B. One (1) additional test cylinder will be taken during cold weather concreting, and be cured on job site under same conditions as concrete it represents.

C. One (1) slump test will be taken for each set of test cylinders taken.

PART 2 - PRODUCTS

2.1 UNTREATED BASE COURSE MATERIAL

A. Angular crushed natural stone; free from shale, clay and friable materials and debris; graded within following limits per ASTM C 136:

GRADATION, 1" MAXIMUM SIZE

Sieve Size	% Passing
1 inch (25 mm)	100
¾ inch (19 mm)	90 to 100
½ inch	78 to 90
3/8 inch	65 to 70
No. 4	47 to 61
No. 16	23 to 35
No. 50	10 to 20
No. 200	5 to 11

B. Material passing the No. 40 sieve: Non-plastic and liquid limit less than twenty-five (25), when tested in accordance with AASHTO Test Methods T-89 and T-90.

C. Percentage of wear not to exceed fifty (50) when tested in accordance with AASHTO Test Method T-96.

D. Rodded Weight: Not less than 75 pounds per cubic foot when tested in accordance with AASHTO Test Method T-19.

E. California Bearing Ratio Value (CBR) of eighty (80) minimum when tested in accordance with ASTM Test Method D-1883.

F. Determine material passing the No. 200 sieve by washing in water in accordance with ASTM Test Method T-11.

2.2 CONCRETE MATERIALS

A. Portland Cement: ASTM C150; Type II

B. Fine Aggregate for Concrete.

1. Fine aggregate deleterious substance limits conform to the requirements of ASTM C 33 with the following exceptions:

Substance	Max. % by Weight
Clay Lumps	0.5
Coal and Lignite	0.3
Other Substances	2.0

2. Grading. Well-graded fine aggregate from coarse to fine conforming the following gradation requirements:

Sieve Size	% Passing
3/8 inch	l00
No. 4	90 to 100
No. 50	10 to 30
No. 100	2 to 10

C. Coarse Aggregates for Concrete.

1. Crushed stone, gravel, or other approved inert materials of similar characteristics, or combinations thereof, having strong and durable pieces.

2. The aggregates shall be free from vegetable matter, lumps or balls of clay, adherent films of clay, or other matter that would prevent thorough bonding. Coarse aggregate deleterious substance limits conform to the requirements of ASTM C 33 with the following exceptions:

Substance	Max. % by Weight
Coal and Lignite	0.3
Clay Lumps	0.3
Soft Fragments	2.0
Other deleterious substances (such as friable, thin, elongated, or laminated pieces)	2.0

3. Wear and Soundness. ASTM C88. Percentage of wear for coarse aggregates of not more than 40 when tested in accordance with AASHTO T-96 or show a sodium sulphate loss not to exceed 12 percent (12%) when tested in accordance with AASHTO T-104. The wear and soundness requirements may be waived, or modified, by the Engineer provided that the coarse aggregate has a proven service record for similar service and exposure.

4. Gradation. Per ASTM C33. Coarse aggregate for concrete shall meet the following gradation limits for the concrete class specified. Other sizes or combinations of sizes may be used when specified.

Sieve Designation	Percent Passing (by weight)
1 "	100
¾"	95-100
½"	-
3/8"	20-55
No. 4	*0-10

*Not more than five percent (5%) shall pass a No. 8 sieve.

D. Water: Clean and free from injurious amounts of oil, alkali, organic matter, or other deleterious material, complying with AASHTO T-26.

E. Air-Entraining Agent: Use in all weather-exposed concrete. Comply with ASTM C260, except the dilative durability factor in the freezing and thawing test shall not be less than 95.

F. Fiber Reinforcement (include when specifically indicated): Synthetic fibers engineered and designed for secondary reinforcement of concrete slabs, complying with ASTM C116, Type III.

2.3 CONCRETE MIX

A. Mix and proportion to produce minimum 4000 psi compressive strength concrete at 28 days with maximum slump of 3 inches and 5 to 7 percent air-entrainment.

B. Provide Ready-Mixed concrete. Comply with ASTM C 94.

C. Use accelerating admixtures in cold weather only when acceptable to Engineer. Use of admixtures shall not relax cold weather placement requirements. Do not use calcium chloride.

D. Use set-retarding admixtures during hot weather only when acceptable to Engineer.

2.4 REINFORCING MATERIALS

A. Reinforcing Bars: 60 ksi yield strength; plain deformed billet steel bars; ASTM A615; plain finish.

B. Epoxy-Coated Reinforcing Bars (use where indicated): ASTM A775 with ASTM A 615, Grade 60 deformed billet steel bars.

C. Welded Steel Wire Fabric: Plain type, ASTM A185; plain finish.

D. Tie Wire: Minimum 16 gage annealed type, or patented system acceptable to Engineer.

E. Joint Dowel Bars: Plain steel bars, ASTM A615, Grade 60 plain steel bars.

F. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting and fastening reinforcing bars, welded wire fabric and dowels in place. Use wire bar-type complying with CRSI specifications.

2.5 FORMS

A. Plywood, metal, metal-framed plywood or other acceptable panel type materials to provide full-depth, continuous, straight, smooth exposed surfaces. Use flexible or curved forms for curves of a 100-foot or less radius. Provide forms with matched, tight-fitting joints and adequate stiffeners to support weight of concrete without deflection detrimental to tolerances and appearance of concrete.

B. Slip form construction may be used subject to approval of the Engineer. Provide slip-forming equipment with traveling side forms of sufficient dimensions, shape, and strength to support concrete laterally for a sufficient period of time during placement to produce pavement of the required cross-section. The equipment shall spread, consolidate, screed, and float finish the freshly placed concrete in such a manner as to provide a dense homogeneous pavement.

C. Form Release Agent: Provide commercial formulation form-release agent that will not stain or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces. Comply with VOC limitation regulations.

2.6 JOINT MATERIAL

A. Provide joint material of type, thickness, and widths indicated on the drawings.

B. Joint Filler: Bituminous mastic complying with ASTM D 994, formed and encased between 2 layers of bituminous saturated felt or 2 layers of glass-fiber felt. Minimum ½ inch thick.

C. Joint Sealant: Provide one of the following:

1. Concrete Joint Sealer, Cold-Applied: Elastomeric type complying with ASTM C 920, Type S or M, Grade P or NS, Class 25, Use T, NT, M and O, chemically curing suitable for vehicular or pedestrian use, types of construction and substrates indicated, as recommended by Manufacturer.

   a. Self-leveling
   b. Shore Hardness: 40 plus or minus, 5 ASTM D 2240.

c. Final cure: 4 days maximum.
d. Service range: -10 to 150 degrees F.

2. Concrete Joint Sealer, Hot-Applied: Resilient and adhesive compound type complying with ASTM D 340, Type and Grade suitable for specific application as recommended by Manufacturer.

D. Obtain joint sealing materials from a single manufacturer for each different product required.

E. Provide materials that are compatible with one another and with joint substrates under the conditions of service and application.

2.7 CURING MATERIALS

A. Insulating Coverings: Insulating blankets.

B. Moisture-Retaining cover: One of the following, complying with ASTM C 171.

1. Waterproof paper.
2. Polyethylene film.
3. White burlap-polyethylene sheet.

C. Curing Compound: White-pigmented waterborne membrane-forming curing compound free from permanent color, complying with ASTM C 309, Type I, Class B.

D. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.

2.8 PAINTED TRAFFIC LINES AND MARKINGS

A. Alkyd-resin ready-mixed paint, complying with AASHTO M 248, Type F. Provide approved substitute as required to comply with applicable VOC limitations.

B. Color.

1. Pavement and Parking Striping, Stop Bars - White.
2. Crosswalks and Zebra Striping - White.
3. Fire Lane Curbs - Red.
4. Accessible Parking Markings - Blue.

C. Non-slip Aggregate Finish (where indicated): Fused aluminum oxide granules or crushed emery as the abrasive aggregate for a non-slip finish, with aggregate containing not less that 50 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory graded, packaged, rustproof, non-glazing, and unaffected by freezing, moisture and cleaning materials.

D. Bonding Agent: Acrylic or styrene butadiene

E. Epoxy Adhesive: ASTM C881, two-component material suitable for damp or dry surfaces. Material type, grade and class to suit requirements.

F. Apply pavement markings only with equipment manufactured specifically for that purpose. Use equipment capable of applying a stripe of the desired width with a tolerance of plus or minus 1/4 inch.

PART 3 - EXECUTION

3.1 PREPARATION

A. Check construction staking. Notify Engineer of conflicts or slope and drainage deficiencies. Failure to check and verify or notify Engineer will result in Contractor repairing and drainage deficiencies at no additional cost to the Owner.

B. Check form work with construction staking and drawing elevations prior to placing concrete. Adjust form work as necessary. Notify Engineer of conflicts or slope and drainage deficiencies.

3.2 PREPARATION OF SUBGRADE

A. Ensure rough grading has brought subgrade to required elevations.

B. Fill soft spots and hollows with additional structural fill.

C. Level and compact subgrade, to receive granular base course for concrete walkways, ramps, curbs and gutters, to 95% of maximum laboratory density, AASHTO T-99, Method D.

3.3 PLACEMENT OF BASE COURSE

A. Place and level untreated base course over prepared subgrade to a compacted depth indicated on drawings true to lines and levels. Compact to 95% of maximum modified proctor density, ASTM D 1557.

B. Adjust moisture content of base course material, as determined by ASTM D 698, as necessary to plus or minus 2 percent of optimum moisture as required to obtain the specified degree of compaction.

C. Protect placed and compacted base course. Remove and replace "softened" base course areas occurring between base course placement and concrete placement.

D. During concrete placement, keep base sufficiently moist to prevent excessive absorption of water from freshly placed concrete.

3.4 FORM WORK

A. Provide sufficient forms to allow continuous progress of the work and so the forms can remain in place at least 24 hours after concrete placement.

B. Make forms sufficiently tight to prevent loss of concrete.

C. Form vertical surfaces to full depth and securely position to required lines, dimensions, and levels. Ensure form ties are not placed so as to pass through concrete.

D. Arrange and assemble form work to permit easy dismantling and stripping, and to prevent damage to concrete during form work removal.

E. At construction joints, overlap forms over hardened concrete at least 6 inches. Prevent offsets or loss of concrete at construction joint. Maintain a true surface.

F. Position expansion joint material and other embedded items accurately and support to prevent displacement.

G. Provide formed openings for elements embedded in or passing through concrete.

H. Apply form release agent on form work per manufacturer's instructions. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.

I. Do not pry against face or visible edges of concrete to remove forms. Remove and replace sections of concrete work damaged during form removal at no additional cost to the Owner.

J. Thoroughly clean and properly coat forms before reuse.

3.5 REINFORCEMENT PLACEMENT

A. Reinforce concrete walks, curbs and gutters as required on the drawings.

B. Clean reinforcement of loose rust, mill scale, earth, ice, or other bond-reducing materials.

C. Comply with Concrete Reinforcing Steel Institute's recommended practice for placing and supporting reinforcing bars.

D. Maintain minimum cover over reinforcement. Allow for a minimum 1-1/2 inch concrete cover unless otherwise noted.

E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps to prevent continuous laps.

F. Do not extend reinforcing through expansion and contraction joints. Provide doweled joints through expansion and contraction joints, with one end of dowels fitted with capping sleeve to allow free movement.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete form work installation, reinforcing steel, and items to be embedded.

B. Remove snow, ice or frost from base course surface and reinforcing before placing concrete. Do not place concrete on surfaces that are frozen.

C. Moisten base course if required to provide uniform dampened condition at the time of concrete placement.

D. Coordinate with the testing laboratory prior to delivery of concrete. Schedule to have a testing agent on site prior to the start of the pour.

E. Do not discharge concrete into forms if the slump or air-entrainment does not meet the specification requirements.

F. Do not discharge concrete if the time period from the batching at the plant to site discharge exceeds the following:

1. Air temperature less than 90 degrees F.: 1-1/2 hours
2. Air temperature over 90 degrees F. (without a retarder): 1 hour
3. Air temperature over 90 degrees F. (with a retarder): 1-1/2 hours

G. When concrete arrives at the site with a slump below specified, water may be added if the maximum approved water/cement ratio and maximum slump is not exceeded provided that:

1. Approved mix design allows for on-site addition of water.
2. Water addition can be accurately measured to within a gallon of the desired quantity.
3. Water addition is followed by 3 minutes of mixing at mixing speed prior to discharge.

H. Place concrete per ACI 301.

1. Hot Weather Placement: Place per ACI 305.
2. Cold Weather Placement: Place per ACI 306.1. Non-chloride accelerating admixture may be used in concrete work placed at temperatures below 50 degrees F.

I. Maintain mixed concrete temperature at time of placement between 60 degrees F. and 90 degrees F.

J. Do not disturb reinforcement, inserts, embedded parts and formed joints.

K. Do not break or interrupt successive pours such that cold joints occur at locations other than expansion type joints.

L. Honeycomb or embedded debris in concrete is not acceptable.

M. Consolidate per ACI 309.

N Placement of curb and gutter by slip-form paving equipment is acceptable. Comply with the following:

1. Provide adequate control for lines, grades and elevations.
2. Provide equipment that will produce required cross-section, lines, grades, finish and jointing as specified for formed concrete.
3. Prevent damage to adjacent curbs, gutters and pavement by equipment.
4. After placement, check fresh concrete with a straight-edge to ensure the concrete complies with tolerances specified.
5. Provide final finish on slip-formed curb and gutter in accordance with Section 3.07.
6. If results are not acceptable, remove and replace work with formed concrete.

3.7 CONTRACTION JOINTS

A. Construct at right angles to top surface of placement.

B. Construct straight unless otherwise indicated.

C. Construct traverse and longitudinal joints the same dimension.

D. Tooled Joints (Score Lines): Maximum depth 1 inch with a top radius of ½ inch, unless otherwise noted on the drawings.

E. Saw Cut Joints: Saw cuts before uncontrolled shrinkage cracking occurs. Do not tear or ravel concrete during sawing.

F. Templates: 1/8 to 3/16 inch wide.

G. Sidewalks: Construct contraction joints as follows.

1. At intervals equal to the width of the sidewalk and transverse to the line of the walk.
2. Radial at curbs and walks.

3. Place longitudinal joints in walks with width of walk in feet is greater that 2 times the walk thickness in inches (e.g. Maximum width of a 4 inch thick walk before placement of a longitudinal joint is 8 feet).
4. At walk returns make joints radial.
5. Match longitudinal and traverse joints with adjacent walks.

H. Curb, Gutter, Waterway: Construction joints as follows:

1. Place joints at intervals not exceeding 10 feet.
2. At curb radius and walk returns make joints radial.
3. Where possible, make joints of curbs coincide with joints in walks.
4. Where integral curb and gutter is adjacent to concrete pavement, align joints with pavement joints where practical.

3.8 EXPANSION JOINTS

A. Place expansion joints where indicated on the drawings and at immovable structures, when sidewalks abut curb, at points of curve, and at back of curb returns.

B. Construct at right angles to top surface of placement.

C. Construct straight unless otherwise indicated.

D. Construct traverse and longitudinal joints the same dimension.

E. Place expansion joint material to full depth and width of joint. Fit joints with filler of required profiles, set perpendicular to longitudinal axis of walks, ramps, curbs and gutters.

F. Do not place longitudinal expansion joints in waterways

F. Do not place expansion joints in curb returns.

G. Do not extend reinforcement through an expansion joint. Place dowel mechanisms as required.

3.9 SEALED JOINTS

A. Provide sealed joints where required on the drawings. Install cold or hot-applied sealant as required.

B. Saw cut joints as necessary to provide the required sealant thickness and depth.

C. Remove oil, grease, wax, form-release agents, curing compounds and other materials by sand or water blasting as recommended by the manufacturer of the sealant. Remove frost and moisture prior to sealing.

D. Install sealants in uniform, continuous ribbons without gaps or air pockets with complete bonding of joint surfaces.

E. Fill surface rabbet flush with pavement surface.

F. Fill joints to a depth equal to 75 percent of the joint width, but not less than 3/8 inch deep or greater than 5/8 inch deep, unless otherwise indicated on the drawings.

G. Do not overfill joints. Clean overflow or spillage from adjoining surfaces.

3.10 FINISHING

A. Round all edges, including edges of expansion and contraction joints, with ½ inch radius edging tool, unless otherwise noted on the plans. Eliminate tool marks on concrete surfaces.

B. Ensure finished surfaces do not vary from true lines, levels or grade by more than 1/8 inch in 10 feet (3 mm in 3 m) when measured with straightedge.

C. Screed and float exposed surfaces to a smooth and uniform finish, free of open texturing and exposed aggregate. Avoid working mortar to surface. Remove and replace sections where the surface has been overworked at could result in spalling.

D. Finish exposed surfaces of walks with grades of less than or equal to 6 percent with a fine-hair broom applied transverse to the line of the walk.

E. Finish exposed surfaces of walks with grades of greater than 6 percent with a rough broom applied transverse to the centerline.

F. Finish exposed surfaces of curbs, gutters and waterways with a medium texture broom applied longitudinal to the line of the curb, gutter or waterway.

G. Provide exposed aggregate finish on concrete walks next to building to match finish of adjacent historic concrete walks to remain.

H. Do not add water to concrete surface (sprinkle) without approval of the Engineer.

3.11 CURING

A. Apply curing compound on finished surfaces immediately after placement. Apply in accordance with manufacturer's recommendations.

B. Do not apply curing compound to areas to receive special finishes or paint.

C. Protect placed concrete from freezing or excessive moisture loss. Install covers or apply compounds as required. Apply compounds in accordance with manufacturer's recommendations.

3.12 PAINTING

A. Apply traffic paint for curbs and markings at all fire lanes and other locations as indicated on the drawings.

B. Apply with mechanical equipment to produce uniform straight edges.

C. Apply at manufacturer's recommended rates to provide a 15-mil minimum wet film thickness.

3.13 FIELD QUALITY CONTROL

A. Line: Less than ½ inch variance in 10 feet and not more than 1 inch from true line at any location.

B. Grade: Not more than 1/4 inch variance in 10 feet. Flood curb and gutter with water after final cure has been reached. Remove and replace any area where ponding is found to stand more than 3/8 inch deep.

C. Walk Cross Slope: Slope indicated on plans or 4 percent maximum, 1 percent minimum.

3.14 PROTECTION

A. Prevent damage to placed concrete.

B. Exclude traffic or equipment from placed concrete for a minimum of 14 days.

C. Maintain a clean surface and remove spill and surface stains until Substantial Completion.

D. Remove and replace damaged areas, discolored areas, or cracked sections at no additional cost to the Owner.

E. Do not backfill against placed concrete for a minimum of 7 days, unless otherwise approved by the Engineer.

F. Do not permit paving operations (base course or asphalt) against placed curbs, gutters and waterways for a minimum of 7 days, unless otherwise approved by the Engineer.

G. Do not permit paving operations against placed curbs and gutters without completed backfilling behind curbs.

END OF SECTION 02520

SECTION 02620 – SUB DRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes sub drainage systems for foundations.

1.3 SUBMITTALS

A. Product Data: For each type of drainage panel indicated.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to the "Piping Applications" Article in Part 3 for applications of pipe, fitting, and joining materials.

2.2 PERFORATED-WALL PIPES AND FITTINGS

A. Perforated PVC Sewer Pipe and Fittings: ASTM D 2729, square cut ends with sleeved-socket joints.

2.3 SOLID-WALL PIPES AND FITTINGS

A. PVC Sewer Pipe and Fittings: ASTM D 3034, SDR 35, square cut ends, with sleeved-socket joints.

1. Gaskets: ASTM F 477, elastomeric seal.

2.4 SPECIAL PIPE COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant metal tension band and tightening mechanism on each end.

1. Shielded Flexible Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant metal tension band and tightening mechanism on each end.

2.5 CLEANOUTS

A. Cast-Iron Cleanouts: ASME A112.36.2M; with round-flanged, cast-iron housing; and secured, scoriated, Medium-Duty Loading class, cast-iron cover. Include cast-iron ferrule and countersunk, brass cleanout plug.

2.6 DRAINAGE PANELS

A. Molded-Sheet Drainage Panels: Prefabricated geocomposite, 36 to 60 inches (915 to 1525 mm) wide with drainage core faced with geotextile filter fabric.

1. Available Manufacturers:

   a. American Wick Drain Corporation.
   b. Cosella-Dorken.
   c. Eljen Corp.
   d. Greenstreak, Inc.
   e. JDR Enterprises, Inc.
   f. LINQ Industrial Fabrics, Inc.
   g. Midwest Diversified Technologies Incorporated.
   h. TC Mirafi.

2. Drainage Core: Three-dimensional, nonbiodegradable, molded PP or PS.

   a. Minimum Compressive Strength: 10,000 lbf/sq. ft. (479 kPa) when tested according to ASTM D 1621.
   b. Minimum In-Plane Flow Rate: 7 gpm/ft. (87 L/min. per m) of unit width at hydraulic gradient of 1.0 and compressive stress of 25 psig (172 kPa) when tested according to ASTM D 4716.

3. Filter Fabric: Nonwoven needle-punched geotextile, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with the following properties determined according to AASHTO M 288:

   a. Survivability: Class 2.
   b. Apparent Opening Size: No. 40 (0.425-mm) sieve, maximum.
   c. Permittivity: 0.5 per second, minimum.

4. Film Backing: Polymeric film bonded to drainage core surface.

2.7 SOIL MATERIALS

A. Backfill, drainage course, impervious fill, and satisfactory soil materials are specified in Division 2 Section "Earthwork."

2.8 ROOFING FELTS

A. ASTM D 226, Type I, asphalt-saturated roofing felt.

2.9 GEOTEXTILE FILTER FABRICS

A. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. (4480 to 13 440 L/min. per sq. m) when tested according to ASTM D 4491.

1. Structure Type: Nonwoven, needle-punched continuous filament or woven, monofilament or multifilament.
2. Style(s): Flat and sock.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 2 Section "Earthwork."

3.2 PIPING APPLICATIONS

A. Underground Sub drainage Piping:

1. Perforated PVC sewer pipe and fittings for loose, bell-and-spigot joints.

B. Under slab Sub drainage Piping:

1. Perforated PVC sewer pipe and fittings and loose, bell-and-spigot joints.

C. Header Piping:

1. PVC sewer pipe and fittings, couplings, and coupled joints.

3.3 CLEANOUT APPLICATIONS

A. In Underground Sub drainage Piping:

1. At Grade in Earth: Cast-iron cleanouts.
2. At Grade in Paved Areas: Cast-iron cleanouts.

3.4 FOUNDATION DRAINAGE INSTALLATION

A. Place impervious fill on sub grade adjacent to bottom of footing and compact to dimensions indicated, but not less than 6 inches (150 mm) deep and 12 inches (300 mm) wide.

B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

C. Place supporting layer of drainage course over compacted sub grade and geotextile filter fabric, to compacted depth of not less than 4 inches (100 mm).

D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape.

E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for foundation sub drainage.

F. Add drainage course to width of at least 6 inches (150 mm) on side away from wall and to top of pipe to perform tests.

G. After satisfactory testing, cover drainage piping to width of at least 6 inches (150 mm) on side away from footing and above top of pipe to within 12 inches (300 mm) of finish grade.

H. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.

I. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches (100 mm).

J. Install vertical drainage panels as follows:

1. Coordinate placement with other drainage materials.
2. Lay perforated drainage pipe at base of footing. Install as indicated in Part 3 "Piping Installation" Article. Do not install aggregate.
3. Separate 4 inches (100 mm) of fabric at beginning of roll and cut away 4 inches (100 mm) of core. Wrap fabric around end of remaining core.
4. Wrap bottom of panel around drainage pipe.
5. Attach panel to wall at horizontal mark and at beginning of pipe. Place core side of panel against wall. Use concrete nails with washers through product cylinders to attach panel to wall. Place nails from 2 to 6 inches (50 to 150 mm) below top of panel, approximately 48 inches (1200 mm) apart. Construction adhesives, metal stick pins, or double-sided tape may be used instead of nails. Do not penetrate waterproofing. Before using adhesives, discuss with waterproofing manufacturer.
6. If additional panels are required on same row, cut away 4 inches (100 mm) of installed panel core, install new panel against installed panel, and overlap new panel with installed panel fabric.
7. If additional rows of panels are required, overlap lower panel with 4 inches (100 mm) of fabric.
8. Cut panel as necessary to keep top 12 inches (300 mm) below finish grade.
9. For inside corners, bend panel. For outside corners, cut core to provide 3 inches (75 mm) for overlap.

K. Place initial backfill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches (150 mm). Thoroughly compact each layer. Final backfill to finish elevations and slope away from building.

3.5 PIPING INSTALLATION

A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.

1. Foundation Sub drainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 36 inches (915 mm), unless otherwise indicated.
2. Lay perforated pipe with perforations down.
3. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.

B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

C. Install PVC piping according to ASTM D 2321.

3.6 PIPE JOINT CONSTRUCTION

A. Cast-Iron Soil Pipe and Fittings: Hub and spigot, with rubber compression gaskets according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook." Use gaskets that match class of pipe and fittings.

B. Join PVC pipe and fittings according to ASTM D 3034 with elastomeric seal gaskets according to ASTM D 2321.

C. Join perforated PVC pipe and fittings according to ASTM D 2729, with loose bell-and-spigot joints.

D. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.7 CLEANOUT INSTALLATION

A. Cleanouts for Foundation Sub drainage:

1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
2. In vehicular-traffic areas, use NPS 4 (DN 100) cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 18 by 18 by 12 inches (450 by 450 by 300 mm) in depth. Set top of cleanout flush with grade. Cast-iron pipe may also be used for cleanouts in nonvehicular-traffic areas.
3. In nonvehicular-traffic areas, use NPS 4 (DN 100) cast-iron pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 12 by 12 by 4 inches (300 by 300 by 100 mm) in depth. Set top of cleanout plug 1 inch (25 mm) above grade.

3.8 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

3.9 FIELD QUALITY CONTROL

A. Testing: After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

3.10 CLEANING

A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION 02620

SECTION 02720 - STORM DRAIN SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Install storm drainage pipe, catch basins, manholes, and other appurtenances.

B. Install roof drain lines and cleanouts to a point five (5) feet outside buildings and structures or as indicated.

C. Adjust catch basins and other appurtenances to finish grade.

D. Flush and clean all storm drainage lines.

1.2 RELATED WORK

Section 02222, Excavating, Backfilling, and Compacting for Utilities.

1.3 QUALITY ASSURANCE

All products are subject, at the discretion of the Construction Manager, to inspection and approval at the plant of the manufacturer. Any material not meeting the requirements specified herein shall be rejected and shall be removed immediately from the vicinity of other material furnished for the project.

1.4 REFERENCES

A. ASTM A48 Gray-Iron Castings

B. ASTM C76 Reinforced Concrete Culvert, Storm Drain and Sewer Pipe

C. ASTM C150 Specification for Portland Cement

D. ASTM C443 Joints for Concrete Sewer and Culvert Pipe, Using Rubber Gasket

E. ASTM C478 Pre-cast Reinforced Concrete Manhole Sections

F. ASTM D2321 Standard Recommended Practice for underground Installation of Flexible Thermoplastic Sewer Pipe

G. ASTM D3034 Type PSM Polyvinyl Chloride Sewer Pipe and Fittings

H. AWWA C600 Installation of Gray and Ductile Cast-Iron Water Mains and Appurtenances

I. ANSI A21.10 Gray and Ductile Iron Fittings 2-inch through 48-inch for Water and Other Liquids

J. ANSI A21.11 Rubber Gasket Joints for Cast-Iron and Ductile-Iron Pressure Pipe and Fittings

K. ANSI A21.50 Thickness Design of Ductile-Iron Pipe

L. ANSI A21.51 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids

1.5 SUBMITTALS

A. Submit for review and approval, data on fabricated grates and frames to be used, including dimensions, weights, manufacturer, product number, and other related information.

B. All reinforced pre-cast concrete structures shall be submitted for review and approval with suitable detail to show all necessary dimensions and reinforcing.

PART 2 - PRODUCTS

2.1 PIPE

A. Storm Drains

1. High Density Polyethylene (Smooth Interior Corrugated). AASHTO M-294 Type S, Advanced Drainage Systems ADS N-12 or approved equal.

a. Joints. Push-on rubber gasket

b. Fittings. Polyvinyl Chloride (PVC), ASTM D3034, cell classification SDR, and joints to meet pipe requirements for PVC piping.

Reinforced Concrete Pipe. ASTM C76, Type II cement, bell and spigot joints with rubber compression gaskets conforming to ASTM C443. Class III or as indicated on the drawings. In addition to the requirements of the referenced standards above, pipe shall not be installed prior to seven (7) days from the date of manufacture as marked on each pipe.

Polyvinyl Chloride (PVC). ASTM D3034, SDR 35, unless otherwise indicated on the drawings.

a. Cell Classification. 12454B
Joints. Solvent cement or bell and spigot with integral bell elastomeric gasket joint.
Fittings. ASTM D3034, cell classification SDR, and joints to meet pipe requirements for PVC piping

B. Roof Drain Laterals, 4-inch, 6-inch, 8-inch diameter. Pipe for roof drain laterals shall be same type as provided for storm drains.

1. Concrete. ASTM C14, Class 3 unless otherwise indicated on the drawings.

a. Cement. ASTM C150, Portland Cement Type II (or IIA)
b. Joints. ASTM C443, Bell and Spigot Type

2. High Density Polyethylene (Smooth Interior Corrugated, double-wall). Advanced Drainage Systems ADS N-12 or approved equal.

a. Joints. Push-on rubber gasket
b. Fittings. Polyvinyl Chloride (PVC), cell classification SDR, and joints to meet pipe requirements for PVC piping.
c. Perforations, where required on the drawings: corrugation valleys only; ASTM F405 and F667.

3. Polyvinyl Chloride (PVC). ASTM D3034, SDR 35, unless otherwise indicated on the drawings.

a. Cell Classification. 12454B
b. Joints. Solvent cement or bell and spigot with integral bell elastomeric gasket joint
c. Fittings. ASTM D3034, cell classification SDR, and joints to meet pipe requirements for PVC piping.

2.2 CONCRETE

A. All concrete for construction of inlet boxes, catch basins, and appurtenances shall be in accordance with Section 03300 - Cast-In-Place Concrete.

B. Mix shall contain not less than 6½ bags of Type II cement per cubic yard. Maximum aggregate size shall be 1¾ inches.

2.3 MORTAR (GROUT)

A. Mortar for jointing inlet boxes shall be one (1) part Portland Cement and not less than one (1) part nor more than 1½ part plaster sand, mixed with the least amount of water necessary to provide a workable mortar.

2.4 REINFORCING STEEL

A. Reinforcement shall be Grade 60, in accordance with Section 03200 - Concrete Reinforcement.

2.5 CATCH BASINS

A. Catch Basins. Pre-cast or cast-in-place concrete conforming to the drawings.

B. The use of pre-cast catch basins shall be subject to approval by the Contractor. Subcontractor shall submit shop drawings for each type of pre-cast box. Coordination for elevations shall remain the Subcontractor's responsibility.

C. Cast-Iron Frame and Grated Covers. ASTM A48, Class 30, of uniform quality, free from blow holes, porosity, hard spots and shrinkage defects, with non-rocking, machined bearing surfaces between frame and cover. The frame and cover shall be cleaned and painted with an asphalt coating prior to delivery to the site. Frame and grates shall meet AASHTO HS-20 loading requirements.

Frame and grate covers shall be heavy-duty type as noted on the plan.

D. Grout. Non-shrink.

2.6 CATCH BASINS (GUTTER TYPE)

A. Inlet Boxes. Pre-cast or cast-in-place concrete conforming to the drawings.

B. The use of pre-cast inlet boxes shall be subject to approval by the Contractor. Subcontractor shall submit show drawings for each type of pre-cast box. Coordination for elevations shall remain the Subcontractor's responsibility.

C. Cast-Iron Frame and Grate. ASTM A48, Class 30, of uniform quality, free from blow holes, porosity, hard spots, and shrinkage defects with non-rocking, machined bearing surfaces between ring and cover. The ring and cover shall be cleaned and painted with an asphalt coating prior to delivery to the site.

Frame and grates shall be heavy-duty type as noted on the plan.

2.7 MANHOLES

A. Concrete Pre-Cast Sections. ASTM C478, 48-inch inside diameter unless otherwise noted on the drawings.

1. Cement. ASTM C150 Portland Cement Type IIA Modified or Type V
2. Base Section. Base riser with integral floor
3. Cone Section. Concentric cone
4. Pipe connectors

a. Flexible rubber boot. ASTM C023 with stainless steel clamping and retaining bands.
b. Pipe stubs. Same material, class, and requirements as connecting piping.

B. Cast-in-Place Base Section

1. Concrete

a. Use 28-day minimum compressive strength, 3000 psi.
b. Use minimum 5½ bags of cement per cubic yard.
c. Use Type IIA Modified or Type V cement conforming to ASTM C150.

2. Pipe Connectors. Use pipe stubs of same material, class, and requirements as connecting piping.

C. Grade Rings. ASTM C478, Type IIA Modified or Type V cement conforming to ASTM C150.

D. Frame and Cover. ASTM A48, Class 35 Gray-Iron

1. Use non-vented covers with a pick hole for opening.
2. Use low-profile waffle pattern cover.
3. Use cover with the words "STORM DRAIN."
4. Use frame and cover with machined bearing surfaces.
5. Use non-slotted frame.
6. Repair of defects in castings by welding or other methods will not be permitted.
7. Acceptable Manufacturers D&L Supply. A 1181 WP
8. Grout. Non-shrink type.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prior to excavating for storm drain lines, verify locations of existing utilities. Notify Contractor of any conflicts with proposed alignment and grade.

B. Line and Grade. Establish the line and grade of the storm drain line. A laser designated for such work shall be used to establish line and grade. The length of line between laser set-ups shall not exceed 500 feet. Other methods for maintaining line and grade must be approved by Contractor prior to construction.

C. Prior to installation, inspect all pipes, manholes, and appurtenances for cracks, defects, or imperfections, and verify compliance with the specifications. Remove all defective material from the site.

3.2 EXCAVATING, BACKFILLING, AND COMPACTING

Refer to Section 02222 - Excavating, Backfilling, and Compacting for Utilities.

3.3 PIPE LAYING

A. Lay pipe to line and grade indicated.

B. After being cleaned and inspected for soundness, each piece of pipe shall be laid on the previously graded trench bottom or bedding material, as required, after the bell hole has been excavated.

C. Lay bell and spigot type pipe with the bell end upgrade. Pipe laying shall proceed upgrade.

D. Trenches shall be dewatered and under no circumstances shall pipe be laid in water, nor shall the pipe be laid under unsuitable weather or trench conditions.

E. Every precaution shall be taken to prevent foreign material from entering the pipe during installation. No debris, tools, clothing, or other material shall be placed in the pipe.

F. At times when pipe laying is not in progress or at other times during construction as directed by the Contractor, the open end of the pipe shall be closed by a watertight plug or other means approved by the Contractor.

G. Pipe installation and jointing for the various types of pipe specified shall be according to these specifications and the manufacturer's recommendations.

1. Concrete Pipe. Manufacturer's recommendations.
2. Ductile-Iron Pipe. AWWA C600 and manufacturer's recommendations.
3. High density Polyethylene (HDPE) Pipe. ASTM D2321
4. Polyvinyl Chloride (PVC) Pipe. ASTM D2321

3.4 INSTALLATION OF ROOF DRAIN LATERAL PIPING

A. Pipe installation and joining for the various types of pipe specified shall be according to these specifications and the manufacturer's recommendations.

B. Install piping at a grade of two (2) percent minimum and make connections to the storm drainage system at or above spring line or at elevation indicated on the drawings. Provide four (4) feet minimum cover if available.

C. Install cleanouts when indicated, five (5) feet from buildings and in accordance with the drawings. Risers shall be the same size and material as the piping.

3.5 CATCH BASIN INSTALLATION

A. Install catch basins at location and grades indicated.

B. Pre-cast boxes. Place so as to be uniformly supported in proper alignment. Place compacted bedding material under pre-cast boxes if required to provide uniform and stable support.

C. Cast-in-place boxes. Constructed in accordance with the drawings.

D. Grade adjustment. Set catch basin or inlet box to final grade only after final elevation of pavement, gutter, ditch, or sidewalk in which it is to be placed has been established.

E. Pipe connection. Grout openings in walls of pre-cast boxes with non-shrink grout after pipe and castings have been placed to their final position.

F. Pre-cast boxes shall be placed and aligned to provide vertical sides.

G. Grade rings. A maximum of 12 inches of grade rings will be allowed. If possible, one (1) grade ring should generally be installed on catch basins located in landscaped areas.

H. Joints and lift holes. All lift holes and joints between pre-cast boxes, grade rings, or castings shall be sealed by placing a continuous bead of bitumastic material sufficient to fill the void in the joint prior to joining the items.

I. Frame and cover installation

1. In roadways. Top of casting shall be set parallel to and ½ to ¾ inch below finished road surface. Castings shall be fully and uniformly supported. Wedges or shims used to elevate castings shall be brick or metal with concrete placed for uniform support.
2. Off road. Top of castings shall be set as indicated on drawings.

J. Any catch basins displaced or damaged prior to final acceptance shall be removed and replaced to conform to these specifications at the Subcontractor's expense.

3.6 MANHOLE INSTALLATION

A. Install manholes at locations and grades indicated.

B. Pre-cast bases. Place so as to be fully and uniformly supported in proper alignment. Place compacted bedding material under pre-cast base if required to provide uniform and stable support.

C. Cast-in-place base. Provide a continuous pour of the concrete with at least 6 inches of concrete below the invert of the manhole and at least 6 inches radially outside of the outside diameter of the pre-cast riser section. The concrete shall also extend a minimum of 6 inches above the bottom of the riser section around the outside of the manhole.

1. Support bottom pre-cast riser section on concrete blocks and adjust to proper alignment and grade prior to pouring the cast-in-place base.
2. The pre-cast riser section shall not bear directly on any of the pipes.
3. Grout all joints between cast-in-place concrete and pre-cast sections and pipe with non-shrink grout after concrete has cured.

D. Inverts

1. Construct smooth and uniform changes in flow direction with the longest radius possible.
2. Provide cross-sectional shape of the invert channels to match the lower halves of the inflow and outflow pipes.
3. Extend pipes into the manhole a maximum of three (3) inches from the inside of the manhole wall.

E. Place and align pre-cast sections to provide vertical sides.

F. Grade rings. Provide manhole wall sections to allow for a maximum of 12 inches of grade rings on manholes located in roadways. Provide adequate manhole wall sections to avoid the use of grade rings or manholes located off roadways.

G. Joints and lift holes. Seal all joints between pre-cast base, riser and cone sections, grade rings and castings by placing a continuous bead of mastic sealant in the joint prior to joining the items, and touching up the mastic sealant, adding additional mastic sealant as required to form a smooth, watertight joint both inside and outside with mastic sealant. In all cases, a watertight manhole is required.

H. Ring and cover installation

1. In roadways. Set top of casting parallel to and ½ to ¾ inch below finish road surface. Support castings fully and uniformly. Use brick or metal wedges or shims to finely adjust castings to grade. Place concrete around wedges and shims for uniform support.
2. Off road. Top of casting shall be set approximately 6 inches above finish grade unless otherwise indicated or directed by the Contractor.

I. Any manhole displaced or damaged prior to final acceptance shall be removed and replaced to conform to these specifications at the Subcontractor's expense.

3.7 FIELD QUALITY CONTROL

Visual inspection will be performed on all installed storm drain lines prior to acceptance. The Contractor will perform a visual inspection of all installed storm drain lines and manholes to assure conformance with the specifications. All sections of storm drain line will be "lamped" to insure that the line is straight, of uniform grade, and free of all dirt, debris, and obstructions. All broken, misaligned, or displaced pipe and manholes or other defects revealed during this visual inspection shall be corrected at the Subcontractor's expense. The Subcontractor shall furnish suitable assistance to the contractor for visual inspections.

3.8 CLEANING

A. The interior of all storm drain lines, manholes, catch basins, and other appurtenances shall be cleaned of all dirt, debris, or other foreign material. Cleaning shall be by flushing, jetting, or other approved means to remove such foreign material.

B. Connections between new construction and the existing system shall be plugged to prevent any debris from the new construction or from cleaning operations from entering the existing system. Any debris entering the existing system shall be removed at no expense to the construction manager.

END OF SECTION 02720

SECTION 02725 - RAINWATER LEADERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Rainwater leaders or downspout ‘shoes’ connecting copper downspouts to below grade drain lines.

1.2 REFERENCES

A. ASTM A 48 - Standard Specification for Gray Iron Castings.

1.3 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Complete details of layout and assembly, showing member sizes and part identification, fasteners, anchors, and fittings.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum of 15 years experience manufacturing tree grates and accessories.

B. Installer Qualifications: Minimum of 2 years experience assembling and installing tree grates and accessories.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

PART 2 PRODUCTS

2.1 MANUFACTURER'S

A. Acceptable Manufacturers include but are not limited to: Neenah Foundry Co. (2121 Brooks Ave., P. O. Box 729 ; Neenah, WI 54957; Tel: 800-558-5075; Fax: 920-729-3661; Email: request info; Web: www.nfco.com)

B. Requests for substitutions will be considered in accordance with provisions of Section 01635.

2.2 PRODUCTS

A. Rainwater Leaders:

1. Style R-4929:

a. Shape: Offset.
b. Length: 40 in.
c. Extensions: As required – Refer to Building Elevation Drawings.
d. Inside Top Bell: 4 x 5 in.
e. Outside Spigot: 4 7/8 in.
f. Material: Cast Iron.
g. Finish: One (1) coat of Black Primer

2. Soil Pipe Material: PVC

a. Provide no hub coupling between leader and soil pipe.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. All fasteners must be non-rusting, compatible with all adjacent materials and primed/painted to match leaders. Install with nylon washers (gray) between tabs and stone, sized to be fully concealed by tabs.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 02725

SECTION 02764 - PAVEMENT JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Expansion and contraction joints within portland cement concrete pavement.
2. Joints between portland cement concrete and asphalt pavement.

B. Related Sections include the following:

1. Division 2 Section "Hot-Mix Asphalt Paving" for constructing joints between concrete and asphalt pavement.
2. Division 2 Section "Concrete Driveway, Parking, Walk, Curb and Gutter" for constructing joints in concrete paving.
3. Division 7 Section "Joint Sealants" for sealing nontraffic and traffic joints in locations not specified in this Section.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Verification: For each type and color of joint sealant required. Install joint-sealant samples in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.

D. 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. Compatibility and Adhesion Test Reports: From joint sealant manufacturer indicating the following:

1. Materials forming joint substrates and joint-sealant backer materials have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

F. Product Test Reports: From a qualified testing agency indicating joint sealants comply with requirements, based on comprehensive testing of current product formulations.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency, based on testing current sealant formulations within a 36-month period.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
2. Test joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

D. Preconstruction Compatibility and Adhesion Testing: Submit to joint sealant manufacturer, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

   a. Perform tests under environmental conditions replicating those that will exist during installation.

2. Submit not fewer than nine pieces of each type of material, including joint substrates, joint-sealant backer materials, secondary seals, and miscellaneous material.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
5. Testing will not be required if joint sealant manufacturer submits joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.
2. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F.
3. When joint substrates are wet.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than or greater than that allowed by joint sealant manufacturer for application indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range for this characteristic.

2.2 COLD-APPLIED JOINT SEALANTS

A. Type NS Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS.

B. Type SL Silicone Sealant for Concrete and Asphalt: Single-component, low-modulus, neutral-curing, self-leveling silicone sealant complying with ASTM D 5893 for Type SL.

C.

D. Available Products: Subject to compliance with requirements, cold-applied joint sealants that may be incorporated into the Work include, but are not limited to, the following:

E. Products: Subject to compliance with requirements, provide one of the following:
1. Type NS Silicone Sealant for Concrete:

    a. Roadsaver Silicone-SL; Crafco Inc.
    b. 888; Dow Corning.

2. Type SL Silicone Sealant for Concrete and Asphalt:

    a. 890-SL; Dow Corning.

2.3 HOT-APPLIED JOINT SEALANTS

A. Elastomeric Sealant for Concrete: Single-component formulation complying with ASTM D 3406.

B. Sealant for Concrete and Asphalt: Single-component formulation complying with ASTM D 3405.

C. Available Products: Subject to compliance with requirements, hot-applied joint sealants that may be incorporated into the Work include, but are not limited to, the following:

D. Products: Subject to compliance with requirements, provide one of the following:

1. Elastomeric Sealant for Concrete:

a. Superseal 444/777; Crafco, Inc.
b. POLY-JET 3406; W.R. Meadows, Inc.

2. Sealant for Concrete and Asphalt:

a. ROADSAVER 221; Crafco Inc.
b. Product #9005; Koch Materials Company.
c. Product #9030; Koch Materials Company.
d. SEALTIGHT HI-SPEC; W.R. Meadows, Inc.

2.4 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint sealant manufacturer based on field experience and laboratory testing.

B. Round Backer Rod for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depths and prevent bottom-side adhesion of sealant.

C. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depths, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

D. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depths and prevent bottom-side adhesion of sealant.

2.5 PRIMERS

A. Primers: Product recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint- sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's written installation instructions applicable to products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of backer materials.
2. Do not stretch, twist, puncture, or tear backer materials.
3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

D. Install sealants by proven techniques to comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses provided for each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents that are approved in writing by joint sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint sealant manufacturer's written instructions, unless otherwise indicated.

G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

END OF SECTION 02764

SECTION 04940 – EXTERIOR MASONRY RESTORATION CLEANING

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. The project consists of the restoration cleaning of the exterior limestone and granite. As related to this Specification, "restoration cleaning" or "cleaning" refers to work related to removing stains, dirt, paint, spatters, tar, sealants, etc., and restoring the general appearance of the historic masonry. Provide all masonry cleaning work shown on Drawings, specified herein, and as required for a proper and complete job.

1.2 SUBMITTAL

A. Product Data: Submit full product information for all masonry cleaning materials and associated products. Include manufacturer's printed recommendations for each product and its recommended application method. Include manufacturer's Material Safety Data Sheets (MSDS) for all chemicals and products delivered to the job site. Submit in accordance with Section 01330 - Submittals.

B. Applicator Qualifications:
1. Submit certification that applicator is experienced in the application of the specified products.
2. Submit a list of recently completed exterior masonry restoration cleaning projects, including project name and location, names of owner and architect, and description of cleaning products used, substrates, environmental regulations, and application procedures.

C. Environmental Regulations: Describe testing, handling, treatment, containment, collection, transport, disposal, and discharge of hazardous wastes and cleaning effluents. Describe any hazardous materials to be cleaned from substrates. Describe types of coatings and paints to be stripped from substrates. Indicate any lead-based paints. Submit applicable local environmental regulations.

D. Protection: Describe methods for protecting surrounding areas, landscaping, building occupants, pedestrians, vehicles, and nonmasonry surfaces during the work from contact with chemical restoration cleaners and paint strippers, residues, rinse water, fumes, wastes, and cleaning effluents.

E. Plan of Work:
1. Submit three copies of a detailed written plan of work setting forth the proposed methods for cleaning.
2. The masonry cleaning contractor shall submit the following items in time to prevent delay of the work and to allow adequate time for review and re-submittal, if required. Do not start work or order materials prior to receiving written approval:
   a. Submit all specified materials and MSDS as appropriate. Submit certifications, except where material is labeled with such certifications, by the producers of the materials that all material supplied comply with all the requirements of these specifications.

b. Submit written verification that all specified items will be used and provide purchase orders, shipping tickets, receipts, etc. to verify that all specified materials were ordered and received.

c. Submit product data sheets for each product to be used, including recommendations for their application and use. Include test reports and certifications substantiating that the product complies with the requirements of this specification.

F. If alternative methods and materials to those indicated are proposed for any phase of restoration work, provide a written description, including evidence of successful use on other comparable projects, and a testing program to demonstrate their effectiveness for this Project. Follow the procedures for Test Panels described below. Altered methods including compound concentration and dwell time before rinse to obtain a final appearance satisfactory to the Architect will be considered only after test cleaning as specified herein has been performed.

G. State methods and procedures for cleaning including protective measures to be employed to prevent damage to surrounding materials, plants, project personnel, and the public. In particular, state methods and procedures for protection of surfaces from any acidic cleaners used in cleaning.

H. Final Record Log Submittal: At time of Substantial Completion, submit Completed Record Log to Architect for incorporation into Owner's records. Organize into sets, bind and label sets for Owner's continued use and insertion into long-term maintenance log and plan for long-term maintenance of the building.

1.3 PROJECT RECORD DOCUMENTS

A. This Paragraph specifies administrative and procedural requirements for Project Record Documents. Project Record Documents required include:

1. Marked-up copies of Contract Drawings.
2. Marked-up copies of Specifications, Addenda, and Change Orders.
3. Marked-up Product Data Submittal.
4. Record Samples
5. Field Records for variable and concealed conditions.
6. Contractor's Daily Log of work performed, methods used, products used, and quality control test results.

1.4 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Store Record Documents and Samples in the field office apart from Contract Documents used for any other work. Maintain record documents in good order, and in a clean, dry, legible condition. Make documents and samples available at all times for inspection by the Architect.

1.5 DAILY RECORD LOG RECORDING PROCEDURE

A. During the work period, maintain a set of Log books for Project Record Document purposes. Enter information in the Log to indicate the actual installation where the Work varies appreciably from the installation specified. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later. Items required to be recorded in the Log include but are not limited to:

1. Weather Conditions.
2. Changes made by Change Order
3. Details not in original Contract Documents.
4. Waste containment integrity.
5. Area of work cleaned or treated, indicating sizes and location.
6. Method of cleaning and surface preparation.

B. Specific description of all work accomplished each day, including a description of all products used and methods employed.

1.6 MATERIAL SPECIFICATION COMPLIANCE

A. Contractor shall monitor, collect, and record manufacturer's analyses, material safety data sheets, product application literature, and other product shipping or descriptive data for each material received for each shipment supplied for the work and shall immediately transfer a written copy of all such documentation to the Architect.

1.7 REMOVAL OF DETERIORATED MATERIAL

A. All deteriorated or discarded building materials, and all cleaning materials, packaging, by-products, etc. shall be removed and properly disposed of at the completion of the work.

1.8 QUALITY ASSURANCE

A. Qualifications for Workmen:
1. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts, all of whom have a minimum of five years experience and are familiar with the specified requirements of restoration of historic buildings and the methods needed for proper performance of work of this section. Superintendents shall have at least five years previous experience in historical masonry Work.
2. Quality of craftsmanship is essential to the success of the restoration of the exterior of this historic building. Careful attention must be paid to every aspect of the process.

B. Manufacturer's Approval of Methods: Obtain written approval from the cleaning materials manufacturer for proposed cleaning methods.

1.9 MATERIALS SOURCE

A. Use materials from the same manufacturer throughout project.

1.10 MOCK-UP/TEST PANELS

A. If alternative materials or methods are proposed, prepare sample mock-ups as described below and in locations selected by the Architect. Obtain Architect's preliminary acceptance of proposed alternative materials or methods before proceeding with the Test Panel.
1. In an area (a minimum size of 10 feet by 10 feet) designated by the Architect, carry out a complete water and chemical cleaning of a soiled area representative

of the typical conditions of the exterior building masonry. Employ proposed materials and methods. Apply each restoration cleaner and specialty cleaner to test panel(s) to determine optimum dilution rates, dwell times, number of applications, compatibility, effectiveness, application procedures, effects of pressure rinsing, and desired results. Demonstrate the methods are appropriate and be prepared to alter methods to achieve an acceptable result. Allow 48 hours or until test panels are thoroughly dry before evaluating final appearance and results. Altered methods, compound concentrations, or dwell times to obtain a final appearance satisfactory to the Architect will be considered only after test treatments as specified herein have been performed. Do not begin full-scale application until test panels are inspected and fully approved by the Architect.

B. Before full-scale application, review manufacturer's product data sheets to determine the suitability of each product for the specific surfaces.

C. Test all cleaning effluents generated by the restoration cleaning and paint stripping of the test panels to determine any hazardous characteristics. Comply with applicable federal, state, and local environmental regulations regarding testing, handling, treatment, containment, collection, transport, disposal, and discharge of hazardous wastes.

D. Retain and protect approved test panels in undisturbed condition during the work of the Section, as a standard for judging the restoration cleaning work.

1.11 PRE-CONSTRUCTION CONFERENCE

A. Convene a conference two weeks prior to commencing any Work of this Section.

B. Require attendance of parties directly affecting Work of this Section.

C. Review conditions of cleaning procedures and coordination with related Work.

1.12 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, and deterioration due to extreme temperature and moisture in accordance with manufacturer's written instructions.

B. Deliver and store material in manufacturer's original, unopened containers with the grade, batch, and production date shown on the container or packaging. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, sensitive to deterioration, theft, and other losses.

C. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.

D. Deliver products to the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Insure that approve Material Safety Data Sheets are provided for all products shipped or maintained on the site and that the MSDS are available to emergency medical personnel 24-hours a day during the contract work.

E. Inspect products upon delivery to ensure compliance with the Contract Documents, and to ensure that products are undamaged and properly protected.

F. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units. Store heavy materials away from the project structure in a manner that will not endanger the supporting construction.

G. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

H. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter. Remove materials that are damaged or otherwise not suitable for installation from the job site and replace with acceptable materials at no additional cost to the Owner.

1.13 JOB CONDITIONS

A. Comply with the following:
1. Protect any nearby trees, shrubs, and other plants. Collect chemical or other residue from cleaning and discard in an appropriate manner for each material collected, and in accordance with applicable law.
2. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which cleaning operations are indicated are not to be disturbed.
3. Coordinate with the Owner for protected pedestrian and vehicle access and other work restrictions.

1.14 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Conditions: Do not work in temperatures below 40° F, when the substrate is colder than 40° F, or when the temperature is expected to fall below 40° F for 48 hours.

B. Hot Weather Conditions: Do not clean masonry if heat or winds prevent proper application, dwell and/or rinsing of masonry according to manufacturer's recommendations.

C. Use all means necessary to protect the materials of this section before, during, and after use and to protect the work and materials of other trades, the building, and the public.

1.15 SEQUENCING / SCHEDULING

A. Coordinate the Work of this Section with work of other related sections and trades for proper sequencing of the work. Provide for best possible weather resistance and durability of the work and protection of materials and finishes. Do not perform work under adverse weather conditions.

B. Provide a written schedule outlining expected sequence for cleaning and describing the process to be followed including protection of adjacent materials or construction.

PART 2 - PRODUCTS

2.1 MASONRY CLEANING MATERIALS

A. General:
1. Provide masonry cleaning materials and equipment as scheduled here, but in all cases verify the suitability of the cleaning materials with the manufacturer prior to beginning work.
2. An adequate and clean supply of water must be established prior to any Work. Use only clean, potable water, free from minerals, oils, acids, salts and organic materials that could cause staining or leave detrimental residues on surfaces of the stone. The primary cleaning method shall rely on chemical cleaning.
3. The following equipment shall be used in performing the general cleaning operation:
   a. Stiff, non-metallic brushes.
   b. Hardwood or plastic scraping tools scrapper with rounded corners.
   c. Polyethylene tarps and nylon tie cords.
   d. Containers for cleaning agents shall be made of rubber or plastic.
4. All brushes shall be made of densely packed, soft non-metallic fiber. Rinsing equipment must be capable of producing 500 psi hot or cold water rinse using a fan-type spray tip of not less than 15°. Rinsing pressure shall be no greater than required to remove cleaning agents and Contractor shall exercise restraint in the use of higher pressure rinse water. Special attention must be given to all deteriorated surfaces of masonry by protecting them from high pressure water. All deteriorated surfaces will be rinsed with low pressure water not exceeding 60 psi. Additional hand cleaning shall be used to complete work. The alkalinity and/or acidity of rinsing water will be monitored and recorded before, during and after general cleaning.

B. Manufacturer:
1. Use proprietary chemical agents or approved equals. All manufacturer's product information, instructions, MSDS, etc. must be provided as noted above. Review of proposed alternative chemical agents or procedures must follow the process detailed above.

C. Restoration Cleaner (granite):
1. Sure Klean® Heavy Duty Restoration Cleaner: Concentrated, general-purpose acidic restoration cleaner for brick, terra cotta, sandstone, granite, and other masonry surfaces. Dissolves heavy atmospheric soiling. Not suitable for limestone, marble, travertine, concrete, or cast stone surfaces.
   a. Form: Liquid
   b. Color: Clear
   c. pH, 2.2 @ 1:3 dilution
   d. Specific Gravity: 1.132
   e. Flash Point: None
2. Repeated application, or use when diluted with less than three parts fresh water, may damage some masonry surfaces.
3. Not for interior use or for polished stone and glazed surfaces. Protect all such surfaces as noted above.

D. Restoration Cleaner (limestone, concrete):
1. Sure Klean® Limestone Restorer: Concentrated acidic cleaner for unpolished limestone, concrete and cast stone surfaces. Removes atmospheric dirt, mildew and many other surface stains without risk of bleaching or discoloration. Ideal for

lightly to moderately soiled surfaces. Limestone Restorer contains no hydrofluoric acid. Use in combination with pressure water rinsing.
a. Form: Liquid
b. Color: Clear, light amber
c. Specific gravity: 1.14
d. pH: 0.18 @ 1:6 dilution
e. Flash Point: NA

2. Do not use when air or surface temperatures are below 32 degrees F.
3. Not for use on granite or brick. Protect all such surfaces.

E. Restoration Cleaner/Gel (limestone, concrete):
1. Sure Klean® 942 Limestone & Marble Cleaner: Non-acidic cleaning low-odor gel. Designed for removing moderate to severe atmospheric staining. Suitable for limestone and concrete.
a. Form: Gel
b. Color: Clear amber
c. pH: 8.3
d. Flash Point: >200 degrees F

2. Do not use when air or surface temperatures are below 50 degrees F.
3. Can also be used on brick and granite.

F. Paint Strippers:
1. Sure Klean® Heavy Duty Paint Stripper: Alkaline formula with organic solvents, "slow-working", extended-contact remover, remains active for 24 hours. Contains no methanol, methylene chloride, or chlorinated solvents, and is water rinsable and nonflammable.
a. Form: Gel
b. Color: Light Brown
c. pH: 14
d. Specific Gravity: 1.27
e. Flash Point: <200º F

2. Sure Klean® Fast Acting Stripper: Thixotripic stripping compound designed for removing coatings and epoxies from masonry and other surfaces.
a. Form: Gel
b. Color: Clear
c. pH: N/A
d. Specific Gravity: 1.20
e. Flash Point: 95º F

G. Caulk Remover:
1. Sure Klean® Dicone NC15 Gel: Silicone "digestant" for removing silicone-based sealants and adhesives, cured silicone elastomers and silicone water repellent overspray. Gel viscosity for application to vertical surfaces and to allow for extended dwell times required to remove heavy sealant and adhesive residues.
a. Form: Gel
b. Color: Clear brown
c. pH: <1 (anhydrous concentrate)
d. Specific Gravity: .083
e. Flash Point: 180º F
f. Weight Per Gallon: 6.91 lbs
g. Freeze Point: <-22º F

2. Limitations:
a. Product efficiency is reduced when temperatures are below 40 degrees F and above 85 degrees F.
b. Contact with water reduces product effectiveness.

c. Not recommended for direct contact with wood or finished wood surfaces.
d. May damage or discolor some paints and metal finishes. Will attack nylon and similar synthetic coatings and finishes. Test before large-scale applications.

PART 3 - EXECUTION

3.1 SECURITY / PROTECTION FACILITIES INSTALLATION

A. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard of being protected against. Where appropriate or needed, provide lighting.

B. Security Enclosure and Lock-Up: Where materials and equipment must be stored and are of value or attractive for theft, provide a secure lock-up. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism. Areas for storage of materials will be determined prior to the commencement of the work and approved by the Owner.

C. Environmental Protection: Provide protection, operate temporary facilities, and conduct cleaning and repair in ways and by methods that comply with environmental regulations, and minimize the possibility that the building interior, building air handling and HVAC systems, external atmospheric air, waterways, and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise.

3.2 PROTECTION

A. Protect surrounding areas, landscaping, building occupants, pedestrians, vehicles, non-masonry surfaces and masonry surfaces or materials that could be damaged during the work from contact with chemical restoration cleaners and paint strippers, residues, rinse water, fumes, wastes, and cleaning effluents in accordance with manufacturer's instructions.

B. Clean masonry before installation of replacement windows.

C. Test window glass not specified to be replaced for compatibility with chemical cleaning products to determine required protection.

D. Avoid wind drifting of spray of chemical cleaning products, residues, and rinse water.

3.3 MASONRY PREPARATION FOR CLEANING

A. Protection:
1. Protect interior parts of the structure from the intrusion of rinsing water and protect all deteriorated and non-masonry surfaces prior to general cleaning of the masonry.
2. Protect the interior of the structure by providing temporary (removable) sealants in all open joints in the masonry.

3. Prior to performing any operation associated with the cleaning process (testing or cleaning), the following requirements will be met:
   a. Provide Occupational Safety and Health Administration (OSHA) approved sources for water and electricity in addition to OSHA approved hoses and drop cords.
   b. Lifts, lock and tube scaffolding or other OSHA approved working platforms to be provided by the Masonry Cleaning Contractor in order to access all masonry to be cleaned.
4. All non-masonry surfaces or masonry surfaces that could be harmed (e.g., glazed brick) shall be protected during the cleaning process.
5. All acid soluble materials shall be protected from acidic cleaning agents (if used for cleaning).
6. All areas of deteriorating stone shall be identified and protected in accordance with the manufacturer's specifications prior to the general cleaning of the masonry.
7. Prior to and during the cleaning process, monitor the pH of random areas of the masonry and of the rinsing water. Rinsing or neutralizing of the masonry shall continue until testing confirms that no cleaning agents or other harmful contaminants remain on the masonry.
8. Notice to Cleaning Contractor: All test results pertaining to the relative acidity or alkalinity of the cleaned surfaces of the structure shall be compiled and maintained for examination by the Architect. The greatest prospect for damage to the substrate is incomplete removal of chemical residues associated with the cleaning process. The minimal chemical strength in cleaning is a primary objective of the restoration project. Prevent damage to the masonry substrate from the use of excessive pressure during water rinsing. Excessive pressure shall mean pressure that harms the substrate being cleaned. Water pressure should not exceed 700 psi, perhaps much lower on soft, deteriorated limestone. A 20° to 25° fan tip nozzle should be used (0° nozzles or rotating nozzles are strictly prohibited). The manufacturer of the cleaning agent has developed the cleaner to perform certain tasks. Deviation from the prescribed methods and procedures might compromise the end results.

3.4 MASONRY CLEANING – STONE

A. Cleaning Protocol – Granite: Final cleaning protocols for granite to be developed during testing cleaning and mock-ups. It is anticipated the following will be included:
   1. Heavy Duty Restoration Cleaner diluted to 1:3 (chemical agent to water) following the manufacturer's recommendations. Apply the cleaner using a brush or low-pressure spray.
   2. Paint or tar spatters larger than 1 in. diameter or any size paint or tar spatters within 15 ft. of any building entry, are to be removed.

B. Cleaning Protocol – Limestone: Final cleaning protocols for limestone are to be developed during testing cleaning and mock-ups. It is anticipated the following will be included:
   1. Sure Klean® Limestone Restorer diluted to 1:6 (chemical agent to water) following the manufacturer's recommendations. Apply the cleaner using a brush or low-pressure spray.
   2. Paint or tar spatters larger than 1 in. diameter or any size paint or tar spatters within 15 ft. of any building entry, are to be removed.

C. General application protocols for chemical agents should be compared to those utilized in the any test cleaning and the best practices selected.

D. General:

1. Establish that any chemical cleaner used is reactive with the contaminants present and unreactive with the underlying substrate. The cleaning process shall be designed to incorporate the lowest rinsing pressures and the lowest chemical concentrations practical to produce the level of cleaning desired.
2. For the purposes of this specification, the words, 'clean' or 'cleaning' shall mean to remove all contaminants from the surface and pores of the substrate. The surface shall be evenly cleaned with no evidence of streaking or bleaching.
3. The cleaning process shall not affect the density or porosity of the substrate. The use of wire brushes, steel wool, or sandblasting will not be permitted.
4. Workmen using chemicals shall be required to wear protective clothing, goggles, face shields, gloves, and other clothing or equipment in compliance with governing federal and state safety codes and rules.
5. The storage of all chemicals shall be such as to preclude tampering, acts of vandalism, and possible injury to workmen and the public in general. The chemicals shall at all times be stored in sealed containers in a suitable space provided by the Contractor and kept under lock and key. At no time shall containers containing chemicals be carried or hoisted to working levels in open containers. All containers shall have tight covers.
6. Provide every safeguard to protect the workmen of every trade and the general public and their property against injury of any character and magnitude by erecting barriers well outside the limits of wind-drifting water, detergents, acids, and other materials, however mild they might be.
7. The general cleaning operation shall include all of the following steps:
   a. Remove all loose bird droppings, tar, paint, and surface dirt by brushing and scraping.
   b. Each area to be cleaned (major exposure of masonry) shall be randomly evaluated for relative acidity or alkalinity prior to cleaning, with the results recorded and copies made for the Architect.
   c. Any dilution of cleaning agents shall be made according to the written instructions of the manufacturer and only to concentrations that have been tested at the site and previously approved.
   d. All tar, caulk or other foreign materials not removed after general cleaning shall be removed with specialty cleaners. Use all cleaners in strict compliance with the manufacturer's written instructions. Repeat as required to achieve intended results. Rinse all treated surfaces to remove all traces of tar, patching materials and solvent cleaner.
   e. If staining is evident on the masonry surface, pre-wet with clean water and apply the prescribed pre-diluted cleaning agent with masonry washing brushes. The cleaner shall not remain on the surface beyond the time period as specified by manufacturer's written instructions. All cleaning residue and solubilized deposits should be rinsed away. Repeat cleaning regimen as needed.
   f. The relative acidity or alkalinity of the cleaned surfaces shall be determined and the results recorded. If recommended by the supplier, apply a neutralizing rinse to the masonry, them wash thoroughly with clean water. The substrate shall be neutral (range between pH 6.5 and pH 7.5).
   g. Remove all biological materials from the masonry prior to general cleaning.

3.5 APPLICATION OF RESTORATION CLEANER – STONE

A. General: Apply restoration cleaners to substrates in accordance with manufacturer's instructions, environmental regulations, and application procedures determined from test

panel results approved by the Architect. Consult manufacturer's instructions for information on equipment to be used and precautions to be taken with the specified products. Before applying, read "Protect" and "Precautionary Measures" sections in the Manufacturer's Product Data Sheet for Restoration Cleaner. Refer to Product Data Sheet for recommended dilution for intended use.

1. Pre-wet the surface with clean water.
2. Apply the cleaner using a brush or low-pressure spray.
3. Let the cleaning solution stay on the surface for 3 to 5 minutes. Reapply. Gently scrub heavily soiled areas.
4. Rinse with low-pressure flood rinse to remove initial acidic residue with minimum risk of wind drift.
5. Rinse thoroughly using high-pressure spray, from the bottom of the treated area to the top covering each section of the surface with a concentrated stream of water.

3.6 APPLICATION OF PAINT STRIPPERS

A. General: Apply paint strippers to dry substrates in accordance with manufacturer's instructions, environmental regulations, and application procedures determined from test panel results approved by the Architect. Consult manufacturer's instructions for information on equipment to be used and precautions to be taken with the specified products.

3.7 APPLICATION OF SILICONE SEALANT AND ADHESIVE REMOVER

A. General: Remove heavy accumulations of adhesives or sealants using scrapers or other methods. When surfaces are thoroughly dry, apply enough NC15 to produce a 1/8" to 1/4" buildup over the stain or residue to be removed. Let NC15 dwell for 15-30 minutes or until residue softens, "lifts" or shows signs of dissolving. NC15 may be left on the surface for several hours to remove heavy buildup. Remove NC15 and residues using pressure water rinsing equipment. Where such equipment cannot be used, brush the treated surface vigorously with a soft bristle brush and warm water. Rinse thoroughly to ensure all residues are removed from the surface. Reapply as required, repeating steps above.

B. Note: If residues remain after water rinsing, let surface dry completely before reapplying NC15 Gel. Reapplication to damp or wet surfaces greatly reduces effectiveness.

3.8 FIELD QUALITY CONTROL

A. Inspection: Inspect the restoration cleaning work with the Contractor, Architect, applicator, and manufacturer's representative (if applicable), and compare with approved test panels. Determine if the substrates are suitably prepared to start masonry restoration.

B. Manufacturer's Field Services: Provide the services of a manufacturer's authorized field representative to verify specified products are used, and to ensure test panels, protection, surface preparation, and application of restoration cleaners and paint strippers are in accordance with manufacturer's instructions.

3.9 CLEAN UP

A. Keep work areas free of surplus cleaning and debris by daily clean-up. At the end of each workday during progress of Work, empty cans, remove rubbish, rags, and other discarded materials from the site. Upon completion of the Work, complete the following tasks:
   1. Clean concrete, window glass, and other spattered surfaces using care not to scratch or otherwise damage adjacent finished surfaces.
   2. Remove tools, equipment and surplus materials.
   3. Replace or repair Work of other trades soiled or damaged by the masonry restoration.
   4. Complete the final cleaning operations before requesting inspection for Certification of Substantial Completion for the entire Project or a portion of the project.
   5. Clean the Project site, yard, and grounds of rubbish, water materials, litter, and foreign substances. Sweep paved areas broom clean. Remove chemical spills, stains, and other foreign deposits. Rake grounds that are not planted or paved to a smooth even-textured surface.
   6. Remove tools, masonry cleaning and stabilization equipment, machinery, and surplus material from the site.
   7. Remove debris and surface dust from limited access spaces, including roofs, porches, glass, patios, roof tops, air handling and HVAC equipment and similar areas and items.
   8. Leave the Project clean and ready for occupancy.
   9. Remove temporary protection and facilities installed during masonry cleaning to protect previously completed installations.
   10. Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of in a lawful manner. Where extra materials of value remain after completion of associated masonry cleaning and have become the Owner's property, dispose of these materials directed by Architect.

END OF SECTION 04940

SECTION 04942 – EXTERIOR STONE RESTORATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY OF WORK

A. The work consists of the restoration of the exterior limestone and granite. As related to this Specification, "restoration" refers to work related to repairing, resurfacing, retooling or replacing when necessary, damaged or deteriorated limestone and granite, creating matching dutchman patches, and repointing mortar joints or installing joint sealants and lead weather caps as appropriate. Provide all masonry restoration shown on Drawings, specified herein, and as required for a proper and complete job.

1.3 SUMMARY

A. This Section includes the following:
   1. Repairing stonework, including replacing damaged units, resurfacing, patching, etc.
   2. Repointing, capping and/or stabilizing mortar joints.

B. Related Sections include the following:
   1. Division 4 Section "Exterior Stone Restoration Cleaning."
   2. Division 7 Section "Lead Flashing in Masonry Joints" for protection of joints in restored stone construction.
   3. Division 7 Section "Joint Sealants" for sealing joints in restored stone construction

1.4 SUBMITTALS

A. Product Data: For each product indicated, include manufacturer's product data and recommendations for application or use. Include test reports and certifications substantiating that products comply with requirements.

B. Samples for verification, before erecting the mockup, of the following:
   1. Limestone for dutchman or other replacement, a minimum of 12 x 12 in. with surfaces and edges tooled to simulate typical conditions of repaired historic stone to remain.
   2. Granite for dutchman or other replacement, a minimum of 12 x 12 in. with surfaces and edges tooled to simulate typical conditions of repaired historic stone to remain.
   3. Each type of mortar for pointing and stone rebuilding and repair in the form of sample mortar strips, 12 inches long, matching existing joint width(s), set in aluminum or plastic channels.

C. Qualification Data: For firms and persons specified in "Quality Assurance" 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.

D. Restoration program for each phase of the restoration process, including protection of surrounding materials on the building and Project site during operations. Describe in detail the materials, methods, equipment, and sequence of operations to be used for each phase of the restoration work.
   1. If alternative materials and methods to those indicated are proposed for any phase of restoration work, provide a written description, including evidence of successful use on other comparable projects, and a testing program to demonstrate their effectiveness for this Project.
   2. If materials and methods other than those indicated are proposed for cleaning work, provide a written description, including evidence of successful use on other comparable projects, and a testing program to demonstrate their effectiveness for this Project.

1.5 QUALITY ASSURANCE

A. Restoration Specialist: Engage an experienced stone restoration firm that has completed work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
   1. Field Supervision: Restoration specialist firm to maintain an experienced full-time supervisor on the Project site during times that stone restoration and cleaning are in progress.

B. Mockups: Prepare field samples for restoration methods and procedures to demonstrate aesthetic effects and qualities of materials and execution. Use materials and methods proposed for completed Work and prepare samples under same weather conditions to be expected during remainder of Work.
   1. Locate mockups on the building where directed by Architect.
   2. Stonework Repair: Prepare sample panels of a minimum of 10 square feet for each type of stone material indicated to be patched, retooled, or replaced. Erect sample panels into an existing wall, unless otherwise indicated, to demonstrate the quality of materials and workmanship.
   3. Repointing: Prepare two separate sample areas a minimum of 10 square feet for each type of repointing required; one for demonstrating methods and quality of workmanship expected in removing mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints.
   4. Notify Architect seven days in advance of the dates and times when samples will be prepared.
   5. Obtain Architect's approval of mockups before starting the remainder of stone restoration and cleaning.
   6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

C. Source of Materials: Obtain materials for stone restoration from a single source for each type of material required (stone, cement, sand, etc.) to ensure a match of quality, color, pattern, and texture.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Carefully pack, handle, and ship stone and accessories strapped together in suitable packs or pallets or in crates or heavy-duty containers.

B. Deliver other materials to Project site in manufacturer's original and unopened containers, labeled with type and name of product and manufacturer.

C. Store cementitious materials off the ground, under cover, and in a dry location.

D. Store aggregates covered and in a dry location where grading and other required characteristics can be maintained and contamination avoided.

E. Comply with manufacturer's written instructions for minimum and maximum temperature, moisture, and other protection requirements for storage.

1.7 PROJECT CONDITIONS

A. Cold-Weather Requirements: Comply with the following procedures for stone repair and mortar-joint pointing:
   1. When air temperature is below 40 deg F (4 deg C), heat mortar ingredients, stone repair materials, and existing walls to produce temperatures between 40 and 120 deg F (4 and 49 deg C).
   2. When mean daily air temperature is between 25 and 40 deg F (minus 4 and 4 deg C), cover completed Work with weather-resistant, insulating blankets for 48 hours after repair and pointing.
   3. When mean daily air temperature is below 25 deg F (minus 4 deg C), provide enclosure and heat to maintain temperatures above 32 deg F (0 deg C) within the enclosure for 48 hours after repair and pointing.

B. Hot-Weather Requirements: Protect restoration work when temperature and humidity conditions produce excessive evaporation of water from mortar and patching materials. Provide artificial shade, wind breaks and misting to maintain required humidity and meet manufacturer's requirements. Use cooled materials as required. Do not apply mortar to substrates with temperatures of 90 deg F (32 deg C) and above.

C. Apply stone consolidation treatment only when surface and air temperatures are between 50 and 90 deg F (10 and 32 deg C) and rain is not expected within 24 hours or as directed by manufacturer.

D. Prevent grout or mortar used in repointing and repair work from staining face of surrounding stone and other surfaces. Immediately remove grout and mortar in contact with exposed stone and other surfaces. Wash thoroughly and repeatedly to prevent any staining or 'halo' effect.

E. Protect sills, ledges, and other projections or surfaces from mortar droppings.

1.8 SEQUENCING AND SCHEDULING

A. Order replacement materials at the earliest possible date, to avoid delaying completion of the Work.

B. Perform stone restoration work in the following sequence:
   1. Remove any plant growth.
   2. Protect any adjacent historic materials or features with appropriate material.
   3. Repair existing stonework, including replacing or patching existing stone with new stone materials or patching mortars.
   4. Rake out existing mortar from joints indicated to be repointed.
   5. Point existing mortar joints of stone indicated to be restored.
   6. Coordinate final cleaning of stone surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide the following as appropriate:
   1. Factory-Mixed Patching Mortar:
      a. Jahn M70 or M70SC manufactured by Cathedral Stone Products, Inc. (for unpolished limestone or granite only; color, texture, appearance, and other physical properties to match cleaned historic limestone or granite, as appropriate).
   2. Stone-to-stone adhesive (for securing dutchman patches):
      a. Akepox 2010 manufactured by Akemi North America.
      b. Anchor™ Engineering Grade Epoxy for Stone by Bonstone; standard limestone color to be selected by Architect (for limestone); custom color for granite.
   3. Consolidant and Water/Stain Repellent:
      a. Conservare® H100 consolidation/water-repellent treatment manufactured by PROSOCO, Inc. (for unpolished limestone and granite; must not alter appearance nor reduce vapor permeability of stone)

2.2 STONE MATERIALS

A. Stone: Utilize new granite and limestone of color, finish, graining, texture, size, and shape to match restored existing/adjacent stone.

B. Granite: Little Cottonwood Canyon Granite or equivalent to match historic. Alternative equivalent granite (subject to acceptance by Architect) may include
   1. "Rockville White." Source: Cold Spring Granite, 17482 Granite West Road, Cold Springs, MN 56320-4578; phone 800.328.5040; www.coldspringgranite.com

C. Limestone: Sanpete Limestone to match historic. Alternative equivalent limestone (subject to acceptance by Architect) may include
   1. "Buff." Source: Valders Stone & Marble, Inc., 318 West Washington Street, Valders, WI 54245; phone 800.569.2156; wwwvaldersstone.com

2.3 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II.
   1. Provide white cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Aggregate for Mortar: ASTM C 144, unless otherwise indicated.
   1. Colored-Mortar Aggregate: Natural or manufactured sand selected to produce mortar color indicated.
   2. For pointing mortar, provide sand with rounded edges.
   3. Match size, texture, and gradation of existing mortar as closely as possible.

D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in stone mortars.

E. Water: Potable.

2.4 MORTAR MIXES

A. Measurement and Mixing: Measure cementitious and aggregate material in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
   1. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 1 to 2 hours. Add remaining water in small portions until reaching mortar of the desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

B. Colored Mortar: Produce mortar of color required by using selected ingredients. Do not adjust proportions without Architect's approval.
   1. Mortar Pigments: Where mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.

C. Mortar Proportions: Mix mortar materials in the following proportions or as required to match strength and appearance of historic mortar:
   1. Pointing Mortar for Stone: 1 part white portland cement, 2 parts lime, and 6 parts colored- or natural-mortar aggregate.
      a. Add mortar pigments to produce mortar color required.
   2. Rebuilding Mortar: 1 part white portland cement, 1 part lime, and 6 parts colored- or natural-mortar aggregate.

PART 3 - EXECUTION

3.1 EXAMINATION & PREPARATION

A. General: Comply with manufacturer's written instructions for protecting building surfaces against damage from exposure to their products.
   1. Plan work based on scope finalized/prioritized following restoration cleaning to address total extent of restoration work.
   2. Comply with manufacturer's written instructions for protecting building surfaces against damage from exposure to their products.

B. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from injury resulting from stone restoration work.
   1. Prevent chemical cleaning solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be injured by such contact.
   2. Erect temporary protection covers over pedestrian walkways and at points of entrance and exit for persons and vehicles that must remain in operation during course of stone restoration work.

C. Protect adjacent surfaces but do not apply liquid masking agent to painted or porous surfaces.

3.2 STONE REMOVAL AND REPLACEMENT

A. Carefully remove by hand, at locations indicated, stone that has deteriorated, shifted, or is damaged beyond repair.

B. Support and protect remaining stonework that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

C. Remove mortar, loose particles, and soil from salvaged stone and stone surrounding removed units to prepare for resetting.

D. Fabrication of new or salvaged limestone or granite for dutchman or other repairs or replacements will result in mostly 'new' unweathered, clean surfaces. Any previously exposed surfaces retained as exposed surfaces during fabrication, will require restoration as specified in 04940 – Exterior Stone Restoration Cleaning or this Section. All exposed surfaces must be formed and dressed to visually blend with adjacent historic stone surfaces.

E. Replace removed stone with salvaged stone matching existing stone in size, color, texture and other characteristics. Anchor only with stainless steel to industry standards and structural requirements. Butter vertical joints for full width before setting and set units in full bed of mortar, unless otherwise indicated.
   1. Tool joints after setting to match joints of surrounding stone.
   2. Rake out mortar used for laying stone before mortar sets and point new mortar joints in repaired area to comply with requirements for repointing existing stone.
   3. Carve surface to match adjoining stone texture and shape.

3.3 STONE PATCHING – PLASTIC PATCH

A. Follow manufacturer's recommendations for all aspects of stone patching – preparation, installation and curing control.

B. Indicated cracks in stone to be repaired using stone patching and concealed cross-crack stainless steel anchors set in epoxy, as needed.

C. Cut out deteriorated stone and adjacent stone that has begun to deteriorate. Remove additional stone so patch will not have feathered edges and will be at least 1/4 inch (6 mm) thick.

D. Remove loose particles, soil, debris, oil, and other contaminants from existing stone units at locations indicated by cleaning with a stiff-fiber brush.

E. Brush-coat stone surfaces with a slurry coat of patching mortar complying with manufacturer's written instructions.

F. Place patching mortar in layers no thicker than 2 inches (50 mm) or as recommended by manufacturer. Roughen surface of each layer to provide a key for the next layer.

G. Keep each layer damp and patching environment properly humidified for 72 hours (or as recommended by manufacturer) until patching mortar has cured.

H. Unacceptable patches include those with hairline cracks or that show separation from stone at edges, and those that do not match adjoining stone in color or texture. Remove patches and refill to provide patches free of these defects.

3.4 SPALL AND SURFACE DETERIORATION REPAIR

A. Remove loose particles from existing stone at locations indicated by cleaning with a stiff-fiber brush, nonmetallic scrapers, etc.

B. During repair of all spalls and other surface deterioration, minimize removal of stone and any change of existing or historic profile. Consult with Architect on any spall repair located within 10 ft. of any walking surface.

C. To repair spalls, carefully resurface, tool or hone deteriorated stone to create a visually compatible surface and improve weathering characteristics. Match adjacent surface texture and appearance. Do not retool unnecessarily to completely sound stone. Gently continue resurfacing to all edges or other plane changes on the stone surface. Do not ease or alter edges except to partially blend with adjacent stone units. Spalls deeper than 1 in. and larger than 4 in. in dia. should be patched as specified above.

3.5 REPOINTING STONEWORK

A. Rake out joints as identified or indicated on Construction Documents or as Scheduled below. All open or deteriorated joints should be repointed. Loss of historic mortar bead alone does not constitute a deteriorated joint unless it is within 10 ft. of any publicly accessible walkway or location. Preparation process:
   1. Rake out mortar from joints to depths equal to 2-1/2 times their widths, but not less than 1/2 inch (13 mm) or not less than that required to expose sound, unweathered mortar.
   2. Remove mortar from stonework surfaces within raked-out joints to provide reveals with square backs and to expose stone for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
   3. Do not spall edges of stone units or widen joints. Replace damaged stone units.
      a. Cut out old mortar by hand with a chisel and mallet, unless otherwise indicated.
      b. Any grinding of joints must be done with extreme care. Do not over-cut any joints.

B. Point joints as follows:
   1. Rinse stonework-joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at the time of pointing, excess water has evaporated or run off and joint surfaces are damp but free of standing water.
   2. Apply the first layer of pointing mortar to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch (9 mm) until a uniform depth is formed. Compact each layer thoroughly and allow it to become thumbprint hard before applying the next layer.
   3. After joints have been filled to a uniform depth, place remaining pointing mortar in 3 layers with first and second layers each filling about two-fifths of joint depth; third layer, the remaining one-fifth. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing stone has rounded edges, slightly recess final layer from face. Take care not to spread mortar over edges onto exposed stone surfaces or to featheredge mortar.
   4. When mortar is thumbprint hard, tool joints to match original appearance of joints, unless otherwise indicated. Remove excess mortar from edge of joint by brushing.
   5. Cure mortar by maintaining in a damp condition for at least 72 hours.
   6. Where repointing work precedes cleaning of existing stone, allow mortar to harden at least 30 days before beginning cleaning work.

3.6 CONSOLIDANT – WATER/STAIN REPELLANT APPLICATION

A. Follow manufacturer's recommendations. Prevent runs, drips, puddles, etc. and any discoloration or other visual changes to the treated stone. Protect adjacent surfaces as needed.

B. Provide two complete cycles of specified stone consolidant following all manufacturer's recommendations. Each cycle to consist of three separate saturating applications of consolidant applied at 5 to 15 minute intervals. Allow 20 to 60 minutes between the two cycles. While all applications are to be saturating, the final application should not result in any excess material remaining visible on limestone surface.

3.7 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed stonework surfaces of excess mortar and foreign matter; use stiff-nylon or -fiber brushes and clean water, spray applied at a low pressure.

B. Do not use metal scrapers or brushes or any acidic or alkaline cleaners.

3.8 STONE RESTORATION TREATMENTS & SCHEDULES

A. Limestone and Granite Restoration:
   1. Restoration treatments for limestone and granite are identified and located on Enlarged Exterior Elevations and other drawings. The treatments are labeled S1, S2, S3, etc. and are described in the Stone Legend on the drawings and in more detail below.
   2. Drawings also indicate stone that is concealed and could not be documented (e.g., where foundation veneer is concealed by modern concrete ramp). Notify Architect when stone is exposed and can be evaluated. Restoration work will then be detailed and added to Scope of Work.
   3. Unless noted as S1, S2, etc., all existing historic stone is classified as Light Surface Erosion. This stone is to be cleaned (see Section 04940 Exterior Masonry Restoration Cleaning) and restored as appropriate (e.g., removal of abandoned anchors and preparation/patching of resulting holes). Deteriorated mortar joints are to be prepared and repointed; 20% of joints in these areas are estimated/scheduled for repointing.
   4. Stone treatment S1:
      a. Moderately Deteriorated S1 stone will likely require careful hand-scraping to remove loose, deteriorated material; restoration cleaning; repair of minor cracks or chips; hand sanding to regain historic texture, character and appearance or to appropriately blend with adjacent stone.; repointing as needed; final cleaning; and consolidant application as specified.
   5. Stone treatment S2:
      a. Similar to S1 but more numerous repairs per unit, more significant deterioration, etc.
   6. Stone treatment S3:
      a. Stain on limestone or granite to be cleaned, poulticed, etc. for substantial removal of stain. Do not damage stone. Blend cleaned area with surrounding stone. Also see Section 04940 Exterior Masonry Restoration Cleaning.
   7. Stone treatment S4:
      a. Remove deteriorated stone and install new matching Dutchman as described in paragraph 3.2 above.
   8. Stone treatment S5:
      a. Completely remove and replace existing Dutchman or 'plastic' patch as described in paragraphs 3.2 and/or 3.3 above. Follow extent or Dutchman or joint layout as shown on drawings.
   9. Stone treatment S6:
      a. New limestone or granite units, as appropriate. Use salvaged/restored historic limestone whenever possible. Replacement stone to match adjacent or typical historic stone in material selection, character, color, appearance, tooling, edge treatment, joint size, etc.

10. Stone treatment S7:
    a. New limestone or granite units, as appropriate. Use salvaged/restored historic limestone whenever possible (e.g., Third Floor East Elevation). Replacement stone to match adjacent or typical historic stone in material selection, character, color, appearance, tooling, edge treatment, joint size, etc.
11. Stone treatment S8:
    a. Patch damaged stone using patching mortar ('plastic' patch) as described in paragraph 3.3 above.

3.9 STONE REPOINTING SCHEDULE

A. Scheduled repointing of stone masonry is presented below. Percentages are based on ground-level observation of uncleaned, unrestored stone masonry. Final amounts of repointing may vary from the scheduled amounts; adjustments to be made using Unit Prices provided per Section 01270.
   1. The projected amount of repointing of limestone and granite is described below:
      a. Limestone: Approximately 50% overall, typically concentrated at locations of severe stone deterioration. Stone Legend lists repointing percentages for stone treatment S1 (60%) and S2 (95%). Light Surface Erosion (remainder of stone) projected at 20% repointing.
      b. Granite: 100% repointing.

END OF SECTION 04942

SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Loose steel lintels.
2. Miscellaneous steel framing and supports.
3. Miscellaneous Steel Trim

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts, and wedge-type inserts indicated to be built into unit masonry.

C. Related Sections include the following:

1. Division 6 Section "Miscellaneous Carpentry" for metal framing anchors.
2. Division 9 Section "Painting."

1.3 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.4 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
2. Provide templates for anchors and bolts specified for installation under other Sections.

3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

B. Welding certificates.

C. Qualification Data: For professional engineer.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.6, "Structural Welding Code--Stainless Steel."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
2. Provide allowance for trimming and fitting at site.

1.7 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

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. 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.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.3 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

C. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

D. Hollow Structural Sections: ASTM A500

E. Steel tubes, plate, etc. as detailed or as necessary to fabricate window grilles.

2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 (ASTM F 738M) for bolts and ASTM F 594 (ASTM F 836M) for nuts, Alloy Group 1 (A1).

D. Anchor Bolts: ASTM F 1554, Grade 36.

1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
2. Provide stainless steel anchor bolts where item being installed is indicated to be of stainless steel.

E. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).

F. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).

G. Separation Washers: Fabricated of non-staining, resilient, UV-stable material to prevent marring or other damage to finished masonry and other surfaces.

H. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material for Anchors in Exterior Locations: Alloy Group 1 (A1) stainless-steel bolts complying with ASTM F 593 (ASTM F 738M) and nuts complying with ASTM F 594 (ASTM F 836M).

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure fabrications rigidly in place and to support indicated loads.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2.8 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.

C. Galvanize loose steel lintels located in exterior walls.

2.9 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

C. Galvanize exterior miscellaneous steel trim.

2.10 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.11 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.12 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:

1. ASTM A 123/A 123M, for galvanizing steel and iron products.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

2.13 STAINLESS-STEEL FINISHES

A. Remove tool and die marks and stretch lines or blend into finish.

B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

C. Dull Satin Finish: No. 6.

D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

END OF SECTION 05500

SECTION 06105 - MISCELLANEOUS CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Wood furring, grounds, nailers, and blocking.

   a. Provide solid wood blocking at the following locations including, but not limited to, wood blocking and wood cants at the roofing system and wall mounted fixtures.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments specified to be High-Temperature (HT) type include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and

under temporary coverings.

1. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:

1. NELMA - Northeastern Lumber Manufacturers Association.
2. RIS - Redwood Inspection Service.
3. SPIB - Southern Pine Inspection Bureau.
4. WCLIB - West Coast Lumber Inspection Bureau.
5. WWPA - Western Wood Products Association.

C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece.

D. 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.

1. Provide dressed lumber, S4S, unless otherwise indicated.
2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.

1. Do not use chemicals containing chromium or arsenic.
2. For exposed items indicated to receive stained finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

B. Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. (4.0 kg/cu. m). After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items 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, stripping, and similar concealed members in contact with masonry or concrete.

C. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to a minimum retention of 0.40 lb/cu. ft. (6.4 kg/cu. m).

2.3 DIMENSION LUMBER

A. General: Provide dimension lumber of grades indicated according to the ALSC National Grading Rule (NGR) provisions of the inspection agency indicated.

1. Grade: Standard, Stud, or No. 3.

2. Species: Hem-fir, WCLIB or WWPA

B. Structural Dimension Lumber:

1. Meet requirements of PS 20 and National Grading Rules for softwood dimension lumber.
2. Bear grade stamp of WWPA, SPIB, or other association recognized by American Lumber Standards Committee identifying species of lumber by grade mark or by Certificate of Inspection.
3. Identify lumber and plywood by grade mark or Certificate of Inspection issued by approved lumber grading or inspection bureau or agency. Graded American lumber may be used, subject to CLSAB approval.
4. Lumber 2 inches 50 mm or less in nominal thickness shall not exceed 19 percent in moisture content at time of fabrication and installation and be stamped 'S-DRY', 'K-D', or 'MC15.'
5. Lumber shall be S4S.
6. Preservative Treated Plates / Sills:
   a) 2x4 38 mm by 64 mm: Standard and better Douglas Fir, Southern Pine, or HemFir.
   b) 2x6 38 mm by 140 mm And Wider: No. 2 or MSR 1650f - 1.5e Douglas Fir, Southern Pine, HemFir.

C. Posts, Beams, And Timbers 5 Inches by 5 Inches 125 mm by 125 mm And Larger: No. 1 or better Douglas Fir or Southern Pine.

D. Lumber Ledgers: No. 1 Douglas Fir, Larch, or Southern Pine.

2.5 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.

B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

C. Moisture Content: 19 percent maximum for lumber items are not specified to receive wood preservative treatment.

D. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where miscellaneous carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of Type 304 stainless steel.

B. Nails, Wire, Brads, and Staples: FS FF-N-105.

C. Power-Driven Fasteners: CABO NER-272.

D. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

2.7 METAL FRAMING ANCHORS

A. General: Provide galvanized steel framing anchors of structural capacity, type, and size indicated and as follows:

1. Research or Evaluation Reports: Provide products for which model code research or evaluation reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated with building code in effect for Project.
2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.

B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653, G60 (ASTM A 653M, Z180) coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.

C. Joist Hangers: U-shaped joist hangers with 2-inch- (50-mm-) long seat and 1-1/4-inch- (32-mm-) wide nailing flanges at least 85 percent of joist depth.

1. Thickness: 0.064 inch (1.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.

C. Fit carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

D. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and

plywood.

E. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.

F. Countersink nail heads on exposed carpentry work and fill holes with wood filler.

G. Use fasteners of appropriate type and length. Predrill members when necessary to avoid splitting wood.

3.2 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

A. Install where shown and where required for screeding or attaching other work. Cut and shape to required size. Coordinate locations with other work involved.

B. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.3 WOOD FURRING

A. Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

END OF SECTION 06105

SECTION 06111 – WOOD FASTENINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Quality of wood fastening methods and materials unless specified otherwise.

1.2 REFERENCES

A. American Society For Testing And Materials:
   1. ASTM F 1667-02a, 'Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.'

1.3 DEFINITIONS

A. Nail Terminology:
   1. When following nail terms are used in relation to this Project, following lengths and diameters will be understood. Refer to nails of other dimensions by actual length and diameter, not by one of listed terms:

Nail Term	Length	Diameter	Length	Diameter
8d Box	2-1/2 inches	0.113 inch	63.5 mm	2.827 mm
8d Common	2-1/2 inches	0.131 inch	63.5 mm	3.389 mm
10d Box	3 inches	0.128 inch	76.2 mm	3.251 mm
10d Common	3 inches	0.148 inch	76.2 mm	3.759 mm
16d Box	3-1/2 inches	0.135 inch	88.9 mm	3.411 mm
16d Sinker	3-1/4 inches	0.148 inch	82.6 mm	3.759 mm
16d Common	3-1/2 inches	0.162 inch	88.9 mm	4.115 mm

1.4 SUBMITTALS

A. Shop Drawings:
   1. Submit diameter and lengths of fasteners proposed for use on Project. If length or diameter of proposed fasteners differ from specified fasteners, also include technical and engineering data for proposed fasteners including, but not limited to:
      a. Adjusted fastener spacing where using proposed fasteners and,
      b. Adjusted number of fasteners necessary to provide connection capacity equivalent to specified fasteners.
   2. Submit on powder-actuated fasteners other than those specified in Contract Documents showing design criteria equivalents at each application.
   3. Show type, quantity, and installation location of framing anchors. Where necessary, reference Drawing details, etc, for installation locations.

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PART 2 - PRODUCTS

2.1 MATERIALS

A. Fasteners:
   1. Fasteners in contact with preservative treated wood shall be hot-dipped galvanized or G-185 coated.
   2. Nails:
      a. Meet requirements of ASTM F 1667.
      b. Unless noted otherwise, nails listed on Drawings or in Specifications shall be common nail diameter, except 16d nails, which shall be box diameter.
   3. Wood Screws: Standard type and make for job requirements.
   4. Drill and Epoxy anchors see GSN sheet. On structural drawings SG100

B. Adhesives:
   1. Construction Mastics: Meet requirements of American Plywood Association Specification AFG-01 September 1974. Use phenol-resorcinol type for use on pressure treated wood products.

C. Framing Anchors:
   1. Framing anchors and associated fasteners in contact with preservative treated wood shall be hot-dipped galvanized, G-185 coated, or stainless steel. However, do not use stainless steel items with galvanized items.
   2. Type Two Acceptable Products:
      a. Advanced Connector Systems (ACS), Tempe, AZ www.acsboss.com.
      b. KC Metals Inc, San Jose, CA www.kcmetals.com.
      c. Simpson Strong Tie Co, Dublin, CA www.strongtie.com.
      d. United Steel Products Co Inc (USP), Montgomery, MN www.uspconnectors.com.
      e. Equals as approved by Architect through shop drawing submittal before installation. See Section 01 6000.

PART 3 - EXECUTION

3.1 ERECTION

A. Secure one Manufacturer approved fastener in each hole of framing anchor that bears on framing member unless approved otherwise in writing by Architect. 'Boss' system by ACS is acceptable nailing system for framing anchors.

B. Provide bolt heads and nuts bearing on wood with washers.

END OF SECTION 06111

SECTION 06161 – WOOD PANEL PRODUCT SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install wood panel product sheathing required for walls, roofs, and floors as described in Contract Documents.

1.2 QUALITY ASSURANCE

A. Pre-Installation Conference: Participate in pre-installation conference specified in Section 06 1100.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Protect sheathing and keep under cover in transit and at job site.

B. Do not deliver material unduly long before it is required.

C. Store sheathing on level racks and keep free of ground. Stack to insure proper ventilation and drainage.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Sheathing:
   1. Meet requirements of PS 1-95, PS 2-92, PRP-108 (APA), or PRP-133 (TECO). Except where plywood is specifically indicated on Drawings, oriented strand board (OSB) is acceptable.
   2. Every sheet of sheathing shall be stamped as follows:
      a. Appropriate APA, TECO, or PFS grade stamp identifying thickness and span rating.
   3. Sheathing shall not exceed 18 percent moisture content when fabricated or more than 19 percent when installed in Project.
   4. Sheathing 3/4 inch 19 mm thick and thicker used for single-layer subflooring shall be tongue and groove.
   5. Sheathing used for same purpose shall be of same thickness. In all cases, thickness specified is minimum required regardless of span rating.
   6. Minimum span ratings for given thicknesses shall be as follows:

Thickness		Span Rating
3/8 inch	9.5 mm	24 / 0
15/32 inch actual	11.9 mm actual	32 / 16
1/2 inch nominal	12.5 mm nominal	32 / 16
19/32 inch actual	15.1 mm actual	40 / 20
5/8 inch nominal	15.9 mm nominal	40 / 20
23/32 inch actual	18.3 mm actual	48 / 24
3/4 inch nominal	19 mm nominal	48 / 24

B. Nails:
1. 3/8 inch 9.5 mm panel thickness: 8d common or box.
2. 15/32 inch 11.9 mm and thicker panels: 10d common or galvanized box.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
1. Top of nail heads shall be flush with sheathing surface.
2. Use of edge clips to provide spacing between sheathing panels is acceptable.
3. Place nails at least 3/8 inch 9.5 mm in from edge.

B. Roof Sheathing:
1. Placing:
   a. Lay face grain at right angles to supports. Provide blocking for support where framing turns at roof overhang.
   b. Provide 1/8 inch 3 mm space between sheets at end and side joints.
   c. Stagger panel end joints.
   d. Sheathing shall be continuous of two spans minimum.
2. Size:
   a. 19/32 inch 15.1 mm actual minimum thickness.
   b. Do not install any piece of roof sheathing with shortest dimension of less than 24 inches 600 mm.

3.2 PROTECTION

A. Protect roof sheathing from moisture until roofing is installed.

END OF SECTION 06161

SECTION 06401 - EXTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior standing and running trim.
2. Exterior frames and jambs.
3. Exterior ornamental work.
4. Shop priming exterior woodwork.
5. Shop finishing exterior woodwork.

1.2 SUBMITTALS

A. Product Data: For wood-preservative-treated materials and finishes indicated.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificate.

1.3 QUALITY ASSURANCE

A. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards."

PART 2 - PRODUCTS

2.1 MATERIALS

A. Preservative Treatment by Nonpressure Process: Comply with AWPA N1 using the following preservative for woodwork items indicated to receive water-repellent preservative treatment:

1. Water-Repellent Preservative: Formulation containing 3-iodo-2-propynyl butyl carbamate (IPBC) complying with AWPA P8 as its active ingredient.
2. Water-Repellent Preservative/Insecticide: Formulation containing 3-iodo-2-propynyl butyl carbamate (IPBC) as its active ingredient, combined with an insecticide containing chlorpyrifos as its active ingredient, both complying with AWPA P8.

B. Nails: stainless steel.

C. Screws: stainless steel.

2.2 FABRICATION

A. Wood Moisture Content: 9 to 15 percent.

B. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

C. Woodwork for Opaque Finish:

1. Grade: Premium.
2. Wood Species: Poplar

D. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

E. Shop Priming: Shop prime woodwork for paint finish with one coat of wood primer specified in Division 9 painting Sections.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

F. Shop Finishing: Entire finish of exterior architectural woodwork is specified in this Section. To greatest extent possible, finish architectural woodwork at fabrication shop. Defer only final touchup and cleaning until after installation.

1. Grade: Same grade as item to be finished.
2. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.
3. Sheen: Match existing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

B. Quality Standard: Install woodwork to comply with same grade specified in Part 2 for type of woodwork involved.

C. Install woodwork true and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

D. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk concealed fasteners and blind nailing. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork.

F. Install trim with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Scarf running joints and stagger in adjacent and related members.

G. Complete finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail and screw holes with matching filler where exposed.

H. Refer to Division 9 Sections for final finishing of installed architectural woodwork.

I. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

3.3 PROTECTION

A. Begin and maintain protection and other precautions required through the remainder of construction period to ensure that new woodwork will not be damaged throughout the remainder of the project.

B. Repair or replace all damaged woodwork until time of substantial completion and acceptance of the Installing Contractor's work.

END OF SECTION 06401

SECTION 07142 - HOT FLUID-APPLIED WATERPROOFING

1 PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Reinforced waterproofing membrane.

B. Related Sections include the following:

1. Division 7 Section "Joint Sealants" for joint-sealant materials and installation.

1.3 PERFORMANCE REQUIREMENTS

A. Provide waterproofing that prevents the passage of water and complies with physical requirements in CAN/CGSB-37.50, "Hot Applied, Rubberized Asphalt for Roofing and Waterproofing."

1.4 SUBMITTALS

A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties.

B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins to adjoining waterproofing, and other termination conditions.

C. Samples: For the following products:

1. 12-by-12-inch (300-by-300-mm) square of flashing sheet.
2. 4-by-4-inch (100-by-100-mm) square of drainage panel.

D. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.

E. Product Test Reports: From a qualified independent testing agency indicating and interpreting test results of waterproofing for compliance with requirements, based on comprehensive testing of current waterproofing formulations.

F. Sample Warranty: Copy of special waterproofing manufacturer's and Installer's warranty stating obligations, remedies, limitations, and exclusions before starting waterproofing.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who is authorized, approved, or licensed to install waterproofing manufacturer's products; and who is eligible to receive waterproofing warranty specified.

B. Source Limitations: Obtain waterproofing materials, sheet flashings, protection course, and drainage panels through one source from a single manufacturer.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review requirements for waterproofing, including surface preparation specified under other Sections, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver liquid materials to Project site in original containers with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer.

C. Remove and replace liquid materials that cannot be applied within their stated shelf life.

D. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate, or when temperature is below 0 deg F (minus 18 deg C).

1. Do not apply waterproofing in snow, rain, fog, or mist.

B. Maintain adequate ventilation during application and curing of waterproofing materials.

1.8 WARRANTY

A. Special Manufacturer's Warranty: Written warranty, signed by waterproofing manufacturer agreeing to repair or replace waterproofing and sheet flashings that do not comply with requirements or that do not remain watertight within specified warranty period.

1. Warranty does not include failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in substrate that exceed 1/4 inch (3 mm) in width.

2. Warranty Period: 20 years after date of Substantial Completion.

B. Special Installer's Warranty: Written waterproofing Installer's warranty, on warranty form at

end of this Section, signed by Installer, covering Work of this Section, for warranty period of 10 years.

1. Warranty includes removing and reinstalling protection board, and drainage panels.

2 PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, products that may be incorporated into the Work include the following: Refer to Division 1 Section "Product Requirements."

1. American Hydrotech, Inc.; Liquid Membrane 6125, Fabric.
2. Grace Construction Products: Procor 10, 20, and/or 75.
3. Barrett Company: Ram-Tough 250 DM.
4. Other products which meet all performance criteria of the above will be considered by Architect and Owner. Full Owner acceptance required prior to approval of substitute system.

2.2 MEMBRANE

A. Single-component; 100 percent solids; hot fluid-applied, rubberized asphalt with the following properties measured per applicable test methods in CAN/CGSB-37.50:

1. Flash Point: Not less than 260 deg C or not less than 25 deg C above manufacturer's maximum recommended application temperature.
2. Cone Penetration: 110 maximum at 25 deg C, and 200 maximum at 50 deg C.
3. Flow: 3 mm maximum at 60 deg C.
4. Toughness: Not less than 5.5 J
5. Ratio of Toughness to Peak Load: Not less than 0.040.
6. Adhesion Rating: Pass.
7. Water-Vapor Permeance: 1.7 ng/Pa x s x sq. m.
8. Water Absorption: 0.35-g maximum mass gain, or 0.18-g maximum mass loss.
9. Pinholing: Not more than one pinhole.
10. Low-Temperature Flexibility: No cracking.
11. Crack Bridging Capability: No cracking, splitting, or loss of adhesion.
12. Heat Stability: Comply with requirements for penetration, flow, low-temperature flexibility, and viscosity when heated for five hours at manufacturer's recommended application temperature.
13. Viscosity Test: 2 to 15 seconds.

2.3 AUXILIARY MATERIALS

A. Primer: ASTM D 41, asphaltic primer.

B. Elastomeric Flashing Sheet: 50-mil- (1.3-mm-) minimum, nonstaining, uncured sheet neoprene with manufacturer's recommended contact adhesives and predrilled metal termination bars and anchors, with the following physical properties as measured per standard test methods referenced:

1. Tensile Strength: 1400 psi (9.6 MPa) minimum; ASTM D 412, Die C.

2. Elongation: 300 percent minimum; ASTM D 412.
3. Tear Resistance: 125 psi (860 kPa) minimum; ASTM D 624, Die C.
4. Brittleness: Does not break at minus 30 deg F (34 deg C); ASTM D 2137.

C. Sealants and Accessories: Waterproofing manufacturer's recommended sealants and accessories.

D. Reinforcing Fabric: Manufacturer's recommended spun-bonded polyester fabric.

E. Separator Sheet: ASTM D 4397, polyethylene sheet, minimum 4 mils (0.10 mm) thick.

F. Protection Course: Semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:

1. Thickness: 1/8 inch (3 mm), nominal, for vertical applications; 1/4 inch (6 mm), nominal, elsewhere.
2. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for type of protection course.

2.4 MOLDED-SHEET DRAINAGE PANELS

A. Molded-Sheet Drainage Panel: Prefabricated, composite drainage panels, manufactured with a permeable geotextile facing laminated to a molded-plastic-sheet drainage core.

1. Drainage Core: Three-dimensional, nonbiodegradable, molded-plastic-sheet material designed to effectively drain water under backfill pressure; complying with the following properties determined according to tests indicated:

a. Compressive Strength: 21,000 lbf/sf. ft. (1005 kPa), minimum; ASTM D 1621.
b. Flow Rate: 15 gpm per ft. (188 L/min. per m), minimum, at hydraulic gradient of 1.0 and compressive stress of 25 psi (172 kPa); ASTM D 4716.

2. Geotextile: Woven geotextile fabric, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation less than 50 percent; complying with the following properties determined according to AASHTO M 288:

a. Survivability: Class 2.
b. Apparent Opening Size: No. 60 (0.25-mm) sieve, maximum.
c. Permittivity: 0.5 per second, minimum.

3. Film Backing: Polymeric film bonded to drainage core surface.

3 PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.

1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
2. Verify that substrate is visibly dry and free of moisture. Test for capillary moisture by

plastic sheet method according to ASTM D 4263.

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

3.2 PREPARATION

A. Clean and prepare substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from substrate.

1. Abrasive blast clean substrate surfaces uniformly to expose top surface of fine aggregate according to ASTM D 4259 with a self-contained, recirculating, blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces according to ASTM D 4258.

D. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.

3.3 JOINTS, CRACKS, AND TERMINATIONS

A. Prepare and treat substrates to receive waterproofing membrane, including joints and cracks, corners, and penetrations according to CAN/CGSB-37.51, "Application of Rubberized Asphalt, Hot-Applied, for Roofing and Waterproofing," and waterproofing system manufacturer's written instructions.

1. Rout and fill joints and cracks in substrate. Before filling, remove dust and dirt according to ASTM D 4258.
2. Adhere elastomeric flashing sheet to substrate in a layer of hot, rubberized asphalt. Extend elastomeric flashing sheet a minimum of 6 inches (150 mm) on each side of joints and cracks and beyond deck drains, corners, and penetrations.

3.4 MEMBRANE APPLICATION

A. Apply rubberized asphalt according to CAN/CGSB-37.51, "Application of Rubberized Asphalt, Hot-Applied, for Roofing and Waterproofing," and manufacturer's written instructions.

B. Heat rubberized asphalt in an oil- or air-jacketed melter with mechanical agitator specifically designed for heating rubberized-asphalt waterproofing.

C. Start application with manufacturer's technical representative present.

D. Apply primer, at manufacturer's recommended rate, over prepared substrate and allow to dry.

E. Reinforced Membrane: Apply waterproofing to substrates and adjoining surfaces indicated. Spread hot fluid-applied, rubberized asphalt to a thickness of 90 mils (2.3 mm); embed reinforcing fabric, overlapping sheets 2 inches (50 mm); and spread another 125-mil-(3.2-mm-) thick layer to provide a uniform, reinforced, seamless membrane 215 mils (5.5 mm)

thick.

F. Apply waterproofing over prepared joints and up wall terminations and vertical surfaces to heights indicated or required by manufacturer.

G. Cover waterproofing with separator sheet with overlapped joints while rubberized asphalt is still hot and before membrane is subject to traffic.

1. Install protection course with overlapped joints over separator sheet.

3.5 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

A. Place and secure molded-sheet drainage panels to substrate according to manufacturer's written instructions. Use adhesives that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

1. For vertical applications, install board insulation used as a protection course before installing drainage panels.

3.6 FIELD QUALITY CONTROL

A. Flood Testing: Flood test each deck area for leaks, according to recommendations in ASTM D 5957, after completing waterproofing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.

1. Flood to an average depth of 2-1/2 inches (65 mm) with a minimum depth of 1 inch (25 mm) and not exceeding a depth of 4 inches (100 mm). Maintain 2 inches (50 mm) of clearance from top of sheet flashings.
2. Flood each area for 48 hours.
3. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.

3.7 CURING, PROTECTING, AND CLEANING

A. Cure waterproofing according to manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.

1. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction

END OF SECTION 07142

SECTION 07311 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Asphalt shingles.
2. Underlayment.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each exposed product and for each color and blend specified.

C. Product test reports.

D. Research/evaluation reports.

E. Maintenance data.

F. Warranties: Sample of special warranties.

1.3 QUALITY ASSURANCE

A. Fire-Resistance Characteristics: Where indicated, provide asphalt shingles and related roofing materials identical to those of assemblies tested for fire resistance per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

1. Exterior Fire-Test Exposure: Class A; ASTM E 108 or UL 790, for application and roof slopes indicated.

B. Preinstallation Conference: Conduct conference at Project site.

1.4 WARRANTY

A. Special Warranty: Standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within specified warranty period.

1. Material Warranty Period: 40 years from date of Substantial Completion, prorated, with first five years nonprorated.
2. Algae-Discoloration Warranty Period: Asphalt shingles will not discolor five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

A. Multitab-Strip Asphalt Shingles: ASTM D 3462, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.

1. Basis-of-Design Product: Subject to compliance with requirements, provide GAF/Elk "Timberline Prestique" or comparable product by one of the following:

a. Atlas Roofing Corporation.
b. CertainTeed Corporation.
c. IKO.
d. Owens Corning.
e. PABCO Roofing Products.
f. TAMKO Roofing Products, Inc.

2. Tab Arrangement: Five tabs, randomly spaced
3. Cutout Shape: Tapered.
4. Butt Edge: Straight cut.
5. Strip Size: Manufacturer's standard.
6. Algae Resistance: Granules treated to resist algae discoloration.
7. Color and Blends: As selected by Architect from manufacturer's full range.

B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles.

2.2 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226 or ASTM D 4869, Type I, asphalt-saturated organic felts, nonperforated.

B. Self-Adhering Sheet Underlayment, High Temperature: Minimum of 30- to 40-mil- (0.76- to 1.0-mm-) thick, slip-resisting, polyethylene-film-reinforced top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.

1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D 1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.

2.3 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, smooth shank, 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. 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.

2.4 METAL FLASHING AND TRIM

A. Comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."

1. Sheet Metal: Copper.

PART 3 - EXECUTION

3.1 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 eaves. Lap sides a minimum of 2 inches (50 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 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 3 inches (75 mm) in direction to shed 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 inch (900 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 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 3 inches (75 mm) in direction to shed water.
3. Terminate felt underlayment extended up not less than 4 inches (100 mm)] against sidewalls, curbs, chimneys, and other roof projections.
4. Install fasteners at no more than 36 inch (900 mm) o.c.

D. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below, lapped in direction to shed 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.

3.2 METAL FLASHING INSTALLATION

A. General: Install metal flashings and other sheet metal to comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."

1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

3.3 ASPHALT SHINGLE INSTALLATION

A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

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.

1. Extend asphalt shingles 1/2 inch (13 mm) over fasciae at eaves and rakes.
2. Install starter strip along rake 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 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 five roofing nails located according to manufacturer's written instructions.

1. Where roof slope exceeds 20:12, seal asphalt shingles with asphalt roofing cement spots after fastening with additional roofing nails.
2. Where roof slope is less than 4:12, seal asphalt shingles with asphalt roofing cement spots.
3. When ambient temperature during installation is below 50 deg F (10 deg C), seal asphalt shingles with asphalt roofing cement spots.

G. Open Valleys: Cut and fit asphalt shingles at open valleys, trimming upper concealed corners of shingle strips. Maintain uniform width of exposed open valley from highest to lowest point.

H. Ridge and Hip Cap 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.

END OF SECTION 07311

SECTION 07591 - REROOFING PREPARATION

1 PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Removal of historic cupola for restoration and reinstallation.
2. Roof tear-off.
3. Removal of base flashings.

B. Related Sections include the following:

1. Division 1 Section "Summary" for use of the premises and phasing requirements.
2. Division 1 Section "Cutting and Patching" for cutting and patching procedures for reroofing preparation.
3. Division 6 Section "Miscellaneous Carpentry" for wood nailers, cants, curbs, and blocking.

1.3 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

1.4 DEFINITIONS

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

B. Existing Roofing System: Asphalt and shingles, or standing seam metal over built-up roof, surfacing, and components and accessories between deck and roofing membrane.

C. Roof Tear-Off: Removal of existing roofing systems from deck.

D. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and reinstalled.

E. Existing to Remain: Existing items of construction that are not indicated to be removed.

F. Remove and Reinstall: Existing items of construction that are indicated to be temporarily removed and then reinstalled.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Temporary Roofing: Include Product Data and description of temporary roofing system. If temporary roof will remain in place, submit surface preparation requirements needed to receive permanent roof, and submit a letter from roofing membrane manufacturer stating acceptance of the temporary membrane, and that its inclusion will not adversely affect the roofing system's resistance to fire and wind or its FMG rating.

C. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, that might be misconstrued as having been damaged by reroofing operations. Submit before Work begins.

D. Landfill Records: Indicate receipt and acceptance of hazardous wastes, such as asbestos-containing material, by a landfill facility licensed to accept hazardous wastes.

E. Qualification Data: For Installer including certificate that Installer is licensed to perform asbestos abatement.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Installer of new SBS-modified bituminous roofing system, licensed to perform asbestos abatement in the State or jurisdiction where Project is located.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning roofing systems removal. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Reroofing Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:

1. Meet with Owner; Architect; Owner's insurer if applicable; testing and inspecting agency representative; roofing system manufacturer's representative; deck Installer; roofing Installer including project manager, superintendent, and foreman; and installers whose work interfaces with or affects reroofing including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to reroofing preparation, including SBS modified bituminous roofing system manufacturer's written instructions.
3. Review roof drainage during each stage of reroofing and review roof drain plugging and plug removal procedures.
4. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
5. Review procedures to determine condition and acceptance of existing deck for reuse.
6. Review structural loading limitations of deck during reroofing.
7. Review base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that will affect reroofing.
8. Review procedures for asbestos removal or unexpected discovery of asbestos-containing materials.
9. Review governing regulations and requirements for insurance and certificates if applicable.
10. Review existing conditions that may require notification of Architect before

proceeding.

1.7 PROJECT CONDITIONS

A. Owner will occupy a portion of the building being reroofed as well as continue use of adjacent Executive Residence. Adjacent apartment building is occupied. Conduct reroofing so Owner's and Tenants’ operations will not be disrupted. Provide Owner and Tenant point-of-contact with not less than 72 hours' notice of activities that may affect Owner's operations.

B. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.

C. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.

D. Owner assumes no responsibility for condition of areas to be reroofed.

1. Conditions existing at time of inspection for bidding will be maintained by Owner as far as practical.

E. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering into existing roofing system or building.

F. Hazardous Materials: May be present in building to be reroofed. A report on the presence of hazardous materials is being prepared by the Owner. It will be made available for review and use. Examine report to become aware of locations where hazardous materials are present.

2 PART 2 - PRODUCTS

2.1 AUXILIARY REROOFING MATERIALS

A. General: Auxiliary reroofing preparation materials recommended by roofing system manufacturer for intended use and compatible with components of new membrane roofing system.

B. Base Sheet Fasteners: Capped head, factory-coated steel fasteners, listed in FMG's "Approval Guide."

C. Metal Flashing Sheet: Metal flashing sheet is specified in Division 7 Section "Sheet Metal Flashing and Trim."

3 PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate with Owner to shut down or modify air intake equipment in the vicinity of the Work. Cover disabled air intake louvers or extend air intakes to clean location before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.

B. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.

C. Maintain any roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast. Install temporary screens as appropriate.

1. If roof drains will be temporarily blocked or unserviceable due to roofing system removal or partial installation of new membrane roofing system, provide alternative drainage method to remove water and eliminate ponding. Do not permit water to enter into or under existing membrane roofing system components that are to remain.

D. Verify that rooftop utilities and service piping have been shut off before commencing Work.

3.2 ROOF TEAR-OFF

A. Roof Tear-Off: Remove existing roofing systems and other membrane roofing system components down to the deck.

1. Remove cover boards, roof insulation, felts, and substrate boards.
2. Remove fasteners from deck.

3.3 DECK PREPARATION

A. Inspect deck after tear-off of roofing systems.

1. Verify that substrate is visibly dry and free of moisture.

B. If deck surface is not suitable for receiving new roofing, or if structural integrity of deck is suspect, immediately notify Architect. Do not proceed with installation until directed by Architect.

C. Provide additional deck overlayment, fastening and seismic anchoring as indicated on Drawings.

3.4 EXISTING BASE FLASHINGS

A. Remove existing base flashings around parapets, walls, and penetrations.

1. Clean substrates of contaminants such as asphalt, sheet materials, dirt, and debris.

B. Do not damage metal counterflashings that are to remain. Replace metal counterflashings damaged during removal with counterflashings of same metal, weight or thickness, and finish.

3.5 DISPOSAL

A. Collect and place demolished materials in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

1. Storage or sale of demolished items or materials on-site will not be permitted.

B. Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION 07591

SECTION 07610 - SHEET METAL ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Standing-seam metal roofing, on-site, roll formed.

1.2 PERFORMANCE REQUIREMENTS

A. Energy Performance: Provide metal roofing with solar reflectance index not less than [**78**] [**29**] when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show installation layout of sheet metal roofing, including plans, elevations, expansion joint locations, and keyed details. Distinguish between shop- and field-assembled work.

1. Include details for forming, joining, and securing sheet metal roofing, including pattern of seams, termination points, fixed points, expansion joints, roof penetrations, edge conditions, special conditions, connections to adjoining work, and details of accessory items.

C. Samples: For each exposed product and for each finish specified.

D. Coordination Drawings: Roof plans drawn to scale with coordinated details for penetrations and roof-mounted items.

E. Portable Roll-Forming Equipment Certificate: Issued by UL for equipment manufacturer's portable roll-forming equipment capable of producing panels that comply with UL requirements.

F. Product test reports.

G. Maintenance data.

H. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE

A. Roll-Formed Sheet Metal Roofing Fabricator Qualifications: Fabricator authorized by portable roll-forming equipment manufacturer to fabricate and install sheet metal roofing units required for this Project, and who maintains current UL certification of its portable roll-forming equipment.

B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing roofing panels for sheet metal roofing assemblies that comply with UL 580 for Class 90 wind-uplift resistance. Maintain UL certification of portable roll-forming equipment for duration of sheet metal roofing work.

C. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

D. Copper Roofing Standard: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical roof area and eave as shown on Drawings; approximately 48 inches (1200 mm) square by full thickness, including attachments, underlayment, and accessories.

F. Preinstallation Conference: Conduct conference at Project site.

1.5 WARRANTY

A. Special Warranty: Warranty form in which Installer agrees to repair or replace components of sheet metal roofing that fail in materials or workmanship within Two years from date of Substantial Completion.

B. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ROOFING SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper, 16 oz./sq. ft. (0.55 mm thick) unless otherwise indicated.

1. Non-Patinated Exposed Finish: Mill.

2.2 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).

2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C).

B. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum, rosin sized.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by primary sheet metal or portable roll-forming equipment manufacturer unless otherwise indicated.

B. Snap-On Seams: Provide snap-on seams integrated with panel-edge profile as recommended by portable roll-forming equipment manufacturer to produce sheet metal roofing assemblies that comply with UL 580 for wind-uplift resistance classification specified in "Quality Assurance" Article.

C. Fasteners: Wood screws, annular-threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

1. General:

a. Exposed Fasteners: Heads matching color of sheet metal roofing using plastic caps or factory-applied coating.
b. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
c. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

2. Fasteners for Copper Sheet: Copper, hardware bronze, or Series 300 stainless steel.

D. Solder:

1. For Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.

E. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

F. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant as recommended by portable roll-forming equipment manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal roofing and remain watertight.

G. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 ACCESSORIES

A. Sheet Metal Accessories: Provide components required for a complete sheet metal roofing assembly including trim, copings, fasciae, corner units, clips, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items. Match material and finish of sheet metal roofing unless otherwise indicated.

1. Provide accessories as recommended by portable roll-forming equipment manufacturer to produce sheet metal roofing assemblies that comply with UL 580 for wind-uplift resistance classification specified in "Quality Assurance" Article.
2. Cleats: For mechanically seaming into joints and formed from the following materials:

   a. Copper Roofing: 16-oz./sq. ft. (0.55-mm) copper sheet.

3. Clips: Minimum 0.062-inch- (1.59-mm-) thick, stainless-steel panel clips designed to withstand negative-load requirements.
4. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible-closure strips; cut or premolded to match sheet metal roofing profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
5. Flashing and Trim: Formed from same material and finish as sheet metal roofing, minimum thickness matching the sheet metal roofing.

2.5 FABRICATION

A. General: Custom fabricate sheet metal roofing to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions (panel width and seam height), geometry, metal thickness, and other characteristics of installation indicated. Fabricate sheet metal roofing and accessories at the shop to greatest extent possible.

1. Standing-Seam Roofing: Form standing-seam panels with finished seam height of 1 inch (25 mm).

B. General: Fabricate roll-formed sheet metal roofing panels with UL-certified, portable roll-forming equipment capable of producing roofing panels for sheet metal roofing assemblies that comply with UL 580 for wind-uplift resistance classification specified in "Quality Assurance" Article. Fabricate roll-formed sheet metal according to equipment manufacturer's written instructions and to comply with details shown.

C. Form exposed sheet metal work to fit substrates without excessive oil canning, buckling, and tool marks; true to line and levels indicated; and with exposed edges folded back to form hems.

1. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of metal roofing to profiles, patterns, and drainage arrangements shown on Drawings and as required for leakproof construction.

D. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended by fabricator of sheet metal roofing or manufacturers of the metals in contact.

E. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before shop fabrication.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that tops of fasteners are flush with surface.

3.2 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof sheathing under sheet metal roofing. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply over entire roof, in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

B. Apply slip sheet before installing sheet metal roofing.

3.3 INSTALLATION, GENERAL

A. General: Anchor sheet metal roofing and other components of the Work securely in place, with provisions for thermal and structural movement. Install fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.

1. Field cutting of sheet metal roofing by torch is not permitted.
2. Provide metal closures at rake edges rake walls and eaves.
3. Flash and seal sheet metal roofing with closure strips at eaves, rakes, and perimeter of all openings. Fasten with self-tapping screws.
4. Locate and space fastenings in uniform vertical and horizontal alignment. Predrill panels for fasteners.
5. Locate roofing splices over, but not attached to, structural supports. Stagger roofing splices and end laps to avoid a four-panel lap splice condition.
6. Install sealant tape where indicated.
7. Lap metal flashing over sheet metal roofing to allow moisture to run over and off the material.

B. Thermal Movement. Rigidly fasten metal roof panels to structure at only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction.

1. Point of Fixity: Fasten each panel along a single line of fixing located at center of panel length.
2. Avoid attaching accessories through roof panels in a manner that will inhibit thermal movement.

C. Fasteners: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.

D. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended by SMACNA.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

3.4 ON-SITE, ROLL-FORMED SHEET METAL ROOFING INSTALLATION

A. General: Install on-site, roll-formed sheet metal roofing fabricated from UL-certified equipment to comply with equipment manufacturer's written instructions for UL wind-uplift resistance class indicated. Provide sheet metal roofing of full length from eave to ridge unless otherwise restricted by on-site or shipping limitations.

B. Standing-Seam Sheet Metal Roofing: Fasten sheet metal roofing to supports with concealed clips at each standing-seam joint at location, at spacing, and with fasteners recommended by manufacturer of portable roll-forming equipment.

1. Install clips to substrate with self-tapping fasteners.
2. Install pressure plates at locations indicated in equipment manufacturer's written installation instructions.
3. Before panels are joined, apply continuous bead of sealant to top of flange of lower panel.
4. Snap-On Seam: Nest standing seams and fasten together by interlocking and completely engaging field-applied sealant.
5. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so cleat, sheet metal roofing, and field-applied sealant are completely engaged.

C. Seal joints as shown and as required for watertight construction. For roofing with 3:12 slopes or less, use cleats at transverse seams.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

3.5 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete sheet metal roofing assembly including trim, copings, seam covers, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items.

2. Install accessories integral to sheet metal roofing that are specified in Division 7 Section "Sheet Metal Flashing and Trim" to comply with that Section's requirements.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as sheet metal roofing is installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 07610

SECTION 07620 - SHEET METAL FLASHING AND TRIM

1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following sheet metal flashing and trim:
1. Manufactured through-wall flashing.
2. Manufactured reglets.
3. Formed roof drainage system.
4. Formed low-slope roof flashing and trim.
5. Formed wall flashing and trim.
6. Formed through-wall vent cover.

B. Related Sections include the following:
1. Division 4 Section "Unit Masonry Assemblies" for installing through-wall flashing, reglets, and other sheet metal flashing and trim.
2. Division 6 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
3. Division 7 Section "Joint Sealants" for field-applied sheet metal flashing and trim sealants.
4. Division 7 Section "Sheet Metal Roofing" for installing sheet metal roofing.

1.3 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Fabricate and install roof edge flashing and copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:
1. Wind Zone 1: For velocity pressures of 21 to 30 lbf/sq. ft. (1.00 to 1.44 kPa): 60-lbf/sq. ft. (2.87-kPa) perimeter uplift force, 90-lbf/sq. ft. (4.31-kPa) corner uplift force, and 30-lbf/sq. ft. (1.44-kPa) outward force.

C. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

D. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior or to interior of wall or roof assemblies, etc.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:
   1. Identify material, thickness, weight, and finish for each item and location in Project.
   2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
   3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
   4. Details of expansion-joint covers, including showing direction of expansion and contraction.

C. Samples for Initial Selection: For each type of sheet metal flashing and trim indicated with factory-applied color finishes.
   1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
   1. Sheet Metal Flashing: 12 inches (300 mm) long. Include fasteners, cleats, clips, closures, and other attachments.
   2. Trim: 12 inches (300 mm) long. Include fasteners and other exposed accessories.
   3. Accessories: Full-size Sample.

1.5 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
   1. Copper Standard: Comply with CDA's "Copper in Architecture Handbook."

B. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockup of typical roof eave coping and integral gutter, approximately 48 inches (1200 mm) long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
   2. Approval of mockups is for other material and construction qualities specifically approved by Architect in writing.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
   4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
   1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials and roof accessories.
   2. Review methods and procedures related to sheet metal flashing and trim.
   3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
   4. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.

B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other damage.

1.7 COORDINATION

A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

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. 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.

2.2 SHEET METALS

A. Copper Sheet: ASTM B 370, Temper H00 or H01, cold-rolled copper sheet.

B. Lead-Coated Copper Sheet: ASTM B 101, Temper H00 and H01, cold-rolled copper sheet, of weight (thickness) indicated below, coated both sides with lead weighing not less than 12 lb/100 sq. ft. (0.59 kg/sq. m) nor more than 15 lb/100 sq. ft. (0.73 kg/sq. m) of copper sheet (total weight of lead applied equally to both sides).

2.3 UNDERLAYMENT MATERIALS

A. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

B. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
1. Nails for Copper Sheet: Copper or hardware bronze, 0.109 inch (2.8 mm) minimum and not less than 7/8 inch (22 mm) long, barbed with large head.
2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.

C. Solder for Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.

D. Solder for Lead-Coated Copper: ASTM B 32, Grade Sn60, 60 percent tin and 40 percent lead.

E. Solder for Lead: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.

F. Burning Rod for Lead: Same composition as lead sheet.

G. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

H. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

I. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.

J. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.5 MANUFACTURED SHEET METAL FLASHING AND TRIM

A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory- mitered and -welded corners and junctions.
   1. Available Manufacturers:
      a. Cheney Flashing Company, Inc.
      b. Fry Reglet Corporation.
   2. Material: Copper, 16 oz./sq. ft. (0.55 mm thick) or d-coated copper, 17.2 oz./sq. ft. (0.60 mm thick).
   3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
   4. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
   5. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
   6. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

2.6 FABRICATION, GENERAL

A. General: Custom 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 item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.

B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with

performance requirements, but not less than that specified for each application and metal.

C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.

F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
   1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" and FMG Loss Prevention Data Sheet 1-49 for application but not less than thickness of metal being secured.

H. Seams: Comply with SMACNA "Architectural Sheet Metal Manual", (Sixth Edition, September 2003) Figure no. 3-2 and 3-3 as applicable to specific installations.
   1. Standing Seams: Provide double lock standing seams (detail no. 25, figure no. 3-3), with finish not less than 1-1/4" high.

2.7 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Gutters: Fabricate gutters of dimensions shown on Drawings with closure flange trim to exterior, wall flanges to interior, and base extending into field of roof.

   1. Fabricate integral gutters from the following material:
      a. Copper: 16 oz./sq. ft. (0.55 mm thick).

   2. Fabricate downspout opening flashing Pans from the following material:
      a. Lead: 4.0 lb/sq. ft. (1.6 mm thick), hard tempered.

2.8 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Base Flashing: Fabricate from the following material:
   1. Copper: 20 oz./sq. ft. (0.7 mm thick).

B. Counterflashing: Fabricate from the following material:
   1. Copper: 16 oz./sq. ft. (0.55 mm thick).

C. Flashing Receivers: Fabricate from the following material:
   1. Copper: 16 oz./sq. ft. (0.55 mm thick).

D. Roof-Penetration Flashing: Fabricate from the following material:
   1. Lead: 4.0 lb/sq. ft. (1.6 mm thick), hard tempered.

2.1 WALL SHEET METAL FABRICATIONS

A. Wall, Ledge and Sill Flashing: Fabricate continuous flashings in lengths to match opening, etc. but not exceeding 12 foot (3.6 m) long, sections, under copings, at shelf angles, and

where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings and with 2-inch- (50-mm-) high end dams or as indicated on drawings. Fabricate from the following material and as indicated:

1. Copper: 16 oz./sq. ft. (0.55 mm thick).
2. Lead-Coated Copper: 17.2 oz./sq. ft. (0.60 mm thick).

B. Wall Vent: Fabricate exterior wall vent cover to replace existing cover. Match existing size and profile.

1. Copper: 16 oz./sq. ft. (0.55 mm thick).

2.1 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.

1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

1. Coat side of sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet.
3. Bed flanges in thick, continuous coat of asphalt roofing cement where required for waterproof performance.

C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.

E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
   1. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.

F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with elastomeric sealant concealed within joints.

G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
   1. Copper Use copper or stainless-steel fasteners.

H. Seal joints with elastomeric sealant as required for watertight construction.
   1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).

I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm) except where pretinned surface would show in finished Work.
   1. Do not solder prepainted, metallic-coated steel and aluminum sheet.
   2. Pretinning is not required for lead-coated copper and lead.
   3. Copper Soldering: Tin uncoated copper surfaces at edges of sheets using solder recommended for copper work.
   4. Where surfaces to be soldered are lead coated, do not tin edges, but wire brush lead coating before soldering.
   5. Lead-Coated Copper Soldering: Wire brush edges of sheets before soldering.
   6. Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

B. Integral Gutters: Install gutters where indicated. Continuously support gutter, set to correct elevation and slope, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

   1. Anchor gutter closure trim flange to exterior wall and seal or solder to gutter.

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C. Pans: Install where downspouts penetrate integral gutters roofs. Set in asphalt roofing

cement compatible with roofing membrane.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal roof flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

A. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.

B. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with elastomeric sealant.
1. Secure in a waterproof manner by means of anchor and washer at 36-inch (900-mm) centers.

C. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:
1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.

3.5 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers and at ledges, sills, etc. to match existing or as indicated on drawings.

B. Reglets: Installation of reglets is specified in Division 4 Section "Unit Masonry Assemblies."

3.1 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07620

SECTION 07920 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.

B. Related Sections:

1. Division 2 Section "Pavement Joint Sealants" for sealing joints in pavements, walkways, and curbing.
2. Division 4 Section "Exterior Stone Restoration" for sanded sealant joints in masonry.
3. Division 8 Sections "Wood Window Restoration" for joint sealants and "Glazing" for glazing sealants.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

C. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.

D. Warranties: Sample of special warranties.

E. Sample Installations: Minimum 12 in. installation of sealant or sanded sealant in metal or plastic channel of similar joint width.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

1.5 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less or more than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.6 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Colors of Exposed Joint Sealants and Aggregate for Sanded Sealant Joints: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.

1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Corning Corporation; 790.

b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
c. May National Associates, Inc.; Bondaflex Sil 290 or Bondaflex Sil 728 NS.
d. Pecora Corporation; [301 NS, 311 NS, 890 or 890FTS.
e. Sika Corporation, Construction Products Division; SikaSil-C990.
f. Tremco Incorporated; Spectrem 1 or Spectrem 800.

2.3 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

2.4 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

D. Aggregate: Natural or synthetic, clean sand or other aggregate selected to fully blend with mortar joints when applied to sealant at stone/flashing and other noted joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
3. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

    1. Do not leave gaps between ends of sealant backings.
    2. Do not stretch, twist, puncture, or tear sealant backings.
    3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

    1. Place sealants so they directly contact and fully wet joint substrates.
    2. Completely fill recesses in each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
6. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Application of Aggregate: Immediately after sealant application and before skinning or curing begins, apply approved aggregate to sealant. Apply uniformly to entire face of joint. Prevent damage to any adjacent material. Clean excess aggregate from adjacent surfaces.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces **JS-1**.

1. Joint Locations:

a. Isolation and contraction joints in cast-in-place concrete slabs.
b. Joints in asphalt paving.
c. Joints between different materials listed above.

2. Silicone Joint Sealant: Single component, nonsag, traffic grade, neutral curing.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces **JS-2**.

1. Joint Locations:

a. Indicated joints in dimension stone cladding, typically at installation of sheet metal flashing.
b. Joints between different materials listed above.
c. Perimeter joints between materials listed above and frames of doors, windows and louvers.
d. Other joints as indicated.

2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 50, or Multicomponent, nonsag, neutral curing.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 07920

SECTION 08212 - STILE AND RAIL WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exterior stile and rail wood doors and transoms, frames, trim, etc.
2. Finishing stile and rail wood doors.

B. Related Sections:

1. Division 9 Section "Wood Stains and Transparent Finishes" for field touch-up stile and rail doors.

C. Work Description:

1. Scope of work includes re-creation of entry doors, transom, frame, trim, etc. Provide best possible modern fabrication and finishing techniques for strength and durability minimizing compromises to replicated historic appearance, character and details.
2. Design of reproduction doors based on historic photos (electronic copies available from Architect) and historic interior door used as a model. Carefully verify designs with both sources.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Include details of construction and glazing.
2. Include factory finishing specifications.

B. Shop Drawings: For stile and rail wood doors. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data, including those for stiles, rails, panels, and moldings (sticking); and other pertinent data, including the following:

1. Dimensions of doors for field fitting.
2. Locations and dimensions of mortises and holes for hardware.
3. Requirements for grain matching.
4. Doors to be factory finished, and finish requirements.

C. Samples for Initial Selection: For factory-finished doors.

D. Samples for Verification: Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edgings representing typical range of color and grain for each species of solid lumber required. Finish Sample with same materials proposed for factory-finished doors.

E. Product Certificates: For each type of door, from manufacturer.

F. Warranty: Sample of special warranty.

G. Manufacturer's statement of qualifications and experience, listing five relevant projects.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that has a minimum of five years experience with successful fabrication, finishing and installation of custom solid wood exterior doors.

B. Source Limitations: Obtain stile and rail wood doors from single manufacturer.

C. Safety Glass: Provide products complying with testing requirements in 16 CFR 1201, for Category II materials, unless those of Category I are expressly indicated and permitted.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's written instructions and requirements of quality standard referenced in Part 2.

B. Package doors individually in opaque plastic bags or cardboard cartons. Do not package doors until final finish is fully cured. Package and handle doors to prevent any damage to doors or finish.

C. Mark each door on top and bottom edge with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until wet work in area is complete along with nearby stone restoration, paving, etc.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship, or have warped (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty shall be in effect during the following period of time from date of Substantial Completion:

    a. Exterior Doors: Five years.
    b. Laminated Glass Vision Panels: Five years.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Use only materials that comply with referenced standards and other requirements specified.

1. Assemble exterior doors and transoms, including components, with wet-use adhesives complying with ASTM D 5572 for finger joints and with ASTM D 5751 for joints other than finger joints.

B. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea-formaldehyde resins.

2.2 EXTERIOR STILE AND RAIL WOOD DOORS

A. Exterior Stile and Rail Wood Doors Type SRD-1: Custom exterior doors complying with AWI's "Architectural Woodwork Quality Standards", and with other requirements specified.

1. Manufacturers: Subject to compliance with requirements, provide products by a fully qualified manufacturer:
2. Panel Designs: Indicated by Drawings. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
3. Grade: Premium.
4. Finish: Transparent.
5. Wood Species and Cut for Transparent Finish: Red oak, quarter sawed/sliced stiles and rails, plain sawed/sliced panels to match historic doors.
6. Door Construction for Transparent Finish:

a. Stile and Rail Construction: Clear lumber; may be edge glued for width. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
b. Raised-Panel Construction: Clear lumber; edge glued for width only if present in historic doors to match. Any edge-glued widths must be within range of widths found in historic doors. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.

7. Stile and Rail Widths: As indicated.
8. Raised-Panel Thickness: As indicated.
9. Molding Profile (Sticking): As indicated.
10. Glass: Uncoated, clear, laminated glass type TG2, complying with Division 8 Section "Glazing."
11. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.

2.3 STILE AND RAIL WOOD DOOR FABRICATION

A. Fabricate stile and rail wood doors in sizes indicated for field fitting.

B. Factory fit doors to suit frame-opening sizes as installed/field verified, with the following uniform clearances and bevels unless otherwise indicated:

1. Clearances: Provide 1/8 inch (3 mm) at heads, jambs, and between pairs of doors. Provide 1/2 inch (13 mm) from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide not more than 3/8 inch (10 mm) from bottom of door to top of threshold.
2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.

C. Factory machine doors for hardware that is not surface applied. Locate hardware to match historic conditions and/or comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W Series standards, and hardware templates.

D. Glazed Openings: Trim openings indicated for glazing with solid wood moldings, with interior side removable. Miter wood moldings at corner joints.

E. Glazed Openings: Glaze doors at factory with glass of type and thickness indicated, complying with Division 8 Section "Glazing." Install glass using manufacturer's standard elastomeric glazing sealant complying with ASTM C 920. Secure glass in place with removable wood moldings and concealed steel reinforcements if needed. Miter wood moldings at corner joints. Fully coat or treat all cuts and other concealed surfaces (similar to back-priming).

F. Transom: Fabricate panels to match adjoining doors in materials, finish, quality of construction and detailing.

G. Exterior Doors: Factory treat exterior doors after fabrication with water-repellent preservative to comply with WDMA I.S.4. Flash top of outswinging doors as detailed.

2.4 SHOP PRIMING

A. Doors for Transparent Finish: Shop prime doors with stain (if required), other required pretreatments, and first coat of finish as specified in Division 9 Section "Wood Stains and Transparent Finishes" as necessary to match historic. Seal all four edges, edges of cutouts, and mortises with first coat of finish.

2.5 FINISHING

A. Finish wood doors at factory or woodworking shop.

B. Comply with AWI's "Architectural Woodwork Quality Standards," and with other requirements specified.

1. Finish faces and all four edges of doors, including mortises and cutouts. Stains and fillers may be omitted on bottom edge, edges of cutouts, and mortises.

C. Transparent Finish:

1. Grade: Premium
2. Finish: AWI conversion varnish system.
3. Staining: Match historic door.
4. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores. Match typical historic conditions.
5. Sheen: Semigloss, or as to match typical historic conditions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine door openings and substrates, with Installer present, for suitable conditions where wood stile and rail doors and wood door frames will be installed.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

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

3.2 INSTALLATION

A. Install wood door frames level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Countersink fasteners, fill surface flush, and sand smooth.

B. Hardware: For installation, see Division 8 Section "Door Hardware."

C. Install wood doors to comply with manufacturer's written instructions, AWI's "Architectural Woodwork Quality Standards," and other requirements specified.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory or Shop-Finished Doors: Fully restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING, PROTECTION & CLEANING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

C. Provide and maintain all necessary barriers, sheathing, notification, etc. to fully protect and maintain installed work in "like new" condition until project substantial completion.

D. Remove protection material for review by Architect.

E. Properly clean doors, glazing, etc. at Substantial Completion.

END OF SECTION 08212

SECTION 08361 - SECTIONAL OVERHEAD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes electrically operated custom wood and glass sectional doors.

B. Related Sections:

1. Division 5 Section "Metal Fabrications" for miscellaneous steel supports.
2. Division 16 Sections for electrical service and connections for powered operators and accessories.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Sectional doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.

B. Delegated Design: Design sectional doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Structural Performance: Exterior sectional doors shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Wind Loads: Uniform pressure (velocity pressure) of 20 lbf/sq. ft. (960 Pa), acting inward and outward.

   a. Basic Wind Speed: 90 mph (40 m/s).
   b. Importance Factor: 1.0.
   c. Exposure Category: C.

2. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components. Deflection of door in horizontal position (open) shall not exceed 1/120 of the door width.

D. Air Infiltration: Maximum rate not more than indicated when tested according to ASTM E 283.

1. Air Infiltration: Maximum rate of 0.08 cfm/sq. ft. (0.406 L/s per sq. m) at 15 and 25 mph (24.1 and 40.2 km/h).

E. Windborne-Debris-Impact-Resistance Performance: Provide custom partially glazed sectional doors that pass large-missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and ASTM E 1996.

F. Seismic Performance: Sectional doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
2. Seismic Component Importance Factor: 1.0.

G. Operation Cycles: Provide sectional door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.4 ACTION SUBMITTALS

A. Product Data: For each type and size of sectional door and accessory. Include the following:

1. Construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.
2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Door Sections: 12 inches (300 mm) square at panel corner, but not smaller than required to show panel profile with detail as indicated on drawings.

E. Delegated-Design Submittal: For sectional doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of seismic restraints.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Seismic Qualification Certificates: For sectional doors, accessories, and components, from manufacturer.

C. Warranties: Sample of special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sectional doors to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Source Limitations: Obtain sectional doors from single source from single manufacturer.

1. Obtain operators and controls from sectional door manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Standard for Sectional Doors: Fabricate sectional doors to comply with DASMA 102 unless otherwise indicated.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Faulty operation of hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
d. Delamination of exterior or interior facing materials.

2. Warranty Period: Five years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 WOOD DOOR SECTIONS

A. Construct wood door sections with top, bottom, and end closures of clear, vertical-grain, straight, kiln-dried cedar. All applied detail shall be clear, vertical-grain, straight, kiln-dried cedar. Provide wood blocking to receive hardware, end stiles, and frames for glazing, glued and doweled in place. Form meeting rails to provide rabbeted weathertight-seal joint.

1. Platform: Manufacturer's standard wood and foam core with ¼" cedar plywood facing on each face, complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Bond to facing.
2. Exterior facing: 5/8" cedar tongue and groove, butt joint, boards applied to platform vertically as indicated on drawings. Apply ¾" cedar, "stile and rail" as shown on drawings.

B. Fabricate sections of mortise-and-tenon construction with waterproof glue and steel dowels, or of rabbeted construction with waterproof glue and steel dowels and pins.

C. Reinforce sections with continuous horizontal and diagonal galvanized-steel members as required to stiffen door and for wind loading. Ensure that reinforcement does not obstruct vision lites.

D. Treat wood door members after machining with water-repellent preservative formulation according to WDMA I.S. 4.

E. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, deformation, and delamination.

F. Factory finish door sections with two coat of exterior grade clear finish. Finish to be selected by Architect from samples provided by manufacturer

2.2 TRACKS, SUPPORTS, AND ACCESSORIES

A. Tracks: Manufacturer's standard, galvanized-steel track system sized for door size and weight, designed for lift type indicated and clearances shown on Drawings, and complying with ASTM A 653/A 653M for minimum G60 (Z180) zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced 2 inches (51 mm) apart for door-drop safety device. Slope tracks at proper angle from vertical or design tracks to ensure tight closure at jambs when door unit is closed.

B. Track Reinforcement and Supports: Galvanized-steel track reinforcement and support members, complying with ASTM A 36/A 36M and ASTM A 123/A 123M. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.

1. Vertical Track Assembly: Track with continuous reinforcing angle attached to track and attached to wall with jamb brackets.
2. Horizontal Track Assembly: Track with continuous reinforcing angle attached to track and supported at points from curve in track to end of track by laterally braced attachments to overhead structural members.

C. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of sectional door unless otherwise indicated.

D. Windows: Manufacturer's standard window units of type and size indicated and in arrangement shown. Set glazing in elastic glazing compound for wood doors, as required. Provide removable stops of same material as door-section frames.

2.3 HARDWARE

A. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.

B. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079-inch- (2.01-mm-) nominal coated thickness at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible

C. Rollers: Heavy-duty rollers with steel ball-bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch- (76-mm-) diameter roller tires for 3-inch- (76-mm-) wide track and 2-inch- (51-mm-) diameter roller tires for 2-inch- (51-mm-) wide track.

2.4 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded deadbolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: Provide cylinders standard with manufacturer.
2. Keys: Two for each cylinder.

B. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.5 COUNTERBALANCE MECHANISM

A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from steel-spring wire complying with ASTM A 229/A 229M, mounted on torsion shaft made of solid steel. Provide springs designed for number of operation cycles indicated.

B. Cable Drums and Shaft for Doors: Cast-aluminum or gray-iron casting cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft. Provide one additional midpoint bracket for shafts up to 16 feet (4.88 m) long and two additional brackets at one-third points to support shafts more than 16 feet (4.88 m) long unless closer spacing is recommended by door manufacturer.

C. Cables: Galvanized-steel lifting cables with cable safety factor of at least 5 to 1.

D. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.

E. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

2.6 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Door-Operator Type: Unit consisting of electric motor, gears, pulleys, belts, sprockets, chains, and controls needed to operate door and meet required usage classification.

1. Trolley: Trolley operator mounted to ceiling above and to rear of door in raised position and directly connected to door with drawbar.

D. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 11 Section "Common Motor Requirements for Equipment" unless otherwise indicated.

1. Electrical Characteristics:

a. Phase: Single phase.
b. Volts: 115 V.
c. Hertz: 60.

2. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. (203 mm/s) and not more than 12 in./sec. (305 mm/s), without exceeding nameplate ratings or service factor.
4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
5. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

F. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.

1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.

a. Self-Monitoring Type: Designed to interface with door operator control circuit to detect damage to or disconnection of sensor device. When self-monitoring feature is activated, door closes only with sustained pressure on close button.

G. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."

1. Interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
2. Exterior units, full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.

H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 35 lbf (155 N).

I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

K. Radio-Control System: Consisting of the following:

1. Three-channel universal coaxial receiver to open, close, and stop door; four per operator.
2. Multifunction remote control.

2.7 DOOR ASSEMBLY

A. Wood Sectional Door: Sectional door formed with hinged sections.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Clopay Building Products; a Griffon company.
   b. Fimbel Architectural Door Specialties.
   c. Wayne-Dalton Corp.

B. Operation Cycles: Not less than 20,000.

C. Wood Sections: As indicated on drawings.

D. Track Configuration: Standard-lift track.

E. Weatherseals: Fitted to bottom and top of door.

F. Windows: **As** indicated on Drawings; installed with insulated glazing of the following type:

1. Clear Float Glass: 3 mm thick and complying with ASTM C 1036, Type I, Class 1, Quality Q3.
2. Insulating Glass: Manufacturer's standard.

G. Roller-Tire Material: Case-hardened steel.

H. Locking Devices: Equip door with locking device assembly.

1. Locking Device Assembly: locking bars, operable from outside with cylinder outside only, with cylinder and inside with thunbturn..

I. Counterbalance Type: Torsion spring.

J. Electric Door Operator:

1. Usage Classification: Standard duty, up to 60 cycles per hour.
2. Operator Type: Trolley.
3. Motor Exposure: Interior, clean, and dry.
4. Emergency Manual Operation: Push-up type.
5. Obstruction-Detection Device: Automatic photoelectric sensor.

6. Remote-Control Station: As directed by Architect.
7. Other Equipment: Radio-control system.

K. Clear Wood Door Finish: Modern high solids conversion varnish.

1. Transparent finish system as follows:

a. Apply a light lacquer compatible stain dissolved in lacquer thinner (transparent oil-type stain or TransTint concentrated non-fading dyes or, Ciba-Geigy Orasol brand dyes are acceptable) to match color of retained original woodwork, or of Architect's sample, to create an even tone and appearance on all new woodwork and items of furniture.
b. Follow manufacturer's specifications, depending on approved product used, i.e., Sherwin William's brand of Kemvar conversion varnish.
c. Smooth with 4F grade fine pumice and rubbing oil applied using felt blocks and cotton cloths on flat surfaces, and wadded up rags on moldings and carvings. Follow smoothing with a final rub using Wool-Lube brand rubbing oil and fresh cotton cloths and pads. If a softer sheen is required, as determined by Architect, use 0000 steel wool and Wool-Lube for final rubbing out. Remove all traces of rubbing abrasives and oil very thoroughly.

2. Finish of Interior Facing Material: Match finish of exterior section face.

2.8 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

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

3.2 INSTALLATION

A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Tracks:

1. Fasten vertical track assembly to opening jambs and framing, spaced not more than 24 inches (610 mm) apart.
2. Hang horizontal track assembly from structural overhead framing with angles or channel hangers attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.
3. Repair galvanized coating on tracks according to ASTM A 780.

3.3 STARTUP SERVICES

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust doors and seals to provide weathertight fit around entire perimeter.

D. Align and adjust motors, pulleys, belts, sprockets, chains, and controls according to manufacturer's written instructions.

E. Touch-up Painting: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION 08361

SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Commercial door hardware for the following:

a. Swinging doors.

B. Related Sections include the following:

1. Division 8 Section "Stile and Rail Wood Doors."

C. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.

1. Permanent cores to be installed by Owner.

1.3 SUBMITTALS

A. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples for Verification: Submit minimum 2-by-4-inch (51-by-102-mm) plate Samples of each type of finish required, except primed finish.

C. Qualification Data: For Installer.

D. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

E. Warranty: Special warranty specified in this Section.

F. Other Action Submittals:

1. Door Hardware Sets: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.

b. Content: Include the following information:

1) Identification number, location, hand, fire rating, and material of each door and frame.
2) Type, style, function, size, quantity, and finish of each door hardware item. Include description and function of each lockset and exit device.
3) Complete designations of every item required for each door or opening including name and manufacturer.
4) Fastenings and other pertinent information.
5) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
6) Explanation of abbreviations, symbols, and codes contained in schedule.
7) Mounting locations for door hardware.
8) Door and frame sizes and materials.
9) List of related door devices specified in other Sections for each door and frame.

c. Submittal Sequence: Submit initial draft of final schedule along with essential Product Data to facilitate the fabrication of other work that is critical in Project construction schedule. Submit the final door hardware sets after Samples, Product Data, coordination with Shop Drawings of other work, delivery schedules, and similar information has been completed and accepted.

2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.

1. Installer's responsibilities include supplying and installing door hardware and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
2. Scheduling Responsibility: Preparation of door hardware and keying schedules.

B. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

C. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Keying Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future renovation.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

D. Deliver keys to Owner by in person delivery.

1.6 COORDINATION

A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

B. Electrical System Roughing-in: Coordinate layout and installation of any electrified door hardware with connections to power supplies and access control system.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Structural failures including excessive deflection, cracking, or breakage.
   b. Faulty operation of operators and door hardware.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Three years from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and

adjusting as required for proper door hardware operation. Provide parts and supplies same as those used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this Section and door hardware sets indicated in Part 3 "Door Hardware Sets" Article.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Sets" Article. Products are identified by using door hardware designations, as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Sets" Article.

C. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. 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.

2.2 HINGES, GENERAL

A. Quantity: Provide the following, unless otherwise indicated:

1. Three Hinges: For doors with heights 61 to 90 inches (1549 to 2286 mm).
2. Four Hinges: For doors with heights 91 to 120 inches (2311 to 3048 mm).

B. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

C. Hinge Weight: Unless otherwise indicated, provide the following:

1. Exterior Doors: Heavy-weight hinges.

D. Hinge Base Metal: Unless otherwise indicated, provide the following:

1. Exterior Hinges: Stainless steel, with stainless-steel pin.

E. Hinge Options: Where indicated in door hardware sets or on Drawings:

1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for outswinging exterior doors.
2. Corners: Square.

F. Fasteners: Comply with the following:

1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
2. Screws: Phillips flat-head; machine screws (drilled and tapped holes) for metal doors. Finish screw heads to match surface of hinges.

2.3 HINGES

A. Butts and Hinges: BHMA A156.1.

B. Template Hinge Dimensions: BHMA A156.7.

C. Available Manufacturers:

1. Baldwin Hardware Corporation (BH).
2. Bommer Industries, Inc. (BI).
3. Hager Companies (HAG).
4. McKinney Products Company; an ASSA ABLOY Group company (MCK).
5. Stanley Commercial Hardware; Div. of The Stanley Works (STH).

2.4 LOCKS AND LATCHES, GENERAL

A. Lock Trim:

1. Levers:
2. Dummy Trim: Match lever lock trim and escutcheons.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Bored Locks: Minimum 1/2-inch (13-mm) latchbolt throw.
2. Mortise Locks: Minimum 3/4-inch (19-mm) latchbolt throw.
3. Deadbolts: Minimum 1-inch (25-mm) bolt throw.

C. Backset: 2-3/4 inches (70 mm), unless otherwise indicated.

D. Electrified Locking Devices: BHMA A156.25.

E. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, and as follows:

2.5 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: Function numbers and descriptions indicated in door hardware sets comply with the following:

1. Bored Locks: BHMA A156.2.
2. Mortise Locks: BHMA A156.13.
3. Interconnected Locks: BHMA A156.12.

B. Bored Locks: BHMA A156.2, Grade 1 unless Grade 2 is indicated; Series 4000.

1. Manufacturers:

    a. Schlage Commercial Lock Division; an Ingersoll-Rand Company (SCH).

2.6 LOCK CYLINDERS

A. Standard Lock Cylinders: BHMA A156.5, Grade 1.

B. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:

    1. Number of Pins: Coordinate with Owner requirements.

C. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:

D. Construction Keying: Comply with the following:

    1. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

        a. Replace construction cores with permanent cores as directed by Owner.

E. Manufacturer: Same manufacturer as for locks and latches.

F. Manufacturers:

    1. Schlage Commercial Lock Division; an Ingersoll-Rand Company (SCH).

2.7 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference, and as follows:

    1. Existing System: Master key or grand master key locks to Owner's existing system.

B. Keys: Nickel silver.

    1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

        a. Notation: Information to be furnished by Owner.

    2. Quantity: In addition to one extra key blank for each lock, provide the following:

        a. Cylinder Change Keys: Three.
        b. Master Keys: Five.

2.8 ELECTRIC STRIKES

A. Standard: BHMA A156.31 Grade 1 unless Grade 2 is indicated.

B. General: Use fail-secure electric strikes with fire-rated devices.

C. Manufacturers:

1. Von Duprin; an Ingersoll-Rand Company (VD).

2.9 DOOR GASKETING

A. Standard: BHMA A156.22.

B. General: Provide continuous weather-strip gasketing on exterior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
2. Door Bottoms: Install inset into bottom of door, forming seal with threshold when door is closed.
3. Astragal Seal: Install inset into edge of each door, forming seal with opposite door when doors are closed

C. Air Leakage: Not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.

D. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips or pile are easily replaceable and readily available from stocks maintained by manufacturer.

E. Gasketing Materials: ASTM D 2000 and AAMA 701/702.

F. Manufacturers:

1. Hager Companies (HAG).
2. Pemko Manufacturing Co. (PEM).
3. National Guard Products (NGP)

2.10 THRESHOLDS

A. Standard: BHMA A156.21.

1. Must be rated for vehicles (e.g., large SUV) at 'garage' entry.

B. Available Manufacturers:

1. National Guard Products (NGP)
2. Hager Companies (HAG).
3. Pemko Manufacturing Co. (PEM).

2.11 SURFACE BOLTS

A. 18" heavy duty surface bolt.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule, by one of the following or comparable manufacturer:

   a. Baldwin Hardware Corporation.

2.12 FABRICATION

A. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

B. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

   1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
   2. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.13 FINISHES

A. Standard: BHMA A156.18, as indicated in door hardware sets.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

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

3.2 PREPARATION

A. Wood Doors: Comply with DHI A115-W Series.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated as follows unless otherwise indicated or required to comply with governing regulations.

1. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Thresholds: Set thresholds for exterior doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

3.4 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
3. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 1 Section "Demonstration and Training."

B. DOOR HARDWARE SETS

Door Hardware Set No. 1 (Door 104A)

3 EA	HINGE	BB1199 5x4.5x1729	613	HAG
1 EA	LOCKSET	L9456P	DKB	Schlage
1 EA	CLOSER	78-B/D PA	689	NOR
1 SET	SEALS	5020B	DKB	NGP
1 EA	DOOR BOTTOM	254PDKB	DKB	NGP
1 EA	THRESHOLD	426BR	10B	NGP

Door Hardware Set No. 2 (Door 204A)

3 EA	HINGE	BB1199 5x4.5x1729	613	HAG
1 EA	LOCKSET	L9456P	DKB	Schlage
1 SET	SEALS	5020B	DKB	NGP
1 EA	DOOR BOTTOM	254PDKB	DKB	NGP
1 EA	THRESHOLD	426BR	10B	NGP

END OF SECTION 08710

SECTION 08800 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows – clear insulated and/or laminated glazing for custom replacement doors and windows, patterned insulated and/or laminated glazing at scheduled windows, etc.

B. Related Sections:

1. Division 8 Sections "Stile and Rail Wood Doors" and "Wood Window Rehabilitation."

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit.

D. Deterioration of Insulating Glass: Failure of hermetic seal under normal use attributed to the manufacturing process or to practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.4 PERFORMANCE REQUIREMENTS

A. General: Installed or restored glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects, damage, etc. resulting from construction, installation or standard maintenance.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

1.6 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of scheduled glass; 12 inches (300 mm) square.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

D. Qualification Data: For installers, manufacturers of insulating-glass units with sputter-coated, low-e coatings and sealant testing agency.

E. Product Certificates: For glass and glazing products, from manufacturer.

F. Preconstruction adhesion and compatibility test report.

G. Warranties: Sample of special warranties.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

E. Source Limitations for Glass: Obtain insulating glass from single source from single manufacturer for each glass type.

F. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Glazing Manual."

2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

H. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

I. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

J. Preinstallation Conference:

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures or glass distortion due to altitude change.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

1.10 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Glass Units: Full-size units equal to not less than 2.0 percent of each size and type of quantity installed.

1.11 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from

normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects may include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Laminated-Glass Products: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects may include failure of interlayer and other indications of deterioration in lamination.

1. Warranty Period: 5 years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is observable dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
2. Minimum Laminated Glass Thickness for Exterior Lites: Not less than 3/8 in.
3. Thickness of Pattern Glass: As indicated.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass or laminated-glass lites, properties are based on units with lites of thickness indicated.
2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).

4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).

C. Tempered Patterned Glass: ASTM C 1048, Kind FT (fully tempered), Type II, Class 1 (clear), Form 3; Quality-Q6, Finish F1 (patterned one side).

1. Products: Subject to compliance with requirements, provide the following:

a. Florex (4.0 mm clear) by AGC Flat Glass North America. Phone: 800-251-0441 http://www.afgglass.com/Product.aspx?id=372

2.3 LAMINATED GLASS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work limited to those meeting all experience, capability and quality requirements of this Section.

1. Laminated-Glass Units: Factory-assembled units consisting of lites of glass fully laminated by PVB interlayer.

B. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Insulating-Glass Types" Article.

2.4 INSULATING GLASS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work limited to those meeting all experience, capability and quality requirements of this Section.

B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Sealing System: Dual seal, with polyisobutylene and hot-melt butyl primary.
2. Spacer: Structural silicone foam – Super Spacer Premium Plus manufactured by EdgeTech, I.G., Inc.
3. Width: 1/4 in. (6.5 mm)
4. Color: black
5. Desiccant: Integral in spacer.

C. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Insulating-Glass Types" Article.

2.5 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
4. Colors of Exposed Glazing Sealants: clear.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Corning Corporation; 790.
b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
c. May National Associates, Inc.; Bondaflex Sil 290.
d. Pecora Corporation; 890.
e. Sika Corporation, Construction Products Division; SikaSil-C990.
f. Tremco Incorporated; Spectrem 1.

C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Building Systems; Omniseal 50.
b. Dow Corning Corporation; 795.
c. Polymeric Systems, Inc.; PSI-641.
d. Sika Corporation, Construction Products Division; SikaSil-C995.

D. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Corning Corporation; 799.
b. Polymeric Systems, Inc.; PSI-631.
c. Schnee-Morehead, Inc., an ITW company; SM5731 Poly-Glaze Plus.

E. Glazing Sealant: Acid-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. BASF Building Systems; OmniPlus.
    b. Bostik, Inc.; Chem-Calk 1200.
    c. Dow Corning Corporation; 999-A.
    d. Pecora Corporation; 860.
    e. Polymeric Systems, Inc.; PSI-601.
    f. Schnee-Morehead, Inc., an ITW company; SM5732 Polyglaze.

2.6 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.8 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

2.9 MONOTLITHIC GLASS TYPES

A. Glass Type PG-1: Clear fully-tempered float glass.

1. Thickness: 4 mm.
2. Florex patterned glass. Orient so lines in pattern background are vertical.
3. Provide safety labeling.

2.10 LAMINATED-GLASS TYPES

A. Glass Type LG-1: Clear heat-strengthened laminated glass.

1. Overall Unit Thickness: 3/8 in. (10 mm).
2. Outer Lite: Class 1 clear float glass.
   a. Thickness: 4.0 mm
3. PVB Interlayer:
   a. Thickness: 0.060 in. (1.52 mm)
   b. Interlayer color: Clear
4. Inner Lite: Class 1 (clear) float glass
   a. Thickness: 4.0 mm
5. Visible Light Transmittance: 68 percent minimum.
6. Visible Light Reflectance: 11 percent.
7. Winter Nighttime U-Factor: 0.95 maximum.
8. Summer Daytime U-Factor: 0.87 maximum.
9. Shading Coefficient: 0.46
10. Solar Heat Gain Coefficient: 0.39
11. Application: All scheduled reglazing of existing windows.

2.11 INSULATING-GLASS TYPES

A. Glass Type IG-1: Low-e-coated, clear insulating glass, outdoor lite laminated, indoor lite patterned.

1. Overall Unit Thickness: 10/16 inch (16 mm).
2. Thickness of Outdoor Lite: 1/4 in. (6 mm).
3. Outdoor Lite: Clear fully-tempered float glass.
4. Interspace Thickness: 1/4 in. (6.5 mm)
5. Interspace Content: Air.
6. Indoor Lite: Clear float glass.
7. Thickness of Indoor Lite: 4.0 mm

8. Low-E Coating: Pyrolytic or sputtered on fifth surface.
9. Visible Light Transmittance: 79 percent minimum.
10. Winter Nighttime U-Factor: 0.48 maximum.
11. Summer Daytime U-Factor: 0.55 maximum.
12. Solar Heat Gain Coefficient: 0.70 maximum.
13. Provide safety glazing labeling.
14. Provide pressure equalization tubes if fabricated at, or transported over, an elevation significantly different than the project elevation. Crimp closed at final elevation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

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

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.6 CLEANING AND PROTECTION

A. Protect glass from damage. Do not apply markers, tape, etc. to glass surface. Do not attach protective materials to window sash, trim or other exposed elements. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08800

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces but does not include wall coverings or decorative finishes such as faux marbling, gilding, stenciling or antiquing. Work includes, but is not limited to painting the following:

1. Exterior window surfaces – sash, frame, mullions, trim, etc.
2. Exterior door surfaces only as noted.
3. Exterior stucco surfaces as noted (unless integral color).

B. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

C. Surfaces to be painted: Except where natural finish of material is specifically noted as a surface not to be painted, paint all exposed surfaces whether or not colors are designated in Schedules. Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials, features or areas. If color or finish is not designated, Architect will select from standard or custom colors and finishes.

1. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified herein or under other sections of work.
2. Walls behind scheduled coverings shall receive prime coat.
3. Unless otherwise noted, if scheduled or associated elements or surfaces are visible, they are to be painted.

D. Following categories of work are not included as part of field-applied finish work.

1. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer-finishing is specified for such items as (but not limited to) metal toilet enclosures, prefinished partition systems, acoustic materials, architectural woodwork and casework, elevator entrance doors and frames, elevator equipment, and finished mechanical and electrical equipment, including light fixtures, switchgear and distribution cabinets.
2. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.
3. Finished Metal Surfaces: Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze or similar finished materials will not require finish painting.
4. Operating Parts: Unless otherwise indicated, moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting.
5. Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

E. Related Sections:

1. Shop Primers: Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, metal fabrications, hollow metal work and similar items.

    a. Unless otherwise specified, shop priming of fabricated components such as architectural woodwork, wood casework and shop-fabricated or factory-built mechanical and electrical equipment or accessories is included under other sections of these specifications.

F. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's technical information including Paint label analysis and application instructions for each material proposed for use.

B. Samples/Mock-ups: Prior to beginning work, Architect will furnish color chips or designations for surfaces to be painted. Use representative colors when preparing samples for review. Submit samples for Architect's review of color and texture only. Provide a listing of material and application for each coat of each finish sample.

1. On 12" x 12" hardboard, provide two samples of each color and material, with texture to simulate actual conditions. Resubmit samples as requested by Architect until acceptable sheen, color and texture are achieved.
2. On actual wood surfaces, provide two 4" x 8" samples of natural and stained wood finish. Label and identify each as to location and application.
3. On actual wall surfaces and other exterior and interior building components, duplicate painted finishes of prepared samples. Provide full-coat finish samples on at least 100 sq. ft. of surface, or as directed, until required sheen, color and texture is obtained; simulate finished lighting conditions for review of in-place work.

    a. Final acceptance of colors will be from samples applied on the job.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.

B. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

1.4 DELIVERY AND STORAGE

A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:

1. Name or title of material.
2. Fed. Spec. number, if applicable.
3. Manufacturer's stock number and date of manufacture.

4. Manufacturer's name.
5. Contents by volume, for major pigment and vehicle constituents.
6. Thinning instructions.
7. Application instructions.
8. Color name and number.

B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage of paint in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.

1.5 JOB CONDITIONS

A. Apply water-base paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50°F and 90°F, unless otherwise permitted by paint manufacturer's printed instructions.
B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45°F and 95°F, unless otherwise permitted by paint manufacturer's printed instructions.
C. Do not paint in snow, rain, fog or mist, or when relative humidity exceeds 85%, or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions.

1. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature and humidity limits specified by paint manufacturer during application and drying periods.

D. Determine moisture content of surfaces to be painted by performing appropriate tests using a commercially available moisture meter. Apply paint only when surfaces are within limits specified by the paint manufacturer's printed instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Approved Manufacturers:

1. ICI Paint Stores.
2. PPG Industries, Pittsburgh Paints (Pittsburgh).
3. Pratt and Lambert (P & L).
4. Benjamin Moore & Co.
5. The Sherwin-Williams Company (S-W).
6. Kwal-Howells Paint.

2.2 MATERIALS

A. Material Quality: Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.
B. Proprietary names used to designate color or materials are not intended to imply that products of named manufacturers are required to exclusion of equivalent products of other manufacturers.

C. Federal Specifications establish minimum acceptable quality for paint materials. Provide written certification from paint manufacturer that materials provided meet or exceed these minimums.
D. Manufacturer's products which comply with coating qualitative requirements of applicable Federal Specifications, yet differ in quantitative requirements, may be considered for use when acceptable to Architect. Furnish material data and manufacturer's certificate of performance to Architect for any proposed substitutions.
E. Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.
F. Lead content in pigment, if any, is limited to contain not more than 0.06% lead, as lead metal based on the total non-volatile (dry-film) of paint by weight. This limitation is extended to interior surfaces and those exterior surfaces, such as stairs, decks, porches, railings, windows, and doors which are readily accessible to children under seven years of age.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Applicator must examine areas and conditions under which painting work is to be applied and notify Construction Manager in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Architect.
B. Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.
C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

3.2 PREPARATION

A. General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.
B. Provide barrier coats over incompatible primers or remove and reprime as required. Notify Construction Manager and Architect in writing of any anticipated problems in using the specified coating systems with substrates primed by others.
C. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove elements if necessary for complete painting of items or adjacent surfaces. Following completion of painting of each space or area, properly reinstall removed items.
D. Clean all surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.
E. Cementitious Materials: Prepare cementitious surfaces to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze.

    1. Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition per Manufacturer’s recommendations before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.
    2. Clean concrete floor surfaces scheduled to be painted with a commercial solution or muriatic acid, or other appropriate, compatible etching cleaner. Flush floor with clean water to neutralize acid, and allow to dry before painting.

F. Ferrous Metals: Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease,

dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.

1. Caulk fabrication joints in hollow metal door frames which paint application cannot bridge.

G. Touch-up shop-applied prime coats wherever damaged or bare, where required by other sections of these specifications. Clean and touch-up with same type shop primer.
H. Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent.
I. Cast Metals: Properly clean. Fill all pits exceeding 1/8 in. diameter with compatible permanent filler installed per Manufacturer's recommendations. Do not over-fill or smear on adjacent surfaces. Sand or appropriately texture fill material to match general adjacent texture. Apply protective prime coat.
J. Wood: Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.

1. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.
2. When transparent finish is required, use spar varnish for backpriming.

K. Materials Preparation:

1. Mix and prepare painting materials in accordance with manufacturer's directions.
2. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.
3. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

L. Tinting: Unless otherwise noted, tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes, are indicated in Schedules.
2. Provide finish coats compatible with prime paints used.
3. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
4. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently-fixed equipment or furniture with prime coat only before final installation of equipment.
5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
6. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.
7. Finish doors on tops, bottoms and side edges same as faces, unless otherwise indicated.

8. Sand lightly between each succeeding enamel or varnish coat or per Manufacturer's recommendations.
9. Omit first coat on surfaces which have been shop-primed unless otherwise indicated.

B. Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before any subsequent surface deterioration.

1. Allow sufficient time between successive coatings to permit proper drying per Manufacturer's recommendations. Do not recoat until paint has dried to where it feels firms, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
2. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer.

C. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to those items exposed to mechanical equipment rooms and in occupied spaces.

1. Mechanical items to be painted include, but are not limited to, the following:

a. Piping, pipe hangers, and supports.
b. Roof mounted mechanical units.
c. Ductwork, where exposed in occupied spaces.
d. Motor, mechanical equipment and supports.
e. Accessory items.

2. Electrical items to be painted include, but are not limited to, the following:

a. Conduit and fittings.

D. Prime Coats: Apply prime coat of material which is required to be painted or finished, and which has not been prime coated by others.

1. Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

E. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.
F. Completed Work: Match approved samples/mock-ups for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.4 FIELD QUALITY CONTROL

A. The right is reserved by Owner to invoke the following material testing procedure at any time, and any number of times during period of field painting:

1. Owner may engage services of an independent testing laboratory to sample paint being used. Samples of materials delivered to project site will be taken, identified and sealed, and certified in presence of Contractor.

a. Testing laboratory will perform appropriate tests for any or all of following

characteristics: Abrasion resistance, apparent reflectivity, flexibility, washability, absorption, accelerated weathering, dry opacity, accelerated yellowness, recoating, skinning, color retention, alkali resistance and quantitative materials analysis.

b. If test results show that material being used does not comply with specified requirements, Contractor may be directed to stop painting work and remove non-complying paint; pay for testing; repaint surfaces coated with rejected paint; and/or remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are non-compatible or if directed by Owner.

3.5 CLEAN-UP AND PROTECTION

A. Clean-Up: During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day.

1. Upon completion of painting work, clean window glass and other paint spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

B. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

1. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
2. At completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

C. Extra Stock: Deliver stock or maintenance materials to Owner. Furnish maintenance material matching products installed, packaged with protective covering for storage and identified with appropriate labels.

1. Paint: Furnish not less than one (1) full gallon for each color and type of paint installed. Paint to be fresh and in unopened/unused cans with complete, original labels.

3.6 EXTERIOR PAINT SCHEDULE

A. General: Provide the following Paint systems for the various substrates, as indicated.

1. WOOD

a. See Section 08610 Wood Window Restoration for paint system for wood windows.
b. Latex Systems

1) Semigloss Finish
1st coat: S-W primer (10 mils wet, 5 mils dry per coat)
2nd coat: S-W A-100 Acrylic Semigloss Coating
3rd coat: S-W A-100 Acrylic Semigloss Coating (10 mils wet, 4 mils dry per coat)

2. Stucco Substrates:

a. Latex System: MPI EXT 9.1A.

1. Prime Coat: Exterior latex matching topcoat.
2. Intermediate Coat: Exterior latex matching topcoat.
3. Topcoat: Exterior latex (semigloss).

b. Latex over Alkali-Resistant Primer System (if appropriate): MPI EXT 9.1J.

1. Prime Coat: Alkali-resistant primer.
2. Intermediate Coat: Exterior latex matching topcoat.
3. Topcoat: Exterior latex (semigloss).

3.8 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials.

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 3, "Power Tool Cleaning."

C. 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.

D. Painting: 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).

3.9 REPAIRS AND PROTECTION

A. 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 prime steel surfaces except the following:

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.

END OF SECTION 09900

SECTION 09931 – CLEAR FINISHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparation and finishing of limited exterior wood items.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to any preparation, shop-priming or surface treatment specified under other Sections.

B. Finish exposed surfaces whether or not colors are designated in schedules, except where a surface or material is specifically indicated not to be finished or is to remain natural. Where an item or surface is not specifically mentioned, finish the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available, to match historic appearance.

C. Related Sections: The following Sections contain requirements that relate to this Section.

1. Division 8 Sections "Stile & Rail Wood Doors" and "Sectional Overhead Doors"
2. Division 9 Section "Painting".

1.3 SUBMITTALS

A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each finish system specified, including block fillers and primers.

1. Provide the manufacturer's technical information including label analysis and instructions for handling, storage, and application of each material proposed for use.
2. List each material and cross-reference the specific coating, finish system, and application. Identify each material by the manufacturer's catalog number and general classification.

C. Samples for initial color selection in the form of manufacturer's color charts.

D. Samples for Verification Purposes: Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate.

1. Provide stepped samples, defining each separate coat, including stain, sanding sealer, first coat, and top coat. Use representative product to achieve

appropriate color when preparing samples for review. Resubmit until required sheen, color, and texture are achieved.

a. New wood type: New Samples

2. Provide a list of material and application for each coat of each sample. Label each sample as to location and application.
3. Submit samples on the following substrates for the Architect's review of sheen, color and texture only:

a. Stained or Natural Wood: Provide five, 4 x 16 in. samples of natural and stained wood finish on actual wood surfaces for each wood required. Surfaces shall include both veneer and solid stock.

E. Field Samples: On wall surfaces and other interior components, duplicate finishes of prepared samples. Provide full-coat finish samples on at least two (2), 25 square feet area of surface until required sheen, color, and texture are obtained; simulate finished lighting conditions for review of in-place work.

1. Final acceptance of colors will be from job-applied samples.
2. The Architect will select a surface to represent surfaces and conditions for each type of coating and substrate to be painted. Apply coatings in this surface according to the schedule or as specified.

a. After finishes are accepted, this surface will be used to evaluate coating systems of a similar nature.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed wood refinishing and restoration, and painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.

B. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats whenever possible.

C. Quality Standards: "MPI Approved Products List" and "MPI Architectural Painting Specification Manual."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly, Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application. Post manufacturer's safety data sheets (MSDS) for each product used, and provide respirators with the appropriate cartridges for products used. Maintain respirators in a safe working condition with a sufficient number for the size of the crew.

1.6 JOB CONDITIONS

A. Apply solvent-thinned finishes and paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C).

B. Do not apply stains and finishes when the relative humidity exceeds 75 percent at temperatures less than 5 degrees F above the dew point or to damp or wet surfaces.

1.7 PROTECTION

A. Protect areas retaining their original finishes form damage and overspray.

B. Protect the work of other trades against any overspray, marring, masking residue, or other damage due to the work of this section.

C. Mask off building elements and equipment not to be finished with appropriate masking material and sheeting manufactured for use with materials proposed, i.e. lacquer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Benjamin Moore and Co. (Moore).
2. PPG Industries, Pittsburgh Paints (PPG).
3. Pratt and Lambert (P&L).
4. The Sherwin-Williams Company (S-W).

2.2 FINISH MATERIALS, GENERAL

A. Material Compatibility: Provide primers, stains, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

B. Material Quality: Provide the manufacturer's best-quality trade sale wood finish material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

C. Colors: All colors will be restored or stained to match historic. Tinting may be required to match new wood with existing wood colors. Verify extent of tinting with Architect by submitting samples and by confirming sample selection with full scale applications in areas designated by Architect.

2.3 MISCELLANEOUS WOOD FINISHING MATERIALS

A. Transparent finish systems are required as follows:

1. Modern high solids conversion varnish for the following areas with new or retained wood surfaces:
   a. Exterior doors (all surfaces) and all exterior casing, frame, etc.

   These modern high solids conversion varnishes shall be field applied by the finisher for all existing or built-in millwork and in the shop for any free-standing furniture or other elements. Application in the shop, in temperature controlled environment, is preferred using factory-clean equipment, well-lit spray booths and dust-free curing environment.

B. Wood-Finishing Materials: Provide the manufacturer's recommended factory-formulated, wood-finishing materials that are compatible with the substrate and undercoatings indicated, if any. Manufacturers other than those specified may be used if acceptable to Owner's finishes consultant provided approval is obtained prior to bidding.

C. Apply transparent finish system in well ventilated areas using NIOSH/MSHA approved respirators as follows:

1. Modern high-solids conversion varnish:

   a. Apply a light lacquer compatible stain dissolved in lacquer thinner (transparent oil-type stain or TransTint concentrated non-fading dyes or, Ciba-Geigy Orasol brand dyes are acceptable) to match color of retained original woodwork, or of Architect's sample, to create an even tone and appearance on all new woodwork and items of furniture.
   b. Follow manufacturer's specifications, depending on approved product used, i.e., Sherwin William's brand of Kemvar conversion varnish.
   c. Smooth with 4F grade fine pumice and rubbing oil applied using felt blocks and cotton cloths on flat surfaces, and wadded up rags on moldings and carvings. Follow smoothing with a final rub using Wool-Lube brand rubbing oil and fresh cotton cloths and pads. If a softer sheen is required, as determined by Architect, use 0000 steel wool and Wool-Lube for final rubbing out. Remove all traces of rubbing abrasives and oil very thoroughly.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which clear finishes will be performed for compliance with finish or paint application requirements. Surfaces must be thoroughly dry before finish or paint is applied.

1. Do not begin to apply clear finishes until unsatisfactory conditions have been corrected.
2. Start of finishing or painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect about anticipated problems using the materials specified over substrates primed or prepared by others.

3.2 PREPARATION

A. General: Remove all hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be finished or painted. Following completion of finishing in each space or area and complete curing of finish, have items reinstalled by workers skilled in the trades involved.

B. Cleaning: Before applying sealer or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and sealing so dust and other contaminants from the cleaning process will not fall on wet, newly finished surfaces.

C. Surface Preparation: Clean and prepare all new wood surfaces to be finished according to the manufacturer's instructions for each particular substrate condition and as specified.

1. Wood: Clean new wood surfaces of dirt, oil, glue and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view very smooth (320 grit sandpaper or finer) and dust off or use tack cloths. Original existing finish coatings, or later extant refinish coatings, are not to be scraped, or sanded, unless these procedures for surface preparation are specifically approved by the Architect, or his finish consultant. Cleaning with mineral spirits and aqueous solutions of approved detergents/surfactants may be used, but only as directed by the Architect, or his finish consultant. Approved detergents/surfactants include Triton XL 80N surfactant (available from TALAS, 568 Broadway, New York, NY 10012, tel: 212.219.0770; www.talasonline.com), and Soilax brand detergent, typically available from hardware and paint stores.

a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill all fastener holes, open joints and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
b. Prime, stain, or seal wood to be finished immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood.

c. When transparent finish is required, backprime with spar varnish, including base boards, door casings, etc.
d. Backprime paneling on interior partitions where masonry, plaster, or other potentially wet wall construction occurs on backside. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately upon delivery.

D. Material Preparation: Carefully mix and prepare finish materials according to manufacturer's directions.

1. Maintain containers used in mixing and applying paint in a clean conditions, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
3. Use only thinners approved by the paint manufacturer and only within recommended limits.

3.3 APPLICATION

A. General: Apply clear finishes according to manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

B. Do not finish or paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable finish with even appearance of color and sheen.

1. The number of coats and the film thickness required are the same regardless of the application method. Do not apply succeeding coats until the previous coat has fully cured as recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth even surface according to the manufacturer's directions.
2. Apply additional coats until film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, and crevices receive a dry film thickness equivalent to that of flat surfaces.
3. The term exposed surfaces includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
4. Finish interior and exterior doors on tops, bottoms, and side edges same as exterior faces.
5. Sand lightly between each succeeding coat or as recommended by manufacturer.

C. Scheduling of Finishing: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for finishing as soon as practicable after preparation and before subsequent surface deterioration.

1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until finish has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of finish does not cause the undercoat to lift or lose adhesion. Follow all manufacturers' recommendations.

D. Application Procedures: Apply finishes, paints and coatings by brush, spray, or other applicators according to the manufacturer's directions.

1. Brushes: Use brushes best suited for the material applied.
2. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

E. Minimum Coating Thickness: Apply materials no thinner than the manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

F. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be finished and that has not been prime-coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

G. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.

1. Provide satin finish for final coats.

H. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with specified requirements.

3.4 FIELD QUALITY CONTROL

A. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied:

1. The Owner may engage the services of an independent testing agency to sample the finish materials being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.
2. The testing agency will perform appropriate tests for the following characteristics as required by the Owner:

   a. Quantitative materials analysis.
   b. Abrasion resistance.
   c. Apparent reflectivity.
   d. Flexibility.
   e. Washability.
   f. Absorption.
   g. Accelerated weathering.
   h. Dry opacity.
   i. Accelerated yellowness.
   j. Recoating.
   k. Skinning.
   l. Color retention.
   m. Alkali and mildew resistance.

3. If test results show material being used does not comply with specified requirements, the Contractor may be directed to stop finishing, remove non-complying materials, pay for testing, repair and prepare surfaces coated with

rejected material, and remove rejected material from previously finished surfaces if, upon refinishing with specified material, the two coatings are incompatible.

3.5 CLEANING

A. Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

1. After completing finishing and painting, clean glass and paint-spattered surfaces. Remove drips or spatters by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.6 PROTECTION

A. Protect work of other trades, whether being finished or not, against damage by finishing activities. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced finished surfaces.

END OF SECTION 09931

SECTION 16050 – BASIC ELECTRICAL MATERIAL AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Raceways.
2. Building wire and connectors.
3. Supporting devices for electrical components.
4. Electrical identification.
5. Concrete equipment bases.
6. Electrical demolition.
7. Cutting and patching for electrical construction.
8. Touchup painting.
9. Submittals.
10. Workmanship.
11. Coordination drawings.
12. Record documents.
13. Drawings and Specifications.
14. Maintenance manuals.
15. Rough-ins.
16. Electrical installations.
18. Cutting and patching.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. FMC: Flexible metal conduit.

C. IMC: Intermediate metal conduit.

D. LFMC: Liquidtight flexible metal conduit.

E. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

A. Product Data: Follow the procedure specified in Division 1 Section "Submittals".

B. Shop Drawings: Dimensioned plans and sections or elevation layouts of electricity-metering equipment.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

D. Additional copies may be required by individual sections of these Specifications.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

B. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

C. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 8 Section "Access Doors."

E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

F. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.

G. Prepare coordination drawings in accordance with Division 1 Section "Project Coordination", to a scale of ¼"=1'-0", or larger; detailing major elements, components, and systems of electrical equipment and materials in relationship with other systems, installation, and building components. Indicate locations where spaces is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the dwork, including but not limited to the following:

H. Indicate the proposed locations of the major raceway systems, equipment and materials. Including the following:

a. Clearance for servicing equipment, including space for equipment disassembly required for periodic maintenance.

b. Exterior wall and foundation penetrations.

c. Fire rated wall and floor penetrations.

d. Equipment connections and support details.

e. Sizes and location of required concrete pad and bases.

1.7 WORKMANSHIP

A. All materials and equipment shall be installed in accordance with the recommendations of the manufacturer to conform with the contract documents. The installation shall be accomplished by workmen skilled in the type of work involved.

B. The Electrical Contractor shall have a licensed or certified Master Electrician assigned to direct the electrical work and to coordinate work with the General Contractor and other trades. Furthermore, a licensed or certified journeyman electrician shall be assigned to supervise the actual performance of all electrical work under Division 16. All installers must be certified journey man.

1. All workmen doing electrical work of any nature must at all times carry their electrician's license with them and show it upon request.

2. The licensed or certified journeyman assigned to supervise the performance of Division 16 electrical work, shall be required to be on the job site at all times, while Division 16 work is being performed.

C. The installation shall conform to the applicable rules of the National Electrical Code and National Electrical Safety Code except where more stringent requirements are noted in these specifications. Conflicts shall be brought to the attention of the Architect/Engineer.

D. The Contractor and Sub-contractors shall comply with OSHA and EPA Standards while in the performance of this contract.

1.8 SUBSTITUTIONS

A. The equipment specified carries brand names and catalog numbers and shall be interpreted as establishing a standard of quality. Use only specified items or those listed by addenda.

B. Any conflict arising from the use of substituted equipment shall be the responsibility of the `supplier, who shall bear all costs required to make the equipment comply with the intent of the plans and specifications.

C. At the option of the Architect, samples may be required for non-standard items before installation during construction.

D. No materials or apparatus shall be substituted after the bid opening except where the equipment manufacturer has been discontinued or delivery becomes a problem, then written approval of the Architect is required.

1.9 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Division 1 Section "PROJECT CLOSEOUT." In addition to the requirements specified in Division 1, indicate installed conditions for:
1. Major raceway systems, size and location, for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.
2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.

PART 2 - PRODUCTS

A. NOT USED.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.
B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 FIRESTOPPING

A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials and installation requirements are specified in Division 7 Section "Firestopping."

3.3 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 4000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

3.4 DEMOLITION

A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.
B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.
C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.
D. Remove demolished material from Project site.
E. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.
F. Contractor shall remove lamps and ballasts from the existing light fixtures and dispose them to the owner furnished containers.

3.5 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.
C. Repair conduit and system that have been disturbed or broken, see 3.4A.

3.6 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:
   1. Raceways.
   2. Building wire and connectors.
   3. Supporting devices for electrical components.
   4. Electrical identification.
   5. Electricity-metering components.
   6. Concrete bases.
   7. Electrical demolition.
   8. Cutting and patching for electrical construction.
   9. Touchup painting.

3.7 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 9 Section "Painting."
   1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
   2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
   3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.8 CLEANING AND PROTECTION

A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION 16050

SECTION 16060 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

C. Field Test Reports: Submit written test reports to include the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Grounding Conductors, Cables and Connectors:
   a. Chance/Hubbell.
   b. Copperweld Corp.
   c. Erico Inc.; Electrical Products Group.
   d. Framatome Connectors/Burndy Electrical.
   e. Harger Lightning Protection, Inc.
   f. Heary Brothers Lightning Protection Co.
   g. Kearney/Cooper Power Systems.
   h. Korns: C. C. Korns Co.; Division of Robroy Industries.
   i. Lyncole XIT Grounding.
   j. O-Z/Gedney Co.; a business of the EGS Electrical Group.
   k. Raco, Inc.; Division of Hubbell.
   l. Thomas & Betts, Electrical.

2.2 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Division 16 Section "Conductors and Cables."

B. Material, copper-clad and copper.

C. Equipment Grounding Conductors: Insulated with green-colored insulation.

D. Copper Bonding Conductors: As follows:

1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch in diameter.
2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.
3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.3 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

PART 3 - EXECUTION

3.1 APPLICATION

A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

B. In raceways, use insulated equipment grounding conductors.

C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells.

D. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.

3.2 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

B. Install equipment-grounding conductors in all feeders and circuits.

C. Install insulated equipment grounding conductor with circuit conductors for the following items, in addition to those required by NEC:

1. Feeders and branch circuits.

2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.

D. Computer Outlet Circuits: Install insulated equipment-grounding conductor in branch-circuit runs from computer-area power panels or power-distribution units.

E. Nonmetallic Raceways: Install an equipment-grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.

F. Signal and Communication Systems: For telephone, alarm, voice and data, and other communication systems, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.

1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch grounding bus.
2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

G. Metal Poles Supporting Outdoors Lighting Fixtures: Provide a grounding electrode in addition to installing a separate equipment-grounding conductor with supply branch-circuit conductors.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

3.4 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

D. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

E. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

F. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

G. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.5 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.

2. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

3.6 GRADING AND PLANTING

A. Refer to section 02200.

END OF SECTION 16060

SECTION 16071 – SEISMIC CONTROLS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes seismic restraints and other earthquake-damage-reduction measures for electrical components. It complements optional seismic construction requirements in the various electrical component Sections.

1.3 DEFINITIONS

A. BOCA: BOCA National Building Code.

B. SBC: Standard Building Code.

C. UBC: Uniform Building Code.

D. Seismic Restraint: A fixed device (a seismic brace, an anchor bolt or stud, or a fastening assembly) used to prevent vertical or horizontal movement, or both vertical and horizontal movement, of an electrical system component during an earthquake.

E. Mobile Structural Element: A part of the building structure such as a slab, floor structure, roof structure, or wall that may move independent of other mobile structural elements during an earthquake.

1.4 SUBMITTALS

A. Product Data: Illustrate and indicate types, styles, materials, strength, fastening provisions, and finish for each type and size of seismic restraint component used.

1. Anchor Bolts and Studs: Tabulate types and sizes, complete with report numbers and rated strength in tension and shear as evaluated by an agency approved by authorities having jurisdiction.

B. Shop Drawings: For anchorage and bracing not defined by details and charts on Drawings. Indicate materials, and show designs and calculations signed and sealed by a professional engineer.

1. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
2. Details: Detail fabrication and arrangement. Detail attachment of restraints to both structural and restrained items. Show attachment locations, methods, and

spacings, identifying components and listing their strengths. Indicate direction and value of forces transmitted to the structure during seismic events.

3. Preapproval and Evaluation Documentation: By an agency approved by authorities having jurisdiction, showing maximum ratings of restraints and the basis for approval (tests or calculations).

C. Coordination Drawings: Plans and sections drawn to scale and coordinating seismic bracing for electrical components with other systems and equipment, including other seismic restraints, in the vicinity.

D. Product Certificates: Signed by manufacturers of seismic restraints certifying that products furnished comply with requirements.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

F. Material Test Reports: From a qualified testing agency indicating and interpreting test results of seismic control devices for compliance with requirements indicated.

1.5 QUALITY ASSURANCE

A. Comply with seismic restraint requirements in UBC, unless requirements in this Section are more stringent.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing seismic engineering services, including the design of seismic restraints, that are similar to those indicated for this Project.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated.

1.6 PROJECT CONDITIONS

A. Project Seismic Zone and Zone Factor as Defined in UBC: Zone 3, Zone Factor 0.30.

1.7 COORDINATION

A. Coordinate layout and installation of seismic bracing with building structural system and architectural features, and with mechanical, fire-protection, electrical, and other building features in the vicinity.

B. Coordinate concrete bases with building structural system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Amber/Booth Company, Inc.
2. B-Line Systems, Inc.
3. Erico, Inc.
4. GS Metals Corp.
5. Loos & Company, Inc.
6. Mason Industries, Inc,
7. Powerstrut.
8. Thomas & Betts Corp.
9. Unistrut Corporation.

2.2 MATERIALS

A. Use the following materials for restraints:

1. Indoor Dry Locations: Steel, zinc plated.
2. Outdoors and Damp Locations: Galvanized steel.
3. Corrosive Locations: Stainless steel.

2.3 ANCHORAGE AND STRUCTURAL ATTACHMENT COMPONENTS

A. Strength: Defined in reports by ICBO Evaluation Service or another agency acceptable to authorities having jurisdiction.

1. Structural Safety Factor: Strength in tension and shear of components used shall be at least two times the maximum seismic forces to which they will be subjected.

B. Concrete and Masonry Anchor Bolts and Studs: Steel-expansion wedge type.

C. Concrete Inserts: Steel-channel type.

D. Through Bolts: Structural type, hex head, high strength. Comply with ASTM A 325.

E. Welding Lugs: Comply with MSS SP-69, Type 57.

F. Beam Clamps for Steel Beams and Joists: Double sided. Single-sided type is not acceptable.

G. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for seismically rated rigid equipment mountings, and matched to the type and size of attachment devices used.

2.4 SEISMIC BRACING COMPONENTS

A. Slotted Steel Channel: 1-5/8-by-1-5/8-inch cross section, formed from 0.1046-inch- thick steel, with 9/16-by-7/8-inch slots at a maximum of 2 inches o.c. in webs, and flange edges turned toward web.

1. Materials for Channel: ASTM A 570, GR 33.
2. Materials for Fittings and Accessories: ASTM A 575, ASTM A 576, or ASTM A 36.

3. Fittings and Accessories: Products of the same manufacturer as channels and designed for use with that product.
4. Finish: Baked, rust-inhibiting, acrylic-enamel paint applied after cleaning and phosphate treatment, unless otherwise indicated.

B. Channel-Type Bracing Assemblies: Slotted steel channel, with adjustable hinged steel brackets and bolts.

C. Cable-Type Bracing Assemblies: Zinc-coated, high-strength steel wire rope cable attached to steel thimbles, brackets, and bolts designed for cable service.

1. Arrange units for attachment to the braced component at one end and to the structure at the other end.
2. Wire Rope Cable: Comply with ASTM 603. Use 49- or 133-strand cable with a minimum strength of 2 times the calculated maximum seismic force to be resisted.

D. Hanger Rod Stiffeners: Slotted steel channels with internally bolted connections to hanger rod.

END OF SECTION 16071

SECTION 16075 – ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes electrical identification materials and devices required to comply with ANSI C2, NFPA 70, OSHA standards, and authorities having jurisdiction.

1.3 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

B. Schedule of Nomenclature: An index of electrical equipment and system components used in identification signs and labels.

C. Samples: For each type of label and sign to illustrate color, lettering style, and graphic features of identification products.

1.4 QUALITY ASSURANCE

A. Comply with ANSI C2.

B. Comply with NFPA 70.

C. Comply with ANSI A13.1 and NFPA 70 for color-coding.

PART 2 - PRODUCTS

2.1 RACEWAY AND CABLE LABELS

A. Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

1. Color: Black letters on orange field.
2. Legend: Indicates voltage and service.

B. Aluminum, Wraparound Marker Bands: Bands cut from 0.014-inch- thick aluminum sheet, with stamped or embossed legend, and fitted with slots or ears for permanently securing around wire or cable jacket or around groups of conductors.

2.2 NAMEPLATES AND SIGNS

A. Safety Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145.

B. Engraved Plastic Nameplates and Signs: Engraving stock, melamine plastic laminate, minimum 1/16 inch thick for signs up to 20 sq. in. and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.

C. Baked-Enamel Signs for Interior Use: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for the application. 1/4-inch grommets in corners for mounting.

D. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32, stainless-steel machine screws with nuts and flat and lock washers.

2.3 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Self-extinguishing, one-piece, self-locking, Type 6/6 nylon cable ties.

1. Minimum Width: 3/16 inch.
2. Tensile Strength: 50 lb minimum.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: According to color-coding.

B. Paint: Formulated for the type of surface and intended use.

1. Primer for Galvanized Metal: Single-component acrylic vehicle formulated for galvanized surfaces.
2. Primer for Concrete Masonry Units: Heavy-duty-resin block filler.
3. Primer for Concrete: Clear, alkali-resistant, binder-type sealer.
4. Enamel: Silicone-alkyd or alkyd urethane as recommended by primer manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Identification Materials and Devices: Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and other designations with corresponding designations in the Contract Documents or with those required by codes and standards. Use consistent designations throughout Project.

C. Sequence of Work: If identification is applied to surfaces that require finish, install identification after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before applying.

E. Install painted identification according to manufacturer's written instructions and as follows:

1. Clean surfaces of dust, loose material, and oily films before painting.
2. Prime surfaces using type of primer specified for surface.
3. Apply one intermediate and one finish coat of enamel.

F. Color Banding Raceways and Exposed Cables: Band exposed and accessible raceways of the systems listed below:

1. Bands: Pretensioned, wraparound plastic sleeves; colored adhesive tape; or a combination of both. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
2. Band Locations: At changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
3. Apply the following colors to the systems listed below:

   a. Security System: Purple
   b. Mechanical and Electrical Supervisory System: Green and blue.
   c. Telecommunications System: Blue
   d. 120/208 volts system: Black.
   e. Traveler (switch to light or switch to switch) 120 volts: Pink
   f. Traveler (switch to light or switch to switch) 277 volts: Purple
   g. Lighting Control System:White.

G. Caution Labels for Indoor Boxes and Enclosures for Power and Lighting: Install pressure-sensitive, self-adhesive labels identifying system voltage with black letters on orange background. Install on exterior of door or cover.

H. Circuit Identification Labels on Boxes: Install labels externally.

1. Exposed Boxes: Pressure-sensitive, self-adhesive plastic label on cover.
2. Concealed Boxes: Plasticized card-stock tags.
3. Labeling Legend: Permanent, waterproof listing of panel and circuit number or equivalent.

I. Color-Coding of Secondary Phase Conductors: Use the following colors for service feeder and branch-circuit phase conductors:

1. 208/120-V Conductors:

   a. Phase A: Black.
   b. Phase B: Red.
   c. Phase C: Blue.
   d. Neutral : White
   e. Ground : Green

2. Factory apply color the entire length of conductors, except the following field-applied, color-coding methods may be used instead of factory-coded wire for sizes larger than No. 10 AWG:

   a. Colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Use 1-inch-wide tape in colors specified. Adjust tape bands to avoid obscuring cable identification markings.

b. Colored cable ties applied in groups of three ties of specified color to each wire at each terminal or splice point starting 3 inches from the terminal and spaced 3 inches apart. Apply with a special tool or pliers, tighten to a snug fit, and cut off excess length.

J. Apply identification to conductors as follows:

1. Conductors to Be Extended in the Future: Indicate source and circuit numbers.
2. Multiple Power or Lighting Circuits in the Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color-coding to identify circuits' voltage and phase.
3. Multiple Control and Communication Circuits in the Same Enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color-coding, or cable marking tape.

K. Apply warning, caution, and instruction signs as follows:

1. Warnings, Cautions, and Instructions: Install to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

L. Equipment Identification Labels: Engraved plastic laminate. Install on each unit of equipment, including central or master unit of each system. This includes power, lighting, communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Unless otherwise indicated, provide a single line of text with 1/2-inch- high lettering on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high. Use white lettering on black field. Apply labels for each unit of the following categories of equipment using mechanical fasteners:

1. Panelboards, electrical cabinets, and enclosures.
2. Access doors and panels for concealed electrical items.
3. Disconnect switches.
4. Enclosed circuit breakers.
5. Push-button stations.
6. Remote-controlled switches.
7. Control devices.

END OF SECTION 16075

SECTION 16080 – ELECTRICAL TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes general requirements for electrical field testing and inspecting. Detailed requirements are specified in each Section containing components that require testing. General requirements include the following:

1. Qualifications of testing agencies and their personnel.
2. Suitability of test equipment.
3. Calibration of test instruments.
4. Coordination requirements for testing and inspecting.
5. Reporting requirements for testing and inspecting.

1.3 QUALITY ASSURANCE

A. Test Equipment Suitability: Comply with NETA ATS, Section 5.2.

B. Test Equipment Calibration: Comply with NETA ATS, Section 5.3.

PART 2 - NOT USED

PART 3 - EXECUTION

3.1 GENERAL TESTS AND INSPECTIONS

A. If a group of tests are specified to be performed by an independent testing agency, prepare systems, equipment, and components for tests and inspections, and perform preliminary tests to ensure that systems, equipment, and components are ready for independent agency testing. Include the following minimum preparations as appropriate:

1. Perform insulation-resistance tests.
2. Perform continuity tests.
3. Perform rotation test (for motors to be tested).
4. Provide a stable source of single-phase, 208/120-V electrical power for test instrumentation at each test location.
5. Provide certification for main GFI.

B. Test and Inspection Reports: In addition to requirements specified elsewhere, report the following:

1. Manufacturer's written testing and inspecting instructions.
2. Calibration and adjustment settings of adjustable and interchangeable devices involved in tests.
3. Tabulation of expected measurement results made before measurements.
4. Tabulation of "as-found" and "as-left" measurement and observation results.

END OF SECTION 16080

SECTION 16120 – CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field Quality-Control Test Reports: From Contractor.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 CONDUCTORS AND CABLES

A. Manufacturers:

   1. American Insulated Wire Corp.; a Leviton Company.
   2. General Cable Corporation.
   3. Senator Wire & Cable Company.
   4. Southwire Company.

5. Okonite.
6. Kerite.

B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.

C. Conductor Material: Copper complying with NEMA WC 5 stranded conductor.

D. Conductor Insulation Types: Type THHN-THWN complying with NEMA WC 5.

E. Minimum Conductor Size: #12 AWG

F. MC-Cable or Romex cables shall not be used in this project.

2.3 CONNECTORS AND SPLICES

A. Manufacturers:

1. AFC Cable Systems, Inc.
2. AMP Incorporated/Tyco International.
3. Hubbell/Anderson.
4. O-Z/Gedney; EGS Electrical Group LLC.
5. 3M Company; Electrical Products Division.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

A. Exposed Feeders: Type THHN-THWN, single conductors in raceway .

B. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway .

C. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspaces: Type THHN-THWN, single conductors in raceway.

D. Exposed Branch Circuits, including in Crawlspaces: Type THHN-THWN, single conductors in raceway .

E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway .

F. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THHN-THWN, single conductors in raceway.

G. Underground Feeders and Branch Circuits: Type THHN-THWN, single conductors in raceway.

H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord.

I. Class 1 Control Circuits: Type THHN-THWN, in raceway.

J. Class 2 Control Circuits: Type THHN-THWN, in raceway .

3.2 INSTALLATION

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Division 16 Section "Basic Electrical Materials and Methods."

F. Seal around cables penetrating fire-rated elements according to Division 7 Section "Through-Penetration Firestop Systems."

G. Identify and color-code conductors and cables according to Division 16 Section " Electrical Identification."

3.3 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.4 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.
2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.

END OF SECTION 16120

SECTION 16130 – RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

B. Related Sections include the following:
1. Division 7 Section "Through-Penetration Firestop Systems" for firestopping materials and installation at penetrations through walls, ceilings, and other fire-rated elements.
2. Division 16 Section "Basic Electrical Materials and Methods" for supports, anchors, and identification products.
3. Division 16 Section "Seismic Controls for Electrical Work" for seismic restraints and bracing of raceways, boxes, enclosures, and cabinets.
4. Division 16 Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. ENT: Electrical nonmetallic tubing.

C. FMC: Flexible metal conduit.

D. IMC: Intermediate metal conduit.

E. LFMC: Liquidtight flexible metal conduit.

F. LFNC: Liquidtight flexible nonmetallic conduit.

G. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: Show fabrication and installation details of components for raceways, fittings, boxes, enclosures, and cabinets.

C. Shop Drawings: Signed and sealed by a qualified professional engineer.

1. Design Calculations: Calculate requirements for selecting seismic restraints.
2. Detail assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

D. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

E. Manufacturer Seismic Qualification Certification: Submit certification that enclosures, cabinets, accessories, and components will withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

   a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
   b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 METAL CONDUIT AND TUBING

A. Manufacturers:

1. AFC Cable Systems, Inc.
2. Alflex Inc.
3. Anamet Electrical, Inc.; Anaconda Metal Hose.
4. Electri-Flex Co.
5. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
6. LTV Steel Tubular Products Company.
7. Manhattan/CDT/Cole-Flex.
8. O-Z Gedney; Unit of General Signal.
9. Wheatland Tube Co.

B. Minimum Size ¾" for indoor, 1" for outdoor.

C. Rigid Steel Conduit: ANSI C80.1.

D. IMC: ANSI C80.6.

E. Plastic-Coated Steel Conduit and Fittings: NEMA RN 1.

F. Plastic-Coated IMC and Fittings: NEMA RN 1.

G. EMT and Fittings: ANSI C80.3.

1. Fittings: Set-screw type.

H. FMC: Zinc-coated steel.

I. LFMC: Flexible steel conduit with PVC jacket.

J. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

2.3 NONMETALLIC CONDUIT AND TUBING

A. Manufacturers:

1. American International.
2. Anamet Electrical, Inc.; Anaconda Metal Hose.
3. Arnco Corp.
4. Cantex Inc.
5. Certainteed Corp.; Pipe & Plastics Group.
6. Condux International.
7. ElecSYS, Inc.
8. Electri-Flex Co.
9. Lamson & Sessions; Carlon Electrical Products.
10. Manhattan/CDT/Cole-Flex.
11. RACO; Division of Hubbell, Inc.
12. Spiralduct, Inc./AFC Cable Systems, Inc.

13. Thomas & Betts Corporation.

B. ENT: NEMA TC 13.

C. RNC: NEMA TC 2, Schedule 40 PVC.

D. ENT and RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.

E. LFNC: UL 1660.

F. Minimum Size ¾" for indoor, 1" for outdoor.

2.4 METAL WIREWAYS

A. Manufacturers:

1. Hoffman.
2. Square D.
3. Walker.

B. Material and Construction: Sheet metal sized and shaped as indicated, NEMA 1.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.

E. Wireway Covers: Screw-cover type .

F. Finish: Manufacturer's standard enamel finish.

2.5 NONMETALLIC WIREWAYS

A. Manufacturers:

1. Hoffman.
2. Lamson & Sessions; Carlon Electrical Products.
3. Hubbell
4. Wiremold

B. Description: Fiberglass polyester, extruded and fabricated to size and shape indicated, with no holes or knockouts. Cover is gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections are flanged, with stainless-steel screws and oil-resistant gaskets.

C. Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.

D. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

E. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.

2.6 SURFACE RACEWAYS

A. Surface Metal Raceways: Galvanized steel with snap-on covers. Finish with manufacturer's standard prime coating .

1. Manufacturers:

a. Airey-Thompson Sentinel Lighting; Wiremold Company (The).
b. Thomas & Betts Corporation.
c. Walker Systems, Inc.; Wiremold Company (The).
d. Wiremold Company (The); Electrical Sales Division.

B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC compound with matte texture and manufacturer's standard color.

1. Manufacturers:

a. Butler Manufacturing Co.; Walker Division.
b. Enduro Composite Systems.
c. Hubbell, Inc.; Wiring Device Division.
d. Lamson & Sessions; Carlon Electrical Products.
e. Panduit Corp.
f. Walker Systems, Inc.; Wiremold Company (The).
g. Wiremold Company (The); Electrical Sales Division.

C. Types, sizes, and channels as indicated and required for each application, with fittings that match and mate with raceways.

2.7 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers:

1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. Emerson/General Signal; Appleton Electric Company.
3. Erickson Electrical Equipment Co.
4. Hoffman.
5. Hubbell, Inc.; Killark Electric Manufacturing Co.
6. O-Z/Gedney; Unit of General Signal.
7. RACO; Division of Hubbell, Inc.
8. Robroy Industries, Inc.; Enclosure Division.
9. Scott Fetzer Co.; Adalet-PLM Division.
10. Spring City Electrical Manufacturing Co.
11. Thomas & Betts Corporation.
12. Walker Systems, Inc.; Wiremold Company (The).
13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.

B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.

D. Nonmetallic Outlet and Device Boxes: NEMA OS 2.

E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

F. Cast-Metal Pull and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

G. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.

H. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

2.8 FACTORY FINISHES

A. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard prime-coat finish ready for field painting.

B. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard paint applied to factory-assembled surface raceways, enclosures, and cabinets before shipping.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors:

1. Exposed: Rigid steel or IMC.
2. Concealed: Rigid steel or IMC.
3. Underground, Single Run: RNC.
4. Underground, Grouped: RNC.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
6. Boxes and Enclosures: NEMA 250, Type 3R.

B. Indoors:

1. Exposed: EMT .
2. Concealed: EMT.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
4. Damp or Wet Locations: Rigid steel conduit.
5. Boxes and Enclosures: NEMA 250, Type 1, except as follows:

   a. Damp or Wet Locations: NEMA 250, Type 4,stainless steel.

C. Minimum Raceway Size: 3/4-inch trade size for indoor, 1-inch trade size for outdoor.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.

E. Install nonferrous conduit or tubing for circuits operating above 60 Hz.

F. Do not install aluminum conduits for this project.

G. Provide steel raceway, fitting, and box system for all wiring, except that plastic conduit (minimum schedule 40) may be installed underground and aluminum cable trays may be installed for communications cabling.

H. For steel raceway installed in contact with soil, provide rigid or IMC PVC coated or wrapped raceways, fittings, etc.

I. Provide steel raceways for penetrating structural elements (minimum 10' each side) and rigid steel conduit (PVC coated or wrapped) for bends greater than 22 degrees.\

J. For Communications raceway, the bend must be a minimum 6 times the diameter for sizes 2" or less and 10 times the diameter for larger then 2".

K. Provide insulated throat or equal type plastic bushings for box connection 1" or larger.

L. Provide double lock nuts and plastic bushings for IMC and rigid conduit.

M. Provide liquid-tight flexible conduit with approved moisture-tight fittings for wet, humid, corrosive or oily locations.

N. Provide minimum 4/s box 1-1/2" deep with plaster rings, except provide 3-1/2" deep masonry boxes for masonry. For boxes with 3 or more raceway entrances, provide minimum 2-1/8" box. For boxes with 4 or more raceway entrances, provide.

O. 4-11/16" boxes (except for masonry boxes).
1. Provide gang boxes for multiple gang installations.
2. Provide accessible junction boxes in interior raceway runs at minimum 100 foot intervals.
3. Provide minimum 12" clearance from hot water and steam lines measured from outside of insulation.

P. Electrical Supports.
1. All raceways, boxes, and conductors shall be supported independently from all other electrical or mechanical systems, directly from building structure by a listed supporting device.
2. Provide bracing parallel to trusses, beams, joist, bridging, etc.
3. Provide anchors capable of supporting 4 times the weight of the unit supported, but not less than 100 lbs.
4. For ceiling fixture outlet boxes, provide minimum supporting capacity of 200 lbs and a standard 3/8" stud.
5. Provide outlet boxes with rigid support using metal bar hangers between studs.
6. Provide concrete pads 6 inches beyond the largest dimension of the equipment. Extend equipment pad a minimum of 4" above finished floor or grade.

Q. Steel Raceway Supports.

1. Provide minimum of 2 supports per ten foot length; Support within 12 inches of bends, couplings, fittings and boxes, minimum of two straps per ten foot length.
2. For 2 runs or less of ¾" to 1-1/4" raceways, provide supports with full straps, clamps or hangers. For individual run 1-1/2" or larger raceways, provide supports with hangers. All other raceways, support with trapeze mounting channels.

R. Future Raceways:
1. Provide five capped spare ¾" conduits from each section of a branch panelboard into the ceiling and floor space. If the floor space is not accessible, provide an additional ¾" conduit from each section of a branch panelboard into the ceiling.
2. Provide 200-lb nylon pull cord in all empty conduit, then cap raceway using a blank cover similar to adjacent wiring device covers.

S. Underground Raceway Identification and Installation:
1. Provide direct buried conduit in an area outside a building not less 24" deep, with magnetic "yellow warning" ribbon 12" directly above and 6" below finished grade measured from the top of the conduit or duct bank.

T. Underground Raceway Identification and Installation:
1. Medium voltage and communication distribution and building feeders shall have 36" minimum cover.
2. Medium voltage conduits and ducts shall be concrete encased.
3. Provide minimum 1 ¼"underground raceway for site lighting circuits.

3.2 INSTALLATION

A. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

B. Complete raceway installation before starting conductor installation.

C. Support raceways as specified in Division 16 Section "Basic Electrical Materials and Methods."

D. Install temporary closures to prevent foreign matter from entering raceways.

E. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above the finished slab.

F. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated.

G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

1. Install concealed raceways with a minimum of bends in the shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.

H. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.

1. Run parallel or banked raceways together on common supports.
2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

I. Join raceways with fittings designed and approved for that purpose and make joints tight.

1. Use insulating bushings to protect conductors.

J. Tighten set screws of threadless fittings with suitable tools.

K. Terminations:

1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.

L. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.

M. Telephone and Signal System Raceways, 2-Inch Trade Size and Smaller: In addition to above requirements, install raceways in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.

N. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where otherwise required by NFPA 70.

O. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; LFMC may be used 6 inches above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.

P. Flexible Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.

Q. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.

R. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

3.3 ACCESS DOORS

A. Related documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Summary: Extent, location, and size of each type of access door required are indicated on drawings.

C. Submittals:

1. Product Data: Submit manufacturers technical data and installation instructions for each type of access door assembly, including setting drawings, templates, instructions and directions for installation of anchorage devices.
2. Include complete schedule, including types, general locations, sizes, wall and ceiling construction details, finishes, latching or locking provisions, and other data pertinent to installation.

D. Quality assurance:

1. Size variations: Obtain Architect's acceptance of manufacturer's standard size units which may vary slightly from sizes indicated.

E. Coordination: Furnish inserts and anchoring devices which must be built into other work for installation of access doors. Coordinate delivery with other work to avoid delay.

F. Manufacturers: Subject to compliance with requirements, provide access doors for manholes / vaults by one of the following:
1. Syracuse Casting

G. Materials and fabrication: Furnish each access door assembly manufactured as integral unit, complete with all parts and ready for installation.
1. Install a bolt-type lock accessible with special tool.

H. Installation: Comply with manufacturer's instructions for installation of access doors.

1. Coordinate installation with work of other trades.

I. Adjust and Clean:

1. Adjust hardware and panels after installation for proper operation.
2. Remove and replace panels or frames which are warped, bowed or otherwise damaged.

3.4 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.5 CLEANING

A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes.

END OF SECTION 16130

SECTION 16140 – WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Single and duplex receptacles, ground-fault circuit interrupters, integral surge suppression units, and isolated-ground receptacles.
2. Single- and double-pole snap switches and dimmer switches.
3. Device wall plates.
4. Pin and sleeve connectors and receptacles.
5. Floor service outlets, poke-through assemblies, service poles, and multioutlet assemblies.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

C. PVC: Polyvinyl chloride.

D. RFI: Radio-frequency interference.

E. TVSS (SP): Transient voltage surge suppressor (Surge Protected).

F. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

C. Samples: One for each type of device and wall plate specified, in each color specified.

D. Field quality-control test reports.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of wiring device through one source from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70.

1.6 COORDINATION

A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1. Cord and Plug Sets: Match equipment requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Wiring Devices:
   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Leviton Mfg. Company Inc.
   c. Pass & Seymour/Legrand; Wiring Devices Div.

2. Multioutlet Assemblies:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Wiremold Company (The).

2.2 RECEPTACLES

A. Straight-Blade-Type Receptacles: Configuration 5-20R ,Comply with NEMA WD 1, NEMA WD 6, DSCC W-C-596G, and UL 498.

B. Straight-Blade and Locking Receptacles: Heavy -Duty grade.

C. Straight-Blade Receptacles: Specification grade.

D. GFCI Receptacles: Straight blade, feed -through type, Heavy-Duty grade, with integral NEMA WD 6, Configuration 5-20R duplex receptacle; complying with UL 498 and UL 943. Design units for installation in a 2-3/4-inch- deep outlet box without an adapter.

E. Description: Matching, locking-type plug and receptacle body connector, NEMA WD 6, Configurations L5-20P and L5-20R, Heavy-Duty grade.

1. Body: Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.
2. External Cable Grip: Woven wire-mesh type made of high-strength galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.3 CORD AND PLUG SETS

A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.

1. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and equipment-rating ampacity plus a minimum of 30 percent.
2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.4 SWITCHES

A. Single- and Double-Pole Switches: Comply with DSCC W-C-896F and UL 20.

B. Snap Switches: Heavy -Duty grade, quiet type.

C. Combination Switch and Receptacle: Both devices in a single gang unit with plaster ears and removable tab connector that permit separate or common feed connection.

1. Switch: 20 A, 120/277-V ac.
2. Receptacle: NEMA WD 6, Configuration 5-20R.

2.5 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for All devices in all Spaces: 0.035-inch- thick, satin-finished stainless steel.

2.6 FINISHES

A. Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect, unless otherwise indicated or required by NFPA 70.
2. Wiring Devices Connected to Emergency Power System: Red.
3. TVSS Devices: Blue.
4. Isolated-Ground Receptacles: Orange.

2.7 Pre Approved Devices Table:

	Manufacturers	Receptacles Cat. No.	Switches Cat No.
a.	Hubbell Inc.	HBL5352-GY	1201-GY
b.	Leviton Mfg. Co. Inc.	5362-GY	1221-GY
c.	Pass & Seymour.	5362-GY	1201-GY

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices and assemblies level, plumb, and square with building lines.

B. Install wall dimmers to achieve indicated rating after derating for ganging according to manufacturer's written instructions.

C. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' written instructions.

D. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

E. Remove wall plates and protect devices and assemblies during painting.

F. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

A. Comply with Division 16 Section "Basic Electrical Materials and Methods and Electrical Identification."

1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black -filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 CONNECTIONS

A. Ground equipment according to Division 16 Section "Grounding and Bonding."

B. Connect wiring according to Division 16 Section "Conductors and Cables."

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.
2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

B. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION 16140

SECTION 16410 – ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes individually mounted enclosed switches and circuit breakers used for the following:

1. Service disconnecting means.
2. Feeder and branch-circuit protection.
3. Motor and equipment disconnecting means.

B. Related Sections include the following:

1. Division 16 Section "Wiring Devices" for attachment plugs, receptacles, and toggle switches used for disconnecting means.
2. Division 16 Section "Switchboards" for individually enclosed, fusible switches used as feeder protection.
3. Division 16 Section "Fuses" for fusible devices.

1.3 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

B. RMS: Root mean square.

C. SPDT: Single pole, double throw.

1.4 SUBMITTALS

A. Product Data: For each type of switch, circuit breaker, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each switch and circuit breaker.

1. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:

a. Enclosure types and details for types other than NEMA 250, Type 1.
b. Current and voltage ratings.

c. Short-circuit current rating.
d. UL listing for series rating of installed devices.
e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

2. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.

C. Manufacturer Seismic Qualification Certification: Submit certification that enclosed switches and circuit breakers, accessories, and components will withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work." Include the following:

1. Basis of Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Qualification Data: Submit data for testing agencies indicating that they comply with qualifications specified in "Quality Assurance" Article.

E. Manufacturer's field service report.

F. Maintenance Data: For enclosed switches and circuit breakers and for components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Closeout Procedures," include the following:

1. Routine maintenance requirements for components.
2. Manufacturer's written instructions for testing and adjusting switches and circuit breakers.
3. Time-current curves, including selectable ranges for each type of circuit breaker.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NEMA AB 1 and NEMA KS 1.

C. Comply with NFPA 70.

D. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
2. Altitude: Not exceeding 4500 feet.

1.7 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Fusible Switches:
   a. Square D Co.
   b. Siemens.
   c. GE

2. Molded-Case Circuit Breakers:
   a. Square D Co.
   b. Siemens.

3. Combination Circuit Breaker and Ground-Fault Trip:
   a. Square D Co.
   b. Siemens.
   c. GE

4. Molded-Case, Current-Limiting Circuit Breakers:
   a. Square D Co.
   b. Siemens.
   c. GE

2.2 ENCLOSED SWITCHES

A. Enclosed, Nonfusible Switch: NEMA KS 1, Type Heavy Duty (HD) with lockable handle.

B. Enclosed, Fusible Switch, 800 A and Smaller: NEMA KS 1, Type HD, with clips to accommodate specified fuses, lockable handle with two padlocks, and interlocked with cover in closed position.

2.3 ENCLOSED CIRCUIT BREAKERS

A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic Trip Unit Circuit Breakers: RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:

   a. Instantaneous trip.
   b. Long- and short-time pickup levels.
   c. Long- and short-time time adjustments.
   d. Ground-fault pickup level, time delay, and I^2t response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker; trip activation on fuse opening or on opening of fuse compartment door.
6. GFCI Circuit Breakers: Single- and two-pole configurations with 5 -mA trip sensitivity.
7. Molded-Case Switch: Molded-case circuit breaker without trip units.

B. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.

1. Lugs: Compression style suitable for number, size, trip ratings, and material of conductors.
2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
3. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
4. Communication Capability: Circuit-breaker-mounted communication module with functions and features compatible with power monitoring and control system.
5. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.
6. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage with field-adjustable 0.1- to 0.6-second time delay.
7. Auxiliary Switch: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b"contacts operate in reverse of circuit-breaker contacts.
8. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
9. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.

2.4 ENCLOSURES

A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

2.5 FACTORY FINISHES

A. Manufacturer's standard prime-coat finish ready for field painting.

B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested enclosures before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.

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

3.2 INSTALLATION

A. Comply with mounting and anchoring requirements specified in Division 16 Section "Seismic Controls for Electrical Work."

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Basic Electrical Materials and Methods and Electrical Identification."

B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.4 CONNECTIONS

A. Install equipment grounding connections for switches and circuit breakers with ground continuity to main electrical ground bus.

B. Install power wiring. Install wiring between switches and circuit breakers, and control and indication devices.

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL

A. Testing: After installing enclosed switches and circuit breakers and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.6 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

3.7 CLEANING

A. On completion of installation, inspect interior and exterior of enclosures. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

B. END OF SECTION 16410

SECTION 16442 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes load centers and panelboards, overcurrent protective devices, and associated auxiliary equipment rated 600 V and less for the following types:

1. Lighting and appliance branch-circuit panelboards.
2. Distribution panelboards.

B. Related Sections include the following:
1. Division 16 Section "Seismic Controls for Electrical Work."

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

C. RFI: Radio-frequency interference.

D. RMS: Root mean square.

E. SPDT: Single pole, double throw.

F. TVSS: Transient voltage surge suppressor.

1.4 SUBMITTALS

A. Product Data: For each type of panelboard, overcurrent protective device, TVSS device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:

a. Enclosure types and details for types other than NEMA 250, Type 1.
b. Bus configuration, current, and voltage ratings.
c. Short-circuit current rating of panelboards and overcurrent protective devices.

d. UL listing for series rating of installed devices.
e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

2. Wiring Diagrams: Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.

C. Manufacturer Seismic Qualification Certification: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces defined in Division 16 Section "Seismic Controls for Electrical Work." Include the following:

1. Basis of Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. The term "withstand" means "the unit will remain in place without separation of internal and external parts during a seismic event."
3. The term "withstand" means "the unit will remain in place without separation of internal and external parts during a seismic event and the unit will be fully operational after the event."
4. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
5. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Qualification Data: Submit data for testing agencies indicating that they comply with qualifications specified in "Quality Assurance" Article.

E. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

F. Maintenance Data: For panelboards and components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Contract Closeout," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NEMA PB 1.

C. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

1.7 EXTRA MATERIALS

A. Keys: one spares of each type of panelboard cabinet lock.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:
   a. Square D Co.
   b. Siemens.
   c. GE

2.2 FABRICATION AND FEATURES

A. Enclosures: Flush- and surface-mounted cabinets. NEMA PB 1, Type 1, to meet environmental conditions at installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

B. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.

C. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.

D. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.

E. Directory Card: With transparent protective cover, mounted inside metal frame, inside panelboard door.

F. Bus: Hard-drawn copper, 98 percent conductivity.

G. Main and Neutral Lugs: Compression type suitable for use with conductor material.

H. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.

I. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.

J. Gutter Barrier: Arrange to isolate individual panel sections.

2.3 PANELBOARD SHORT-CIRCUIT RATING

A. UL label indicating series-connected rating with integral or remote upstream devices. Include size and type of upstream device allowable, branch devices allowable, and UL series-connected short-circuit rating.

B. Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

B. Doors: Front mounted with concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.5 DISTRIBUTION PANELBOARDS

A. Doors: Front mounted, except omit in fused-switch panelboards; secured with vault-type latch with tumbler lock; keyed alike.

B. Main Overcurrent Protective Devices: Circuit breaker.

C. Branch overcurrent protective devices shall be one of the following:

1. For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
2. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

2.6 OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits.
2. GFCI Circuit Breakers: Single- and two-pole configurations with 5 -mA trip sensitivity.

B. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Comply with mounting and anchoring requirements specified in Division 16 Section "Seismic Controls for Electrical Work."

C. Mounting Heights: Top of trim 74 inches above finished floor, unless otherwise indicated.

D. Mounting: Plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.

E. Circuit Directory: Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

F. Install filler plates in unused spaces.

G. Provision for Future Circuits at Flush Panelboards: Stub six 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub six 1-inch empty conduits into raised floor space or below slab not on grade.

H. Wiring in Panelboard Gutters: Arrange conductors into groups and bundle and wrap with wire ties after completing load balancing.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Basic Electrical Materials and Methods and Electrical Identification."

B. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.3 CONNECTIONS

A. Install equipment grounding connections for panelboards with ground continuity to main electrical ground bus.

B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

A. Testing: After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

B. Balancing Loads: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes as follows:

1. Measure as directed during period of normal system loading.
2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data-processing, computing, transmitting, and receiving equipment.
3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.

4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.5 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

3.6 CLEANING

A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 16442

SECTION 16590 – HISTORIC LIGHTING FIXTURE RESTORATION

PART 1 – GENERAL

1.1 SUMMARY

A. This section includes the following:

1. Contractor responsibilities in the handling, installation and post-installation activities in regards to the historic lighting fixtures.
2. Restoration and coordination directives with regards to the historic lighting fixtures.

B. The contractor will be responsible for verifying mounting conditions; coordinating, providing and installing the mounting hardware; and ensuring that all structural, mechanical, electrical, design, construction and fabrication of fixtures meet all applicable codes as related to public safety concerns. This includes supplying seismic cables for all ceiling supported historic lighting fixtures where required. It will be the responsibility of the contractor to ensure that fixtures are safely installed with careful attention to fixture weight and mounting, lift and lowering devices, and safety/seismic cables, where applicable.

C. Related Sections may include the following to be provided in future Bid Packages:

1. Division 16 Section "Lighting Controls" for manual or programmable control systems employing low-voltage control writing or data communication circuits.
2. Division 16 Section "Wiring Devices" for manual wall-box dimmers for incandescent lamps.
3. Division 16 Section "Lighting Control Devices" for automatic control of lighting, including time switched, photoelectric relays, occupancy sensors, and multiple lighting relays and contractors.

1.2 DEFINITIONS

A. Historic Lighting Fixture Restorer (Restorer): Lighting Manufacturer/Restorer that will restore all existing historic lighting fixtures as described herein. These fixtures are identified on the drawings.

B. Contractor: Contractor selected to, and responsible for, all removal, packaging, shipping, etc., and reinstallation of restored historic lighting fixtures.

1.3 SUBMITTALS

A. Division 1 Sections shall govern general guidelines regarding shop drawings, product data, samples, and submission procedures, as modified below.

B. For existing historic lighting fixtures: Provide shop drawings for structural and electrical modifications indicating all materials, finishes, lamping, voltage, ballast information and mounting details. Shop drawing shall be half- or quarter-scale, six copies.

C. For all historic lighting fixtures: Detailed assembly and installation instructions shall be provided by the Restorer for each fixture and shall include color digital photos of each sub-assembly with

cross-references to the shop drawings. Lamp and Ballast access points shall be noted along with detailed instructions for replacement.

D. Samples: Samples of shades, diffuser material (glass, plastic, etc.), metals and metal finishes shall be submitted by the Restorer for approval prior to the notice to proceed with restoration.

1.4 QUALITY ASSURANCE

A. Division 1 Sections shall govern regarding issues of Quality Assurance.

1.5 COORDINATION AND PRODUCT HANDLING

A. Coordinate layout and installation of lighting fixtures and attachment suspension system with other adjacent and/or related construction.

B. The Contractor will be responsible for all work, coordination and costs in removing historic fixtures from existing locations, disassembly, packaging, crating, insurance, shipping, reassembly and reinstallation of restored fixtures. Installed fixtures shall be provided with protective covering and protected from all damage until such time as the area is cleaned and ready for occupancy. The Contractor shall be responsible for final lamping, luminaire adjustment and cleaning.

C. The Historic Lighting Fixture Restorer shall perform all repairs, rewiring, refinishing/repatinating, etc. necessary to fully restore the historic fixtures. The Restorer shall also furnish all glass shades, parts, fasteners, etc. needed for restored fixtures to be "like new" in the appearance and operation.

1.7 WARRANTY

A. Where applicable, Division 1 or Division 16 Sections shall govern regarding issues of Warranty.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. The following Historic Lighting Fixture Restorers are pre-qualified:

1. Rambusch Lighting
   28 West 25th Street
   New York City, NY 10010
   Tel: (212) 675-0400

2. St. Louis Antique Lighting Company
   801 North Skinker Blvd.
   St. Louis, MO 63130
   Tel: (314) 863-1414; Fax: (314) 863-6702

3. Historical Arts & Castings, Inc.
   5580 West Bagley Park Road

West Jordan, UT 84088
Tel: (800) 225-1414 or (801) 280-2400; Fax: (801) 280-2493

2.2 FIXTURES AND COMPONENTS

A. Lamps: Shall be furnished by Contractor, as specified or recommended by the Restorer. Lamps shall be from the same manufacturer for each lamp type and shall be manufactured by GE, Osram-Sylvania or Philips, unless specified otherwise. Lamp performance requirements and color temperature shall be specified by the Historic Lighting Fixture Restorer.

2.3 LIGHTING FIXTURES

A. Fixtures: Refer to lighting Fixture Schedule or references on the drawings.

PART 3 – EXECUTION

3.1 RESTORATION

A. Fully document condition of fixture prior to any disassembly. Carefully disassemble, securing all historic elements for reinstallation.

B. Clean all parts and elements. Strip paint without damaging fixture. Make all repairs necessary or re-create any missing or unrepairable elements. Repatinate bronze elements to consistent historic condition. Consult with Architect to determine appropriate color(s) and appearance.

C. Install new lampholders and new wiring to best possible practices.

D. Provide and install glass shades to match appearance, detail and light transmission of historic shades. Shades to be of adequate strength and thickness to be fully serviceable and appropriate for installed location and conditions. Provide one full set of replacement shades as attic stock.

E. Provide and install any gaskets, fasteners, etc. needed with glass shades, appropriately sized, shaped and detailed, to create serviceable conditions.

3.2 INSTALLATION

A. Install mounting accessories as required for conditions. Luminaire type designations do not necessarily denote specific mounting accessories where a luminaire may be installed.

B. Install support for each luminaire. Verify weight and mounting method of luminaries with Restorer and furnish and install suitable supports. It is the responsibility of the Contractor to coordinate with the Restorer for any special mounting requirements, including attachments for seismic cables and lowering/lift systems.

C. Fixtures shall be installed in such a manner that they are square, level, plumb, and properly aligned, both vertically and horizontally.

D. For luminaries with variable position lampholder assemblies, Contractor shall confirm with the Restorer, prior to installation, proper lampholder (socket) position, and shall adjust in field.

E. Surface Mounted Luminaries: Install in such a manner that there are no light leaks or visible gaps between finished architectural surface and fixture.

F. All installed fixtures shall be fully protected with dust covers, barriers, etc. during construction. Protection devices shall be removed and fixtures turned over to the Owner in an "as new" clean condition at time of substantial completion.

G. Ascertain and ensure that lamps installed are exactly as specified for each luminaire type.

H. Replace burned-out or inoperative lamps, ballasts, etc., prior to substantial completion and before the building is accepted by the Architect. Luminaires shall be in first-class operating condition prior to acceptance.

I. Provide a maintenance manual, which shall include the shop drawing of each historic fixture type, an outline for proper cleaning and maintenance methods and mounting, assembly, lamping requirements, lamp access and ballast replacement instructions.

3.3 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

A. Inspect each installed fixture for any damage. Replace damaged fixtures and components.

1. Clean transparent or translucent materials. Replace chipped or broken shades, lens or other damaged materials.
2. Restore reflective surfaces to their "like new" reflective conditions.
3. Clean light fixtures and lamps.

B. Verify normal operation of each fixture after installation.

C. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify normal transfer to battery power source and retransfer to normal.

D. Prepare a written report of test, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 16590

SECTION 16717 - VIDEO SURVEILLANCE SYSTEM (CCTV)

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. Introduction:

The Contractor shall provide, install, and program a functionally complete, integrated CCTV System per Manufacturer's guidelines, codes described, and these specifications with all equipment being UL listed.

B. Work include under this section:
   a. Complete Functional System and it's Components.
   b. Complete System Wiring.
   c. Mounting Panels, Accessories, etc. as required for a complete installation.
   d. System Programming and Integration.
   e. Services as required for a complete functional system.
   f. Training, 4 Hours minimal.

C. Related work specified under other sections of these Specifications:
   a. Provision for 120 volts power as required for the entire system.
   b. Provision for 24 VDC as required for the entire system.
   c. Grounding

D. Related sections include but not limited to the following sections:
   i. Division 16 Section "Basic Electrical Materials and Methods".
   ii. Division 16 Section "Grounding and Bonding".
   iii. Division 16 Section "Seismic for Electrical Work".
   iv. Division 16 Section "Electrical Identification".
   v. Division 16 Section "Electrical Testing".
   vi. Division 16 Section "Conductors and Cables".

1.02 GENERAL CONDITIONS

A. Submittals at bid time: For bid evaluation, bid submittals shall include three (3) sets of the items described below:
   1. Specification sheets (cut sheets) of all proposed equipment.
   2. Equipment list identifying:
      a. Model number of each unit.
      b. Quantities of each type of device.
   3. Specification compliance: A letter submitted with the bid, responding to specification sub-sections individually, indicating exceptions, substitutions, and alternates. The Contractor shall submit requests for substitutions (as well as all relevant technical data pertaining to the substituted equipment) to the specifier 20 days prior to the close of bid for evaluation and approval.

B. Submittals after award of contract:
   1. Drawings: Shop drawings to provide details of proposed system and the work to be provided. These include point-to-point drawings of systems and wiring diagrams of individual devices.
   2. The Contractor must be Currently Licensed by the State of Utah as a Burglar Alarm Company. All persons installing any portion of the CCTV System must be

Currently Licensed by the State of Utah as a Burglar Alarm Company Agent. The Qualifying Agent of the Licensed Burglar Alarm Company must supervise the job.

C. Documentation to be submitted by the Contractor upon completion of system installation:
1. "As-builts": Upon completion of installation, the Contractor shall prepare "as-built" drawings of the system.
2. "As-built" shall be submitted to the Owner for approval prior to the system acceptance walk-through.
3. Operation and maintenance manuals: Three (3) sets of operating manuals shall be provided explaining the operation and maintenance of the system.

D. On-site security personnel training: the Contractor upon completion of installation shall furnish Training in the complete operation of the systems. A minimum of one (1), four (4) hour Class.

E. System approvals:
1. The system shall be a product of one or more of the approved manufacturers. The manufacturer(s) shall have been in business manufacturing similar products for at least 5 years.

F. Quality assurance: All equipment, systems, and materials furnished and installed under this section shall be installed in accordance with the applicable standards of:
1. National codes: NEC, NFPA, UBC
2. Approvals and listings: UL
3. Local authorities having jurisdiction

G. Warranty: All components, parts, and assemblies supplied by the Manufacturers and installed by the Contractor shall be warranted against defects in material and workmanship for a period of at least 12 months (parts and labor), commencing upon date of acceptance by Owner. A qualified factory-trained service representative shall provide warranty service.

H. Service/Maintenance:
1. System repair due to workmanship defects during the warranty period shall be provided by the Contractor free of charge (parts and labor).
2. Periodic testing of the system shall be carried out on a monthly or quarterly basis to ensure the integrity of the system. The owners' maintenance personnel may perform this testing. A yearly test of the system shall be performed by the Contractor within a window of 14 days of the annual completion date of the system.
3. The installer shall correct any system defect within three (3) business hours of receipt of call from the Owner.
4. The Contractor for shall offer extended service/maintenance agreements up to four years after the warranty expires. The agreement shall be renewable monthly, quarterly, or yearly.

1.03 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace intrusion detection devices and equipment that fail in materials or workmanship within specified warranty period.

Warranty Period: One year from date of Substantial Completion.

1.04 INSTRUCTIONS TO THE BIDDER

A. The bid shall include all costs deemed necessary to cover all contingencies essential to the installation of the specified system.

B. Total cost for installation, materials, labor project management, permit fees, and other miscellaneous items must be listed separately.

C. A complete materials list, including description, manufacturer, part number, quantity, unit price and total price must also be included.

D. A statement of estimated labor hours and prevailing hourly labor rates must be included.

E. All products and materials shall be new, clean, free of defects and free of damage and corrosion.

F. Where discrepancies are found during the bid process, the most stringent requirements must be included in the bid.

G. Where discrepancies are found during the bid process, the most stringent requirements must be included in the bid.

H. Any cost encountered, which is not specifically itemized in the bid, shall not be incurred unless specifically agreed upon, in writing.

I. No additional compensation will be allowed for extra work incurred on the part of the contractor due to the bidder's failure to notice any existing condition, which may cause the additional labor.

J. Bid responses shall be concise following the format and numbering of this specification.

K. Bidders must notify the Owner as soon as detected, any omissions or errors in the specification so corrective addenda may be issued. The Owner prior to the bid opening must receive such notification.

L. The Owner reserves the right to consider bids that exceed these requirements.

M. Freight costs must be included on all materials.

1.05 RIGHTS OF THE OWNER

A. Reserves the right to accept and bid or, at its discretion, reject any bids for whatever reasons it deems appropriate.

B. Reserves the right to purchase ALL or PART of the materials and hardware needed for the project.

C. Receipt of a bid response does not obligate the purchaser to pay any expenses incurred by the bidder in preparation of the bid response or obligate the Purchaser in any other respect.

D. Reserves the right to modify the specifications anytime during the bidding period through addendum.

E. Only changes issued as an addendum will be binding upon the Owner. No verbal instructions or interpretations of requirements shall be accepted.

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION

The CCTV system specified herein shall include:
Existing Digital Video Recorder, 16 Channels Existing
Color Duplex Digital Multiplexer
Exterior Vandal Resistant Color Cameras (PTZ as required),
Mega Pixel Camera Arecont AV8365, 360 degree.
Existing Power Supplies,
Converters,
Existing Joy sticks,
Existing Color Monitor,
Existing "head-end" equipment,
NVR 8 Terabytes, Exacqvision 1608-480-8000-R4 Hybrid /5000-40140 Dual NIC.
Giga bite switcher with POE feature for 8 cameras.
Bosch LED illuminator EX26LED8W IR/PSU-230-24 Power Supply.
Other hardware and software etc as required to accommodate installation of all new devices.

2.02 The following describes the general functional requirements of the CCTV system:

A. The CCTV System shall be used to provide video documentation of the actions of the residents, guests, employees and any others observed/recorded by the CCTV system.

B. All Cameras of the CCTV System must be able to be recorded simultaneously on Existing Digital Video Recorder.

C. Any or All Cameras of the CCTV System must be able to viewed at all times while recording.

2.03 SYSTEM FEATURE/CAPABILITY SUMMARY

The following indicates system software/hardware capabilities, capacities, and formats:

A. Exterior vandal resistant Color Camera: Cameras and lens as required. Provide environmental housing with PTZ for the locations as shown.

B. Power Supply: sufficient for this application plus minimum 20% extra capacity.

C. Cable: RG6/RG59 or CAT5e w/18g 2c encased as required by the system manufacturer.

D. All mounting accessories as required for proper installation.

2.04 SYSTEM INTERFACE REQUIREMENTS

A. Grounding: The *Electrical Contractor* shall properly earth ground the CCTV Power Supply to prevent electrostatic charges and other transient electrical surges from damaging the CCTV System.

B. Primary power: The *Electrical Contractor* shall provide a dedicated 120VAC power circuit to the CCTV system. This circuit shall be connected to the emergency power system

C. Wiring: The contractor shall provide cables consistent with the manufacturer's recommendations. The following general guidelines shall be followed for wiring installation:
   1. Wiring shall be appropriately color-coded with permanent wire markers. Stranded Copper conductors shall be used.
   2. All cables provided under this contract shall be Class II. Where subject to mechanical damage, wiring shall be enclosed in metal conduits or surface metallic raceway as per NEC.
   3. Wires shall not be enclosed in conduit or raceways containing AC power wires.

2.05 MANUFACTURERS:

A. Manufactures: Subject to compliance with the requirements, provide video surveillance system products of one or more of the following.
   1. To match Existing devices.

2.06 APPROVED CONTRACTORS:

- Wasatch Control.
  Attn: Mike Skinner
  801.673.4630
  801.956.0465

PART 3 - EXECUTION

3.01 INSTALLATION

Install all equipment and materials in accordance with the "current" recommendations of the manufacturer. The work shall also be in accordance with:

A. Installation criteria defined in these specifications and in the construction documents.

B. Approved submittals.

C. Applicable requirements of referenced standards.

3.02 SUPERVISION

The contractor shall provide the following services as part of the contract:

A. Supervision of sub-contractors.

B. Coordination of other contractors for system-related work (electrical contractor, finish hardware contractor, architect, and general contractor).

C. Attending site construction/coordination meetings.

D. Keeping updated construction drawings at the construction site.

E. Meeting construction deadlines per the construction schedule.

3.03 PROGRAMMING

Programming of the system shall include the following tasks:

A. Programming system configuration parameters (hardware and software)

3.04 TESTING

Operational Testing: The contractor shall perform thorough operational testing and verify that all system components are fully operational.

3.05 COMMISSIONING

The contractor shall certify completion in writing and schedule the commissioning walk-through. The contractor shall provide all the tools and personnel needed to conduct an efficient commissioning process.

END OF SECTION